MEDICAL PSYCHIATRY UNITS

Improving their organization, focus, and value

Maarten A. van Schijndel

Medical psychiatry units
Improving their organization, focus, and value

Medisch psychiatrische units
Het verbeteren van hun organisatie, focus en waarde

Thesis

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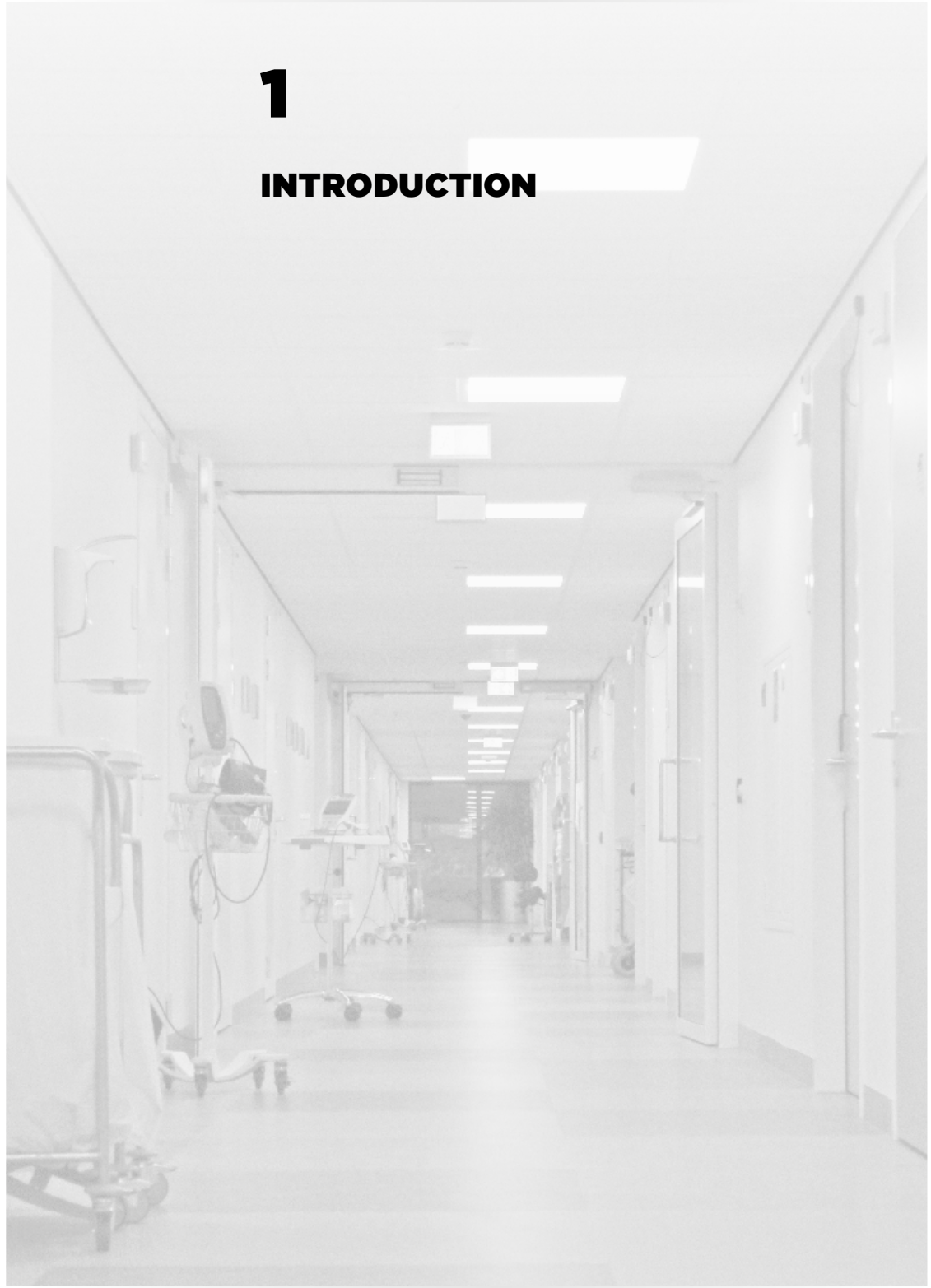
INTRODUCTION



Medical psychiatry units (MPUs) are hospital wards that cater for hospital inpatients who are too medically ill for a psychiatric ward, and too psychiatrically ill for general medical wards (1). Patients with psychiatric comorbidity or behavioral problems are frequently encountered in the hospital setting (2). To cater for the most complex patients with medical and psychiatric comorbidity, MPUs have been established worldwide since the 1980s (3). Specific characteristics of MPUs include the following:

1. The structural and technical capacity to care for patients presenting with psychiatric and somatic disorders;
2. Nursing staff with expertise in both healthcare fields;
3 The ability to carry out medical and psychiatric interventions in an integrated and secure setting (4).

The term MPU is used in a generic way and can therefore refer to quite different hospital units. From the medical perspective, the term not only refers to units that can evaluate and treat patients with serious and acute multimorbid illness, but also to units that offer basic and non-acute general medical care. From the psychiatric perspective, some of these units have limited tolerability for disruptive behaviors (5). The diversity in organization, patients served, and therapeutic milieus employed suggests that MPUs are still in an early stage of their evolution (6). To date, no consensus has emerged regarding their appropriate focus or structure (6) and evidence on cost and effects is scarce (5, 7). The research presented in this thesis aims to arrive at a consensus about the appropriate focus and structure of MPUs and to provide evidence about costs and effects.

1.1 THE FOCUS OF MPUS: TARGETED POPULATION

From clinical studies, it is known that at least 40% of medical inpatients have some form of behavioral disturbance (2). Between 15 and 50% of medical inpatients have a psychiatric disorder (8). This prevalence appears to be higher in specific settings, such as the emergency room, and neurology, burns, and intensive care units (2, 9). Affective, anxiety, somatic symptom, and substance-related disorders, delirium, and dementia are the most common disorder groups encountered at medical hospitals, although sub-threshold presentations are even more common and associated with disability and functional impairment (2, 9). Non-psychiatric hospital professionals often feel insufficiently equipped to treat such comorbidity. Medical wards lack the psychiatrically trained nursing staff, therapeutic milieus, and physical characteristics that are essential to psychiatric wards. Even with an adequate psychiatric consultation-liaison service, psychiatric symptoms or behavioral problems such as suicidal behavior, psychosis, depression or mania, as well as patient-staff interaction problems (10, 11) are potentially disruptive to both staff and patients (See Box 1 – Examples of patients who can be encountered at an MPU). Psychiatric symptoms or behavioral problems can hinder medical evaluation and treatment. Consequently, 'difficult' patients can be discharged prematurely, or without adequate aftercare arrangements. Moreover, unmanageable

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A patient with psychotic depression and renal failure can be peritoneally dialyzed at the same time as electroconvulsive therapy is being given.

A patient with delusions in the context of schizophrenia and hyponatremic primary polydipsia can be treated for psychosis while access to water is restricted and hyponatremia is corrected.

A patient amid a manic phase of bipolar disorder and cellulitis can be treated with intravenous antibiotics.

A patient with acquired immunodeficiency syndrome (AIDS) and hyperactive delirium can be treated for pneumocystis pneumonia while the symptoms of delirium are reversed with intravenous haloperidol.

A patient who developed psychotic symptoms after prednisone given for arthritis can be treated for psychosis and arthritis concurrently.

Box 1 – Examples of patients that can be encountered on an MPU. The examples are adapted from the work of Kishi et al. and Kathol et al. (13, 14).

behavior problems can paralyze care on medical wards, putting the patients at risk, frustrating the professionals and reducing the quality of care of other patients on the ward. In contrast, psychiatric wards are not capable of handling medical problems of somewhat higher acuity, leading to direct hospital referral at the first suspicion of active medical illness (12). This gap between the care in acute medical hospitals and mental healthcare institutions can thus result in the refusal to handle patients, or 'patient bounce', sending patients back and forth between institutions.

1.2 THE ORGANIZATION OF MPUS

Organizational characteristics of MPUs vary widely (15), influencing the level of care that can be effectively provided in both general medical and psychiatric spheres. This was acknowledged by Kathol et al. (14, 16, 17) when they proposed a categorization of MPUs based on their level of medical and psychiatric acuity capabilities (Figure 1).

Kathol et al. identify four types of MPUs (14, 17). Type I MPUs treat patients with acute psychiatric disorders who also have stable medical problems for which non-acute attention is required (14). Many acute general psychiatry wards fall into this category when the physicians and staff of these units have the willingness and skills to deal with the basic medical problems of their patients (17). Type II MPUs, conversely, treat patients with acute medical disorders in whom non-acute psychiatric problems co-occur (14).

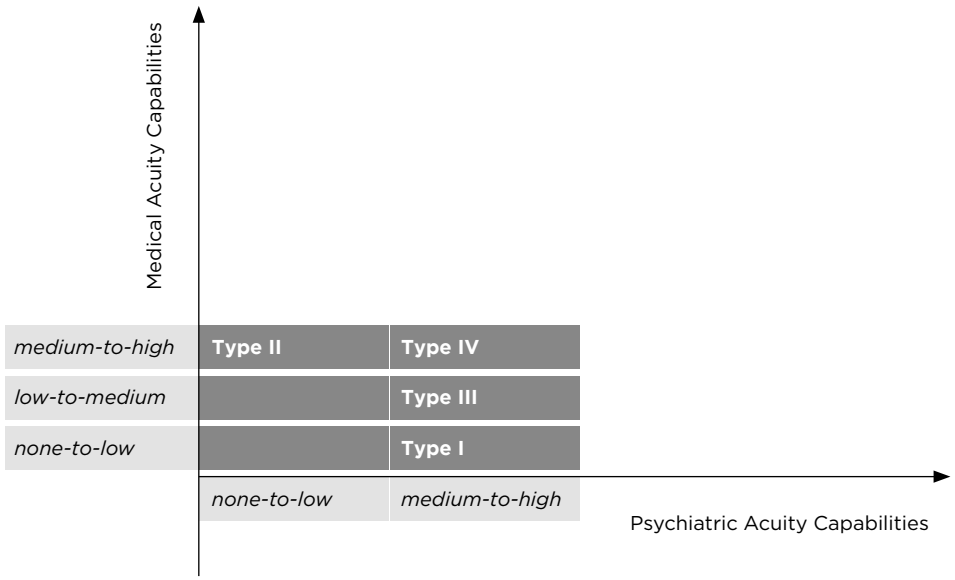

Figure 1. Categorization of MPUs based on their level of medical and psychiatric acuity capabilities. The figure is based on the descriptions of Kathol et al. (14).

These are conventional medical wards with the active involvement of a consultation-liaison psychiatrist. Kathol argues that a population of inpatients exists which is not easily addressed in conventional medical or psychiatric inpatient wards (14, 17). For this population (see the examples in Box 1), Type III and IV MPUs provide increased levels of medical and psychiatric services in the same setting. More recently, Kathol et al. proposed to name these high acuity MPUs 'complexity intervention units' (13), but this name has not been widely adopted. Type III and IV MPUs require the structural involvement of general medical ('somatic') and psychiatric physicians, medical and psychiatric safety features, and nursing staff training in medical and psychiatric nursing techniques (14). Kishi et al. argue that most Type III programs are administered through psychiatry, as the clinical needs of inpatients with combined medical and psychiatric illness are commonly handled by consultation-liaison psychiatrists (14). As Figure 1 shows, Type III programs cannot deliver high acuity medical care. This is caused by insufficient medical nursing expertise, the lack of timely access to emergency medical procedures, and varying availability of medical physician coverage (14). The separate reimbursement of medical and psychiatric treatment also plays a role in limiting medical and psychiatric services in Type III MPUs (14). Type IV MPUs are capable of treating patients with any level of medical acuity similar to medical/surgical wards and any level of psychiatric acuity similar to inpatient acute general psychiatry wards (14).

Empirical research that addresses the occurrence and functioning of these MPU types remains scarce (5, 7). Consequently, understanding of the relevance of the types and performances of MPUs is limited with regard to, for instance, effectiveness and efficiency (5). Moreover, the definitions of the types outlined are broad, overlap in some areas and do not always appear to be applied correctly. The concept of patient acuity, although widely used in health sciences literature, lacks a proper specification of its exact meaning (18). Kathol uses the term 'acuity' in two ways: as a characteristic of patients (patient acuity) and as a capability of MPUs (medical and psychiatric acuity capabilities). Categorizing MPUs on the basis of their capabilities is pragmatic in the sense that it does not rely on organizational and contextual aspects, but purely on patient care capabilities. This idea has not been implemented consistently by Kathol et al., because the MPU types are both defined in terms of acuity capabilities and in terms of organization and context. Moreover, these 'dimensions' are mutually dependent. To give an example, Kathol states that "Type III medical psychiatry units must be located in a general hospital rather than in a free-standing psychiatric facility". Strictly speaking, this standard is not necessary, because the organization and setting of a unit would follow from the required capabilities of these units: they must be able to care for patients with medium-to-high psychiatric acuity and low-to-medium medical acuity. In conclusion, the categorization is ambiguous on this essential issue. On the one hand, the categorization is based on the care needs of patients (patient acuity) and the corresponding capabilities of MPUs (acuity capabilities), and on the other hand, much organizational variation is possible within the types. Moreover, the categorization lacks empirical validation. The research in this thesis attempts to clarify Kathol's categorization in relation to the performance of MPUs.

1.3 THE VALUE OF MPUS

The value of an MPU can be determined from different perspectives: the patient perspective, the societal perspective, and the hospital or professional perspective. From a patient perspective, MPUs add value as they may increase the quality of care, reduce the length of stays, and prevent readmissions. Moreover, they can add to the well-being of the patients, as they are treated in the most adequately equipped environment and by the best-trained personnel. The societal perspective values MPUs in terms of the relationship between their costs and effects. Many have suggested that this relationship is favorable from the societal perspective, although formal and state-of-the-art health economic evaluations are lacking (7, 19, 20).

Other potential benefits brought by MPUs include: 1) reductions in the strain on the staff of other units that would otherwise have to deal with these complex patients in ill-equipped settings (hospital/professional perspective); 2) better relationships between psychiatry and physical health physicians and staff through a focus on mutual assistance

(hospital/professional perspective); 3) improved ability of staff in other areas of the general hospital to handle psychiatric comorbidity because of nurse-to-nurse in-services and communication (patient perspective and hospital/professional perspective); and 4) excellent training for many health professionals (professional perspective) (13). Although most of these benefits have high face validity, their underpinning is still theoretical or anecdotal. Improving the level of empirical evidence is therefore warranted, and this thesis aims to meet this need.

1.4 AIMS AND OUTLINE OF THESIS

This thesis aims to contribute towards a consensus on the appropriate focus and structure of MPUs, and to advance the evidence base on their value. More specifically, the following objectives are pursued:

- Improve the focus of MPUs by delineating patient populations that are currently treated by MPUs, and by identifying subgroups of medical inpatients with psychiatric comorbidity that have worse health(-economic) outcomes than medical inpatients without such comorbidity, as these outcomes are potentially modifiable by MPU-admission.
- Improve the structure of MPUs by investigating organizational variations in order to develop an empirical MPU typology.
- Improve the value of MPUs by reviewing what is known about the costs and effects of these units, and by defining quality of care from the perspectives of patients, professionals and payers.

In order to achieve these objectives, the following research questions are considered:

1. *What is known with respect to MPUs about (i) patient populations, (ii) organizational characteristics, and (iii) costs and effects?*
   We conducted a literature review for patient population and organizational (structural, procedural) characteristics of MPUs, and for the known costs and effects of these units (Chapter 2).
2. *What types of MPUs can be identified in practice?*
   In Chapter 3, the organizational characteristics of Dutch MPUs are inventoried using a structured questionnaire based on the literature review of Chapter 2. Subsequently, we report on three models developed to structure the field of Dutch MPUs and their types (Chapter 4).
3. *What is the relationship between medical-psychiatric comorbidity and health-economic outcomes for hospital inpatients?*
   The value of MPUs is often expressed in terms of their potential cost-effectiveness. Consensus on the appropriate focus (patient population) and adequate cost-effectiveness data are lacking. Hence, we set out from the societal perspective to identify sub-populations of hospital inpatients with potentially modifiable cost drivers and report on this exercise in Chapter 5.
4. *How can quality of care be defined from the perspectives of patients, professionals and payers?*
   Chapter 6 uses the shared values of patients, professionals and payers to define quality indicators for hospital psychiatry including MPUs.
5. *Which factors influence the admission decision to MPUs?*
   To clarify the interaction between target population and organizational context, we investigated which factors contribute to the MPU admission-decision in Chapter 7.
6. *How can the need for a new MPU in a university hospital setting be defined?*
   To support the establishment of a new MPU in the Erasmus MC University Medical Center, in Chapter 8, we estimated the intended population on the basis of doctors' and nurses' assessments of currently unmet needs.

Chapter 9 provides a general discussion of the research findings and concludes with a perspective on the future of medical psychiatry units (MPUs) and future research. A summary of our findings can be found in Chapter 10.

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3

MEDICAL PSYCHIATRY UNITS IN THE NETHERLANDS: RESEARCH INTO QUALITY AND DISTRIBUTION

This chapter is based on a Dutch publication by Maarten A. van Schijndel, Luc A.W. Jansen, Frank van 't Veer, André I. Wierdsma, Jeroen D.H. van Wijngaarden, Jeroen A. van Waarde and Jan J. van Busschbach. Ned Tijdschr Geneeskd. 2017;161:D890.

ABSTRACT

Aim

One of the priorities of mental healthcare is hospital care for patients with psychiatric comorbidity. In 2014, the Netherlands Psychiatric Association published ten field norms for medical psychiatry units (MPUs). We aimed to survey Dutch healthcare providers in the context of these field norms.

Design

Telephone screening followed by a questionnaire survey.

Methods

In the period May-August 2015, psychiatrists from 90 Dutch hospitals were contacted by telephone with four screening questions. If a department fulfilled the screening criteria for an MPU, a structured interview with 51 questions then followed. The interview script was tested against the field norms using the Delphi method.

Results

Forty departments emerged from the screening that could be categorized as MPUs. 37 (92.5%) participated in the full interview. MPU care was unevenly distributed across the country. Not one department fulfilled all the field norms, although scoring was relatively good on sub-criteria that related to the content of care. The main shortcomings were the lack of some medical care capabilities, the lack of the continual presence of medical nursing expertise, insufficient knowledge of psychiatric problems on the part of the medical specialists, and the lack of integrated care agreements.

Conclusion

MPUs are unevenly distributed across the country. The content of care is adequate; however, training, closer multidisciplinary collaboration, and medical nursing expertise available during every shift, can improve care in an MPU. Departments should also work more on integrated care agreements. The field norms are too strict: these can be improved by determining what the necessary care is and by applying a differentiated weighting of their sub-criteria.

3.1 INTRODUCTION

It is estimated that 25-40% of hospital patients have a comorbid psychiatric disorder (1, 2). Because of the severity of their medical disorders, some of these patients cannot be treated in a regular clinical psychiatric ward or mental healthcare (GGZ) institution. However, because of their psychiatric disorders, nor can they be treated in a medical hospital ward (3). Examples would include a care-avoidant psychotic patient with Wernicke's syndrome, or a patient with a severe depression who refuses treatment for pneumonia, or a patient who uses prednisone and has subsequently developed a 'manic psychosis' (4). For these patients, medical psychiatry units (MPUs) have been set up around the world since the 1980s in general and academic hospitals (2, 5). The administrative agreement of June 2012 declared that medical-psychiatric comorbidity was one of the priorities of the GGZ (6). In 2012-13, the Health Care Inspectorate (IGZ) concluded that only 25 of the 100 hospitals surveyed had an MPU. The IGZ pointed out two other important difficulties: integrated care agreements were insufficiently implemented, and there were no field norms for MPUs (7).

These field norms appeared in 2014, established by the Netherlands Psychiatric Association, in conjunction with patients, care providers, the government, and insurance companies (3). The norms are based on four types of MPU, categorized according to medical and psychiatric care acuity levels (Table 1) (3, 8).

Table 1. Categorization of MPUs based on the level of acuity capabilities (3, 8).

Type	Psychiatric acuity	Medical acuity
I	Medium to high	None to low
II	None to low	Medium to high
III	Medium to high	Low to medium
IV	Medium to high	Medium to high

In this study, we used the field norms to make an inventory of care provided for hospital inpatients with severe psychiatric comorbidity in the Netherlands, with the aims of describing the characteristics of the different departments and their geographic distribution.

3.2 METHODS

3.2.1 Screening for MPUs

Initially, all 90 Dutch hospitals that were registered on March 1 2015 at www.zorgatlas.nl were screened for the presence of a department that could qualify as an MPU. For this purpose, we asked the psychiatrists in these hospitals four screening questions (via

telephone). Question 1 was: “Is your department a clinical department?”, where ‘clinical’ means that patients stay in the ward for more than one day, including overnight stays. In the case of an affirmative answer to question 1, the following questions were posed. Question 2: “Does your department offer simultaneous medical and psychiatric care?”. Question 3: “Does your department provide diagnostics and treatment?”. Question 4: “Is your department connected to a general or an academic hospital?”.

3.2.2 Interview with psychiatrists

The screening was followed by a questionnaire survey to determine the extent to which the field norms were implemented. Prior to the questionnaire survey, we operationalized the ten field norms for MPUs in the form of a telephone interview script of 51 closed questions, with space for respondent explanations of their answers. After six pilot interviews, the list was adjusted and then the Delphi method used to determine which answers should be given as the minimum number to fulfil each of the field norms. This exercise was carried out by seven of the field norms authors who, after three rounds, reached consensus on all interpretations. Thus, a set of minimum criteria were defined per field norm.

One researcher conducted all the interviews during the period May-August 2015. Subsequently, the respondents were given one month in which to check their answers. The researchers agreed not to publish their answers at an institutional level. In return, all respondents received a benchmark report that compared their own department’s responses against the national averages.

3.2.3 Analysis

Based on the screening questions, population numbers per province, and travel distance to the nearest hospital, we were able to map the distribution of MPU beds across the Netherlands. We determined the nearest hospital by postcode area and, per catchment area, we divided the number of MPU beds by the number of inhabitants.

We then tested the answers to the interview questions against the minimum criteria, with two researchers interpreting the textual explanations. When no consensus could be reached, a third researcher was consulted. All sub-criteria were equally weighted; thus, failure to meet one sub-criterion meant a failure to fulfil the entire field norm. Calculations comprised: how many departments fulfilled each field norm, how many sub-criteria were met on average, and which sub-criteria were least frequently met. The average percentage of sub-criteria fulfilled gives an estimate of the average amount of effort needed to satisfy the field norm.

3.3 RESULTS

3.3.1 MPU care in the Netherlands

Psychiatrists in all eight academic and 82 general hospitals that were registered in the Zorgatlas in 2015 answered the screening questions (response: 100%). Based on their answers, we identified 40 possible MPUs: 28 of these described themselves as MPUs, five were psychiatric departments in a general hospital (PAAZ), and four used other terms. Of the remainder, two psychiatrists declined participation due to lack of time and one psychiatrist was not granted permission to participate in the study.

The full interview was completed by 37 psychiatrists (92.5%). The questionnaire survey encompassed 6 (16.2%) academic hospitals and 31 (83.7%) general hospitals. Table 2 describes the characteristics of the 37 MPU departments: 30 (81.1%) were a psychiatric ward in a hospital or formed part thereof. The remaining seven (18.9%) were organized by a mental healthcare (GGZ) institution: six of these were located in the institution concerned. There were 34 departments (91.9%) that could receive patients with a legal measure (the BOPZ). A range of between 11-20 beds was the most common (45.9% of the departments).

Table 2. Characteristics of 37 medical psychiatry units in the Netherlands that participated in the 2015 questionnaire survey.

Type of institution	**n (%)**
Academic hospital	6 (16.2)
General hospital	31 (83.8)
• number organized from within mental healthcare institution	7 (18.9)
Setting	
Psychiatric ward or part thereof	30 (81.1)
Situated in mental healthcare institution	6 (16.2)
Can admit patients with legal measure (BOPZ)	
Yes	34 (91.9)
No	3 (8.1)
Number of beds	
1-10	16 (43.2)
11-20	17 (45.9)
> 20	4 (10.8)
Medical final responsibility	
Psychiatrist	33 (89.1)
Medical specialist, not a psychiatrist	3 (8.1)
Shared responsibility	1 (2.7)

Table 3. The number of medical psychiatric units in the Netherlands in 2015 based on four screening questions*

Province	Number of beds	Beds per 100,000
Flevoland	18	4
Overijssel	63	4
Gelderland	62	3
Limburg	44	3
Noord-Holland	85	3
Utrecht	35	3
Friesland	20	3
Noord-Brabant	106	2
Zuid-Holland	62	2
Zeeland	4	1
Drenthe	4	0.8
Groningen	0	0

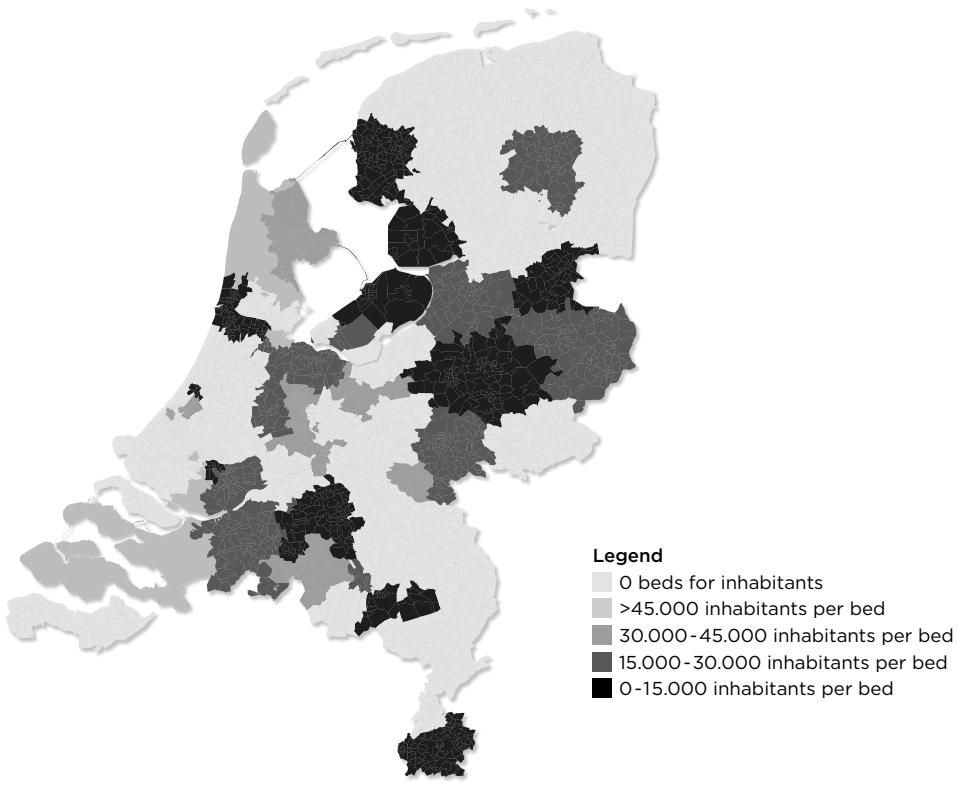

Figure 1. Distribution of beds in medical psychiatry units (MPUs) across the Netherlands. Shown are the number of inhabitants per bed in the areas adjacent to all Dutch hospitals. The light-colored fields are the areas adjacent to hospitals without MPUs.

In 8.1% of the departments, another medical specialist, and not the psychiatrist, held the final responsibility. Bed density was highest in Overijssel and Flevoland (Table 3). In terms of travel distance to the nearest MPU bed, Noord Brabant and Overijssel surpassed the other provinces (Figure 1). Bed density was lowest in Drenthe, Groningen and Zeeland. It should be noted that the designation 'MPU' is based solely on our screening questions and not on the field norms.

3.3.2 Field norms

Table 4 outlines, per field norm, the number of departments that satisfied each norm, how many sub-criteria were contained in each norm, and the percentage of sub-criteria fulfilled on average (the implementation proportion). None of the departments satisfied all ten field norms: four (10.8%) satisfied eight field norms, seven (18.9%) satisfied seven field norms, six (16.2%) satisfied six field norms, and 20 (54.1%) satisfied ≤5 field norms (Figure 2). Field norms 2 (21.6%), 7 (18.9%) and 6 (2.7%) were met by the fewest number of departments. Whether or not a department called itself an MPU, general or university hospital psychiatry unit (PAAZ/PUK), or otherwise, did not relate to the number of field norms met.

Although only 21.6% of the departments met all 57 sub-criteria, the implementation proportion of field norm 2 was still high (95.8%). The most significant shortcomings were that the medical specialists in the department often had no specific experience or training in the care of patients with psychiatric comorbidity (86.5%), and that many

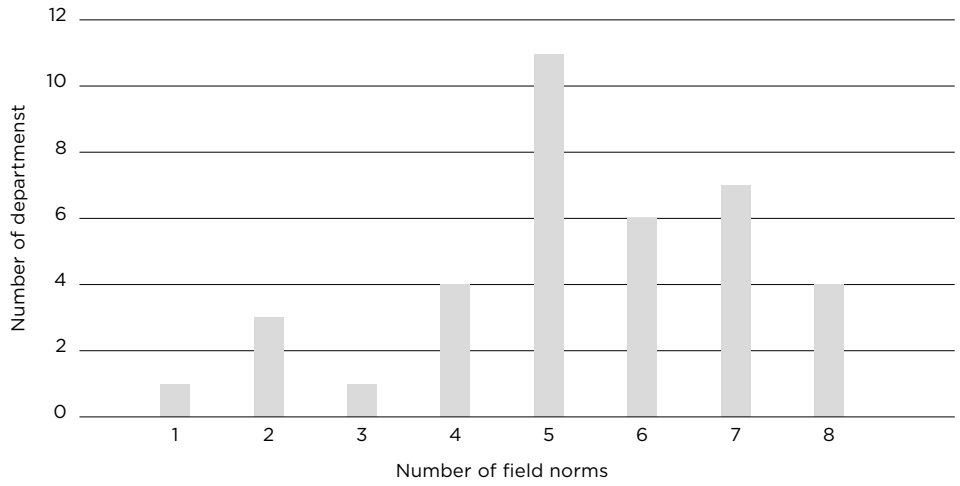

Figure 2. Implementation of the Field norms for Type IV medical psychiatry units in 37 medical-psychiatric hospital departments in the Netherlands. Number of departments fulfilling the field norms and number of field norms.

Table 4. Departments that meet all the sub-criteria for the relevant field norm, the number of sub-criteria per field norm, and the percentage of sub-criteria fulfilled on average (implementation proportion).

Field norm (3)		Satisfies norm n (%)	Sub-criteria n	Implementation proportion
1	A MPU provides integrated, clinical, psychiatric and medical diagnostics and treatment. B The level of care provision is in line with that of regular psychiatric and medical departments.	27 (73.0)	9	96.1%
2	A MPU offers 24/7 multidisciplinary diagnostics, nursing and treatment. B The medical specialists are experienced and trained in the treatment of patients with complex problems. C The field norm contains a non-exhaustive list of 10 care issues that can be treated at the MPU.	8 (21.6)	57	95.8%
3	The medical-specialist care at the MPU is organizationally completely embedded in the hospital.	27 (73.0)	3	85.6%
4	The control and management of the MPU are guaranteed sufficient managerial and medical expertise and are in line with the organization of the hospital.	37 (100)	3	10.0%
5	In addition to the MPU, the hospital also has a consultative psychiatric service and an outpatient clinic for hospital psychiatry.	32 (86.5)	2	93.2%
6	The MPU has integrated care agreements both inside and outside of the hospital.	1 (2.7)	20	33.1%
7	For every shift at the MPU, there is sufficient available medical and psychiatric nursing experience.	7 (18.9)	5	74.1%
8	At a minimum, the MPU has available the following paramedic disciplines: activity leader, social worker, ergotherapist, physiotherapist, dietitian, speech therapist, and GZ psychologist.	22 (59.5)	7	93.5%
9	The spatial provisions of the MPU allow for the possibility of both psychiatric and medical specialist care.	12 (32.4)	12	90.2%
10	Electroconvulsive therapy is barrier-free and quickly available 24/7 for patients at the MPU.	25 (67.6)	1	67.6%

departments did not have a facility for seclusion (37.8%), parenteral nutrition (35.1%), donor blood (13.5%), terminal care (10.8%), or PEG probe placement (8.1%).

The average implementation proportion for field norm 6 was very low (33.1%). Only one hospital had made written integrated care arrangements regarding relocation, registration procedures, division of responsibility, structural consultation, and managerial hierarchy in the event of conflicts. The average implementation proportion for field norm 7 was 74.1%; for nine departments (24.3%), both medical and psychiatric nursing expertise was not always available. Fifteen departments (41.5%) remained below the norm of 1 FTE per bed.

3.4 DISCUSSION

Our questionnaire survey covered 37 (92.5%) of the 40 hospital departments in the Netherlands that, in principle, satisfy the qualification for 'medical psychiatry unit' (MPU). None of the departments we examined fulfilled all the specified field norms. The Health Care Inspectorate (IGZ) research revealed that the number of departments referring to themselves as MPUs rose from 25 in 2012-13 to 28 in 2015. Our research shows that the title 'MPU' bears no relationship to the number of field norms satisfied by the departments surveyed: the number of departments that offer MPU care could, in reality, have risen more significantly.

The increased attention paid to medical comorbidity in psychiatric patients in recent years also makes this probable. Since field norms are now available, it will be possible to monitor better the growth and quality of MPU care: this research is one of the first contributions to this improved monitoring.

3.4.1 Accessibility and quality

The disproportionate distribution of MPU beds across the Netherlands is likely to affect accessibility to MPU care. In Drenthe, Groningen and Zeeland, there are few MPU beds available (see Table 3 and Figure 1). Many departments do not comply with field norm 2: training and experience of the medical specialists are insufficiently tailored to the target group, and provisions for certain care needs, especially medical ones, are insufficient. On the other hand, almost all departments can accommodate patients with acute psychiatric care issues. Thus, most departments are classifiable as Type III care providers and not as Type IV: this is the type on which the field norms have been modeled (see Table 1).

This conclusion is supported by the finding that the majority of the departments studied are organized on a psychiatric ward, have a psychiatrist as the head of treatment, and do not conform to field norm 7 (continual presence of medical nursing expertise).

Nevertheless, one can cautiously conclude that MPU development is on the right track here, because the (average) number of requirements needed to achieve field norm 2 is low (see Table 4). The norm can be achieved by improving the provisions for medical care, by emphasizing medical nursing care during every shift, by training the medical specialists, and through multidisciplinary collaboration.

One notable finding is that virtually none of departments satisfied field norm 6. Written integrated care agreements were missing almost everywhere, although the IGZ had insisted on this in 2013. The extent to which this situation has improved is unknown; however, because the greatest number of sub-criteria were not met for this norm, there is still much work to be done in this respect.

3.4.2 Field norms

The current field norms reflect the insights obtained in 2014 and their format did not always seem logical when designing this study (3). Different field norms covered multiple themes, and some themes were reflected in more than one norm (see Table 4). There are a few domains that can be recognized, however: field norms 1, 2, 7 and 8 deal with the domain 'content of care' (78 sub-criteria); field norms 9 and 10 cover the domain 'facilities' (13 sub-criteria); and field norms 3, 4, 5 and 6 are concerned with the domain 'organization' (28 sub-criteria). In addition, the field norms have been drawn up as minimum norms and not as target norms. The combination of the high number of sub-criteria and their absolute character – you either comply with them or not – increases the likelihood of a department not meeting a field norm. The fact that not one department satisfied all field norms thus gives an overly pessimistic picture of the status quo. What is missing is a form of weighting between the sub-criteria.

The essence of MPU care lies in the domain of 'content of care': an MPU delivers clinical and integrated medical-psychiatric 24-hour care, treats combined care issues that cannot be properly treated at a regular medical or psychiatric department, involves competent medical specialists and nurses, and has particular paramedical disciplines available. In our research only one department achieved all field norms in this area and could therefore justifiably call itself an 'MPU'. Nonetheless, the situation is not so clear cut when we look at the average number of sub-items achieved for each domain: content of care' 89.9%, 'facilities' 78.9%, and 'organization' 78.0% (see Table 4). Based on these findings, MPUs perform well with regard to their main function.

3.4.3 Limitations

The interviews were conducted with psychiatrists who had an interest in placing their MPU in a positive light, which may have influenced the results in a positive direction. Moreover, not all hospitals took up the offer to check their answers after the interview. This can be a point of attention in follow-up research.

3.4.4 Towards standard care

The current field norms have three major shortcomings. Firstly, they assume that all MPUs must be of the most intensive type (see Table 1), when such intensive care is not required in every hospital. Secondly, they do not prescribe what 'necessary care' is: what kind of care should be available and in which hospitals? Thirdly, the field norms are not weighted and do not distinguish between domains, given that 'content of care' should be the most weighted domain.

These shortcomings will have to be resolved in the field norms revision process. Follow-up research should focus upon what is the necessary care in terms of demand, desired level of supply, and geographical distribution.

3.4.5 Conclusion

The number of medical psychiatry units (MPUs) in the Netherlands has increased in recent years, but access to MPU care differs by province. The field norms for MPUs, established in 2014, can be properly tested, but they are too strictly defined and too little differentiated according to the level of care needed. Currently, none of the departments studied have satisfied all the field norms. These shortcomings, however, have more to do with facilities and organization than their primary care function.

The care at an MPU can improve through training, closer multidisciplinary collaboration and through the availability of medical nursing expertise during every shift. Additionally, departments must work more on integrated care agreements. Follow-up research should focus on the definition of necessary care in terms of demand, desired supply, and geographic distribution.

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4

EMPIRICAL TYPES OF MEDICAL PSYCHIATRY UNITS

This chapter is based on a publication and the accompanying appendices by Maarten A. van Schijndel, Luc A.W. Jansen, and Joris J. van de Klundert. Psychother Psychosom. 2019;88(2):127-12.

Medical psychiatry units (MPUs) aim to care for patients that are too psychiatrically ill for treatment in traditional medical wards and too medically ill for treatment in a psychiatric ward (1). From the medical perspective, the term MPU not only refers to units that can evaluate and treat patients with a serious and acute multimorbid illness, but also to units that offer basic and non-acute general medical care. From the psychiatric perspective, some of these units have limited tolerability for disruptive behaviors (2).

MPU designs vary widely according to differences in objectives, operating contexts, and populations served. Kishi and Kathol (3), Kathol et al. (4), and Hall and Kathol (5) have proposed a typology for these designs, distinguishing types based on the level of medical and psychiatric acuity (see Figure I for the description of Types I-IV). Empirical scientific research that addresses the occurrence and functioning of these MPU types remains scarce (2, 6). Moreover, the type definitions employed are sometimes unclear and overlap (Appendix A). Consequently, scientific understanding of the relevance of the types and performances of corresponding MPUs is limited in regards, for instance, to effectiveness and efficiency (2). To advance this understanding, we have empirically investigated MPUs and MPU types in the Netherlands.

Our research is based on a systematic screening of all 90 Dutch hospitals, 40 of which reported to have an MPU. Via telephone interviews and using a 225-item questionnaire, we approached these MPUs to collect data on their designs (7). The questionnaire was built on consensus-based Dutch norms for (the most complete) Type IV. Thirty-seven out of 40 (92.5%) Dutch hospital-based MPUs responded.

We developed three models that use these empirical data to structure the field of Dutch MPUs and their types. Each of the three models uses a different measure of similarity between the MPUs. These similarity-measures express whether MPUs provided similar questionnaire responses in different ways.

Model 1 is based directly on Types I-IV. Appendix B provides detailed descriptions of the model and corresponding methods. In brief, we selected a subset of questions from the full questionnaire that were relevant in distinguishing the four types. Next, we defined ideal answers for each of these questions for each type. Comparing the answers of the 37 MPUs to the ideal-type answers, we calculated their similarity to each ideal-type. According to Model 1, Dutch MPUs are significantly more similar to Type III (similarity 0.794 on a scale from 0 to 1, range 0.885 – 0.664) and IV (0.787, range 0.987 – 0.636) than to Type II (average 0.670, range 0.753 – 0.532) and Type I (average 0.587, range 0.669 – 0.490). However, Type III and IV are hardly distinctive for the Dutch context as the average similarity difference of MPUs to Type III and IV is 0.032 (range 0.007 – 0.073).

Model 2 does not directly use Types I-IV but relies more generally on the two underlying dimensions of medical acuity and psychiatric acuity (Fig. 1). Appendix D provides a detailed description of the model and corresponding methods. In brief, we classified each question as medical, psychiatric, or as both. Using this classification, each MPU accumulated a score for psychiatric capabilities and a score for medical capabilities, thus forming a point in the two-dimensional space defined by the psychiatric and medical axes. Figure 1 presents the Model 2 results and also depicts the scores for Types I-IV. The figure confirms that there are few and varying MPUs with lower psychiatric or lower general medical capabilities and that most Dutch MPUs have moderate to high medical and psychiatric acuity capabilities. Like Model 1, it also fails to structure the landscape of Dutch MPUs (including the ideal Types III and IV).

In contrast to Models 1 and 2, Model 3 does not assume a theoretical framework (such as a typology or dimensions) but approaches the question empirically. Using the k-means clustering methods described in Appendix D, it structures the set of MPUs directly from the questionnaire responses. We ran the k-means algorithm for $k=2,\ldots,5$ clusters and identified which questions significantly contributed to the assignment of MPUs to a particular cluster.

Based on the results, an expert panel identified a clustering that most meaningfully distinguished clusters, or types, within the set of 37 Dutch MPUs. The expert panel identified the three clusters: 'CIUs with coercive admission facilities and 24/7 ECT availability' (n=16), 'Hospital-focused CIUs' (n=14), and 'MPU-light' (n=7).

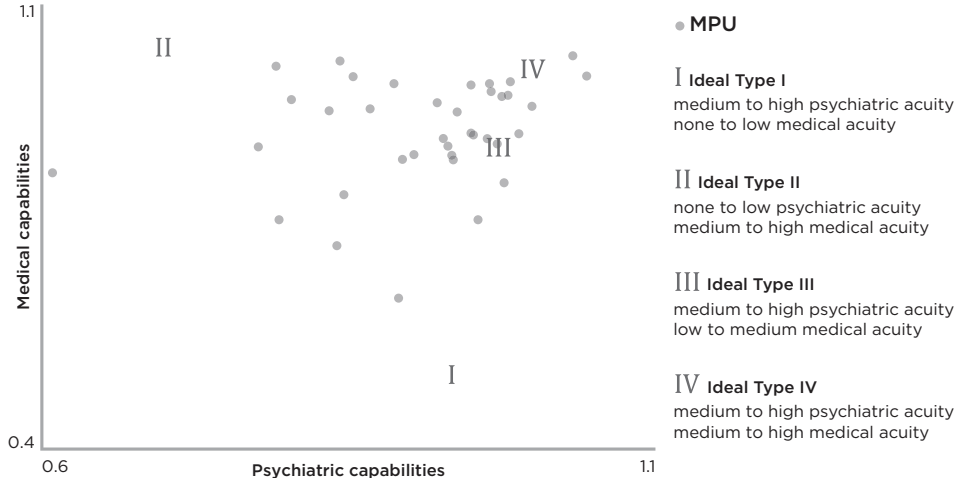

Figure 1. Medical and psychiatric capabilities of MPUs in the Netherlands.

The first two clusters identified by Model 3 provide significant differences among MPUs in the 'cloud' of Type III and IV-like MPUs in Figure 1. Psychiatric acuity capabilities appeared most distinctive for these high acuity clusters, while medical acuity capabilities are comparable. Both clusters can be classified as complexity intervention units (CIUs) because of their medium to high medical and psychiatric acuity capabilities (8). Appendix C provides a complete overview of their differences and commonalities. The finding that 80% of Dutch MPUs can be considered CIUs supports the idea that the value of MPUs occurs most consistently when they target assistance to complex patients, often with severe and acute medical disorders (2, 8). The Dutch landscape encompasses only a modest number of low acuity MPUs, which form the third cluster.

The availability of an extensive set of nationwide data on the organization of MPUs and the high density of these units constitute the strength of this study. Limitations follow from the use and design of the questionnaire and from limiting respondent selection to general and university hospitals, thus excluding 'free-standing' units in psychiatric hospitals.

Altogether, our empirical study suggests that Model 3 structures the Dutch MPU landscape in the most meaningful way, and therefore proposes a promising alternative typology for MPUs. To increase validity, we encourage the extension of the evidence base to other countries by repeating the analysis. Meanwhile, the three identified clusters can serve as a basis for advancing evidence on the effectiveness and efficiency of MPU types.

APPENDIX A: CATEGORIZATION OF TYPES OF MPUS BASED ON LEVEL OF ACUITY

Appendix A aims 1) to give an overview of Kathol's typology (Table 1); 2) to explain how the questionnaire that was used in this research (Box 1) relates to this typology (Table 2). The scoring of answer options for Model 1 and 2 can be found together with all raw study material via the Erasmus University research repository on http://hdl.handle.net/1765/109342.

A.1 Overview of Kathol's Types I-IV

Table 1 summarizes the core characteristics of each of Kathol's Types I-IV based on three landmark papers (3, 4, 9). Per type, core features, location, acuity, staff, procedures, physical requirements, organization and admission criteria are described. Type I can serve medium to high psychiatric acuity and none to low medical acuity; Type II can serve none to low psychiatric acuity and medium to high medical acuity; Type III can serve medium to high psychiatric acuity and low to medium medical acuity; Type IV can serve medium to high psychiatric and medical acuity (Figure 1).

Table 1. Kathol's typology.

	Type I	Type II	Type III	Type IV
Core features	Acute psychiatric disorders in patients who also have stable medical problems for which nonacute attention is required (3). Most general psychiatric wards fall into this category, since about one-third accept patients totally dependent in daily activities (3).	Patients with acute medical disorders in whom nonacute psychiatric problems co-occur (3). Only those in which on-site psychiatric liaison is available and thus the psychiatric problems are routinely addressed (3).	Type III and IV programs introduce real change in clinical capabilities by providing increased levels of both medical and psychiatric services in the same setting. These programs require the active and sustained involvement of primary care physicians and psychiatrists. Both medical and psychiatric safety features form a prerequisite for the physical settings in which these units are housed, and nursing personnel must receive extra training in psychiatric and medical nursing techniques (3). In fact, there is some overlap of Type III and Type IV units, since the setting and personnel dictate the services that can be provided. In general, however, Type IV units require special physical alteration of the ward to accommodate patients with severe combined illness; active, not passive, involvement of an internist or other primary physician; and a highly trained nursing staff (4).	
			Principal limitation is the ability to provide high acuity medical care. Limitations in psychiatric care may also be present (4).	Most comprehensive medical-psychiatry units. Capable of diagnosing and treating any patient with any level of medical acuity that can be handled on a general medicine ward and any level of psychiatric acuity that can be handled on an acute care psychiatry ward (4).
Location	Hospital or free-standing (4).	Hospital medical unit (4).	General hospital (4), some freestanding (3).	General hospital (3, 4).
Acuity	Medium to high psychiatric acuity (3, 9). None to low medical acuity (3, 9).	Medium to high levels of medical acuity (3, 9). None to low psychiatric acuity (3, 9).	Medium to high psychiatric acuity (3, 9). Low to medium medical acuity (3, 9).	Medium to high psychiatric acuity (3, 9). Medium to high medical acuity (3, 9).
				The development of Type IV medical/psychiatry units requires commitment by the institution, physicians in psychiatry and a primary medical specialty, and nurses willing to deal with individuals with serious medical and psychiatric illnesses (4).

	Type I	Type II	Type III	Type IV
Staff	**Nursing** Rudimentary nursing training about medical illness, evaluation and treatment (4).	**Nursing** Rudimentary nursing training about psychiatric illness, evaluation and treatment (4).	**Nursing** Cross-training nursing personnel. More extensive medical training for psychiatric nurses and psychiatric training for medical nurses will allow nursing staff to feel comfortable in applying both medical and psychiatric nursing skills to patients with combined problems. Unless this takes place, the nurses will legitimately refuse to accept patients that stretch the limits of their competence, thus obviating the unit director and hospital's intent of providing care for patients with active medical and psychiatric problems and, it could be added, the patients who would benefit most from this specialized ward setting (4).	**Nursing** Highly trained nursing staff (4).
	Medical Willingness of physicians and staff to deal with the medical problems that are present and may be impacting behavioural symptoms. In most cases, non-psychiatrist physician availability (4).	**Medical** Psychiatrist working in close liaison with primary physicians. Such a unit thus provides a setting in which there is ready access to individuals who have familiarity with psychotropic medications and psychotherapeutic interventions (4).	**Medical** Cross-coverage by both a primary physician, preferably an internist, and a psychiatrist with a special interest in patients with combined medical and psychiatric illness is necessary (4).	**Medical** Active, not passive, involvement of an internist or other primary physician. A variety of consultants must be accessible in a timely fashion, and rapid institution of medical treatment or transfer to an intensive care unit must be convenient (4).
Procedures	**Psychiatric** Milieu therapy, activities therapy. group therapy, individual psychotherapy. Psychopharmacology, ECT, behavior modification, amytal interviews. Development of violence management. acute pharmacologic intervention, adept crisis intervention, and quiet room observation skills (4).	**Psychiatric** Milieu therapy, activities therapy. group therapy, individual psychotherapy, psychopharmacology, ECT, behavior modification. Amytal interviews (4).	**Psychiatric** Milieu therapy, activities therapy. group therapy, individual psychotherapy. Psychopharmacology, ECT, behavior modification, amytal interviews. Development of violence management. acute pharmacologic intervention, adept crisis intervention, and quiet room observation skills (4).	**Psychiatric** Milieu therapy, activities therapy, group therapy, individual psychotherapy. Psychopharmacology, ECT, behavior modification, amytal interviews. Development of violence management. acute pharmacologic intervention, adept crisis intervention, and quiet room observation skills (4).

	Type I	Type II	Type III	Type IV
Psychiatric	**Medical** No intravenous medication, simple intravenous rehydration. Stable continuous flow oxygen (usually by portable tank). Minor dressing changes. No drains. Nasogastric tube for refeeding. No endotracheal tubes, blood sampling, ECG, EEG, X ray, lumbar punctures (otherwise no invasive medical procedures); minor medical medication adjustment (4).	**Medical** Blood sampling, ECG, EEG, X ray. Simple intravenous, medication and rehydration steady-state oxygen (incl. nasogastric feeding and simple dressing changes) and drain care, Foley placement, ostomy and endotracheal care, bone marrow biopsy, spinal taps, etc.; all medication adjustment. Complicated intravenous medication, central line placement, thoracentesis, paracentesis, punch biopsies, bone marrow biopsy, hemo or peritoneal dialysis, complex dressing changes, tracheal and ostomy tube care, arterial gases, etc; all medical medication adjustment (4).	**Medical** Blood sampling, ECG, EEG, X ray. Simple intravenous, medication and rehydration steady-state oxygen (incl. nasogastric feeding and simple dressing changes) and drain care, Foley placement, ostomy and endotracheal care, bone marrow biopsy, spinal taps, etc.; all medication adjustment (4).	**Medical** Blood sampling, ECG, EEG, X ray. Simple intravenous, medication and rehydration steady-state oxygen (incl. nasogastric feeding and simple dressing changes) and drain care, Foley placement, ostomy and endotracheal care, bone marrow biopsy, spinal taps, etc.; all medication adjustment. Complicated intravenous medication, central line placement, thoracentesis, paracentesis, punch biopsies, bone marrow biopsy, hemo or peritoneal dialysis, complex dressing changes, tracheal and ostomy tube care, arterial gases, etc; all medical medication adjustment (4).
Physical requirements	Little physical changes (4).	Little physical changes (4).	Physical changes include those necessary to make the ward accommodate both the medically and psychiatrically ill. On the medical side it is necessary that medical gases, intravenous therapies, and suction be available. The ward location should also allow ready access to diagnostic tests, medical specialty and subspecialty consultation, and therapeutics. On the psychiatric side, it is necessary to have the ability to restrict access to sharp items, to institute limit-setting procedures, and to allow close observation of patient behaviors in a closed or structured setting. Ready access to activities therapists, occupational therapists, and physical therapists is also helpful (4).	Special physical alteration of the ward to accommodate patients with severe combined illness (4).

	Type I	Type II	Type III	Type IV
Organization			The organization of the unit is determined by physician availability; whether the hospital is a private, teaching, or government facility; and the target population (4).	The development of Type IV medical/psychiatry units requires commitment by the institution, physicians in psychiatry and a primary medical specialty, and nurses willing to deal with individuals with serious medical and psychiatric illnesses (4).
Admission creteria	Admission criteria for Type I medical/psychiatry units include those necessary for admission to any general psychiatry unit. The psychiatric condition in these patients necessitates behavior control in an inpatient psychiatric setting while the medical treatments are given (4).	Admission criteria used on a Type II MPU are the same as those for admission to a general medicine unit. Low medical acuity in general is not sufficient grounds for admission to the hospital (4).	The admission reason (see Table 3) for patients on the Type III medical/psychiatry unit can be medical or psychiatric; however, both are necessary or under consideration for admission. Patients should be admitted based on their ability to use the special capabilities of the unit. Patients who require expertise not provided by the unit should be excluded. The principal limitation on Type III medical/psychiatry units is the ability to provide care for patients with high medical acuity. Type III units may also have limitations in their ability to provide an adequate psychiatric setting. Straightforward medical problems, such as intravenous antibiotic administration, oxygen supplementation, nasogastric suction, etc., can be addressed; however, certain complicated procedures, such as peritoneal dialysis or hemodialysis, central line placement, hyperalimentation, etc., may not be possible (4).	Patients must have medical and psychiatric disorders for admission to the Type IV medical/psychiatry unit (4).

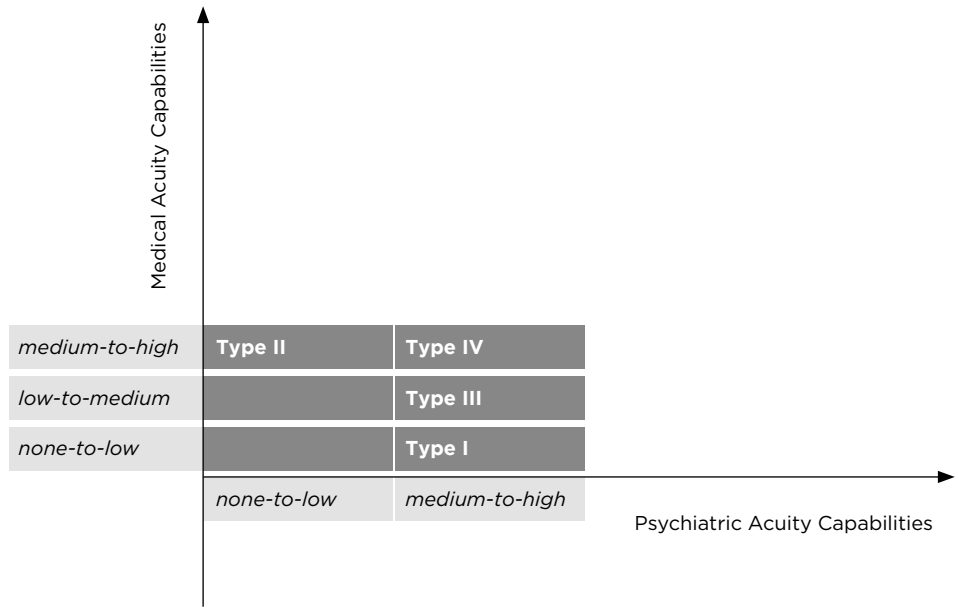

Figure 1. Schematic representation of Kathol's typology.

A.2 Selected MPU-questionnaire questions versus Kathol's typology

The selected MPU-questionnaire questions that were used in this research are listed in Box 1. Table 2 shows how the domains of Kathol's typology (Table 1) relate to the questionnaire questions (Box 1). From Table 2 it can be learned that the questionnaire questions cover all domains that were described by Kathol and colleagues (3, 4, 9), except for 'Admission criteria'.

Box 1. Selected MPU-questionnaire questions

A. General View and Psychiatric and Somatic Care Services Screening [Field Norm 1]:
1) Is your department a clinical department (patients can reside there for more than one day, including overnight)? If so, please answer the following questions:
2) Does your department provide simultaneous somatic and psychiatric care? Yes/No
3) Does your department provide diagnostics and treatment? Yes/No
4) Is your department attached to a general or academic hospital? Yes/No

If so, how? (For example, geographically, organizationally, historically, do patients have to travel outside if they are moved from the department to the hospital?)

If you answer 'no' to one or more of the above questions, you can close the questionnaire.

If you answered 'yes' to all four questions – in the following, the term 'your department' is considered to represent: beds for simultaneous somatic-psychiatric care, referred to as a medical psychiatric unit/psychiatric medical unit or complexity intervention unit.

Question 6 [Field Norm 1]
Does your department provide integrated and coordinated somatic and psychiatric care?
a. Yes, psychiatric aspects are always taken into account in case of somatic treatments and vice versa.
b. Yes, psychiatric aspects are mostly taken into account in case of somatic treatments and vice versa.
c. No, psychiatric aspects are only occasionally taken into account in the case of somatic treatments and vice versa.
d. No, psychiatric and somatic care are provided in parallel, but without co-ordination.

Question 7b [Extra information Field Norm 2]
Which forms of multidisciplinary collaboration (for diagnostics or treatment) are used in your department?
(Multiple answers accepted)
a. Multidisciplinary consultation (on a regular basis), continue to 7c
b. Joint patient visits
c. Joint visit on paper
d. Standard consultation by different disciplines
e. Other, namely:

Question 7c [Specifics]
What is (approximately) the frequency of multidisciplinary consultation in your department?
a. At least once a week
b. Less than once a week
c. Once a month or less frequently
d. Other/comments:

Question 7d [Field Norm 2]
Which disciplines are involved in the multidisciplinary collaboration?
(Multiple answers accepted)
a. Internists
b. Surgeons
c. Neurologists
d. Psychiatrists
e. Medical Psychologists
f. Social workers
g. Creative therapy
h. Other disciplines, namely:

Question 8 [Field Norm 2]
In your department, can patients receive diagnostics, treatment and nursing 24 hours per day, 7 days a week?
0 Yes
0 No, diagnostics is available for ... days, ... hours per day; treatment is available for ... days, ... hours per day; nursing is available for ... days, ... hours per day
0 Other/additional comments

Question 9 [Extra information Field Norm 2]
Can patients be admitted to your department 24 hours per day and 7 days a week and are nurses and doctors (residents) available for this?
0 Yes
0 No
0 Other/comments:

Question 10 [Field Norm 1]
Does your department have the opportunities for diagnostics, treatment and nursing, such as in a somatic (admissions) ward of a general or academic hospital?
0 Yes
0 No
0 Other/comments:

Question 11 [Field Norm 2/Background]
Which specialisms do you have available for the consultation on treatment and/or diagnostics of patients in your department?
(Multiple answers accepted)
a. Anesthesiology
b. Cardiology
c. Surgery, general
d. Dermatology
e. Geriatrics
f. Gynaecology
g. Hematology
h. Intensive Care
i. Internal Medicine
j. Otorhinolaryngology
k. Pulmonary medicine
l. Gastroenterology
m. Neurosurgery
n. Neurology
o. Oncology
p. Ophthalmology
q. Orthopedic surgery
r. Plastic Surgery
s. Psychiatry
t. Emergency medicine
u. Thoracic Surgery
v. Traumatology
w. Vascular Surgery
x. Urology
y. Antenatal Care and Obstetrics
z. None of the above
aa. Other/comments:

Question 12 [Background]
What disciplines do the medical specialists themselves belong to, who come to see patients in your department?
(Multiple answers accepted)
a. Anesthesiology
b. Cardiology
c. Surgery, general
d. Dermatology
e. Geriatrics

f. Gynaecology
g. Hematology
h. Intensive Care
i. Internal Medicine
j. Otorhinolaryngology
k. Pulmonary medicine
l. Gastroenterology
m. Neurosurgery
n. Neurology
o. Oncology
p. Ophthalmology
q. Orthopedic surgery
r. Plastic Surgery
s. Psychiatry
t. Emergency medicine
u. Thoracic Surgery
v. Traumatology
w. Vascular Surgery
x. Urology
y. Antenatal Care and Obstetrics
z. None of the above
aa. Other area/comments:

Question 13 [Field Norm 2]
Are the medical specialists who are involved given (re)training in the treatment of patients with complex somatic-psychiatric problems?
a. Yes, all medical specialists
b. Yes, most medical specialists
c. No, only a minority of medical specialists
d. No, (almost) no one has had (extra) training in the treatment of patients with complex somatic-psychiatric problems.
e. Other/comments:

Question 14 [Field Norm 2]
Are the medical specialists involved, experienced in the treatment of patients with complex somatic-psychiatric problems?
a. Yes, all are considerably experienced
b. Yes, the majority is reasonably experienced
c. No, only a minority is experienced
d. No, they have very little experience
e. Other/comments:

Question 15 [Field Norm 2]
Which diagnostic and treatment options are available 24 hours per day, 7 days a week for the patients in your department?
(Multiple answers accepted)
a. Radiological examination in the department
b. Radiological examination in the department's hospital
c. Laboratory tests in the department
d. Laboratory tests in the department's hospital
e. ECG in the department
f. ECG in the department's hospital
g. EEG in the department
h. EEG in the department's hospital

i. Surgery in the department
j. Surgery in the department's hospital
k. Parturition in the department
l. Parturition in the department's hospital
m. Consultation by an internist in the department
n. Consultation by an internist in the department's hospital
o. Consultation by a surgeon in the department
p. Consultation by a surgeon in the department's hospital
q. Consultation by a cardiologist in the department
r. Consultation by a cardiologist in the department's hospital
s. Consultation by a gynaecologist in the department
t. Consultation by a gynaecologist in the department's hospital
u. Consultation by a neurologist in the department
v. Consultation by a neurologist in the department's hospital
w. CCU in the department
x. CCU in the department's hospital
y. Consultation by an intensivist/IC nurse in the department
z. Referral to Intensive Care treatment in the department's hospital
aa. Referral to medium care monitoring of patient's vital signs in the department's hospital
ab. Referral to high care in the department's hospital

Question 16 [Field Norm 2]
Can your department provide care for patients with oxygen dependencies, including the administration of medical gasses and oxygen saturation monitoring?
0 Yes
0 No
0 Other/comments:

Question 17 [Field Norm 2]
Which forms of medicinal administration are available for patients in your department?
(Multiple answers accepted)
a. Oral
b. Subcutaneous
c. Intramuscular
d. Intravenous
e. Other/comments:

Question 18 [Field Norm 2]
Is it possible for patients who are admitted to your department to receive donor blood?
a. Yes, in our department
b. Yes, with an escort from our department to another department
c. No
d. Other/comments:

Question 19 [Field Norm 2]
What kinds of wounds can be treated and cared for in your department?
(Multiple answers accepted)
a. Decubitus
b. Burns
c. Operation wounds
d. Other/comments:

Question 20 [Field Norm 2]
Is it possible to conduct bladder scans for the patients in your department?
a. Yes, by our department personnel
b. Yes, by consultants or help from nursing from another department
c. No
d. Other/optional comments:

Question 21 [Field Norm 2]
Is your department able to perform bladder catheterizations?
a. Yes, by our department personnel
b. Yes, by consultants or help from nursing from another department
c. No
d. Other/optional comments:

Question 22 [Field Norm 2]
What are the possibilities with respect to clinical nutrition?
(Multiple answers accepted)
a. Gavage feeding is possible
b. PEG tube feeding is possible
c. Total parenteral nutrition is possible
d. Other/comments:

Question 23 [Field Norm 2]
Can complete bed nursing be offered to patients with (total) ADL dependencies and immobility?
0 Yes
0 No
0 Other/additional comments:

Question 24 [Field Norm 2]
Can patients with wheelchair dependencies be cared for in your department, including (attempted) patient mobilization?
a. Yes, nursing and (attempted) patient mobilization can be done by department personnel.
b. Yes, nursing can be done by personnel in the department, (attempted) patient mobilization can be done by personnel on a consultation basis (for example, with a physiotherapist).
c. No
d. Other/comments:

Question 25 [Field Norm 2]
Can terminally ill patients be cared for (including after-death care and reception of next of kin) in your department?
0 Yes
0 No
0 Other/comments:

Question 26a [Specifics]
Which specialized somatic treatment or diagnostics can you provide in your department?
(Multiple answers accepted)
a. Pneumothorax in the department
b. Pneumothorax in the department's hospital
c. Bone marrow biopsy in the department
d. Bone marrow biopsy in the department's hospital

e. Telemetry in the department
f. Telemetry in the department's hospital
g. Administration of cytostatic drugs department
h. Administration of cytostatic drugs in the department's hospital
i. Dialysis in the department
j. Dialysis in the department's hospital
k. Bone marrow transplant in the department
l. Bone marrow transplant in the department's hospital
m. Isolation nursing in the case of infection in the department
n. Isolated nursing in the case of infection in the department's hospital
o. Full immobilization nursing of patients in the department
p. Full immobilization nursing of patients in the department's hospital
q. Other, namely:

Question 27a [Field Norm 1]
Does your department have the opportunities for diagnostics, treatment and nursing, such as in a psychiatric (admissions) ward?
0 Yes
0 No

Question 27b [Specifics]
Are you able to treat the following psychiatric problems in your department?
(Multiple answers accepted)
a. Severely suicidal patients
b. Patients with separation needs
c. Patients with behavioural problems due to dementia

Question 31 [Field Norm 2 and Field Norm 9]
Which of the following treatments, protective regulations and specific nursing care can your department offer to patients with (potentially) dangerous behavior due to a psychiatric illness:
(Multiple answers accepted)
a. Intensive supervision
b. Limitation of freedom of movement by closing the departmental doors
c. Limited visits and/or other stimuli
d. De-escalation techniques
e. Patient restraining in the bed and/or chair
f. Separation
g. Emergency medication
h. Other/optional comments

Question 32 [Field Norm 2]
Are you able to provide specific nursing care and facilities to patients with the following risks:
(Multiple answers accepted)
a. (Potential) disturbances in reality testing
b. Disturbance of cognitive and/or executive brain functions
c. (Potential) wandering off/losing one's way
d. (Potentially) inadequate behavior
e. Potential danger for the patient and his/her environment
h. Other/optional comments:

Question A33 [Field Norm 2 and Field Norm 10]
Can you offer ECT 24 hours per day, 7 days a week to patients in your department?
0 Yes
0 No

Question 34 [General]
Which psychiatric treatment options are available for the patients in your department?
a. Activities therapy
b. Sport therapy
c. Memory training
d. Cognitive behavioral therapy
e. Group therapy
f. Group psycho-education
g. Systemic therapy
h. Other/comments:

B. Embedding of the department
Question 1 [Field Norm 3]
What kind of institution is your department located in?
a. Academic
b. Large teaching hospital
c. Regional hospital
d. Mental health care institution

Question 9 [Specifics]
Who makes the decisions regarding an admission to your department?
(Multiple answers accepted)
a. Internist
b. Psychiatrist
c. Neurologist
d. Other, namely:

Question 11 [Specifics]
Who carries the ultimate medical responsibility for the patients?
a. Internist
b. Psychiatrist
c. Neurologist
d. Other, namely:

Question 12 [Specifics]
Which specialism has the daily management of the department?
a. Internal medicine
b. Psychiatry
c. Neurology
d. Surgery
e. Other, namely:

C. Department personnel
Question 1 [Field Norm 1]
Who provides medical care in your department?
(Multiple answers accepted)
a. Somatic specialists, who work for the department
b. Somatic specialists who are available on request
c. Psychiatrists, who work for the department
d. Psychiatrists who are available on request
e. General practitioners, who work for the department
f. General practitioners who are available on request
g. Other/comments:

Question 3a [Field Norm 7]
What percentage (approximately) of the nursing team has had psychiatric training?
a. 0%
b. 1% - 25%
c. 25% - 50%
d. 50% - 75%
e. 75% - 100%
f. 100%
g. Other/comments

Question 3b [Field Norm 7]
What percentage (approximately) of the nursing team has had somatic training?
a. 0%
b. 1% - 25%
c. 25% - 50%
d. 50% - 75%
e. 75% - 100%
f. 100%
g. Other/comments:

Question4 [Field Norm 7]
Do you have both psychiatric and somatic nursing expertise present at every shift?
a. Yes
b. No, often not in the evenings/nights/weekends
c. No, there is almost always only one of the two present on the work floor
d. Other/comments:

D. Physical facilities.
Question 3a [Field Norm 9]
How many of the following rooms does your department (MPU) have?
(Multiple answers accepted)
Fill in the appropriate amount below:
a. Single room, amount:
b. Double room, amount:
c. Triple room or larger/multiple person room, amount:
d. Other/comments:

Question 3b [Field Norm 7]
Total amount of beds for patients with somatic-psychiatric comorbidity:

Question 5 [Field Norm 9]
Are the corridors wide enough to accommodate the passage of hospital beds?
0 Yes
0 No
0 Other/comments:

Question 6 [Field Norm 9]
Are the sanitary facilities sufficient for the administration of total bed nursing?
a. Yes, for every room
b. Yes, for most rooms
c. No, only in a minority of the rooms
d. No, not for any of the rooms
e. Other/comments:

Question 8 [Field Norm 9]
Is there a separate room for the preparation of medication, where intravenous medication (among others) can be prepared according to the applicable guidelines?
0 Yes
0 No
0 Other/comments:

Question 9 [Field Norm 9]
Is there sufficient storage space for the nursing materials required for somatic care?
0 Yes, on hand in the department
0 No, the nursing staff has to leave the department regularly to retrieve the materials
0 Other/comments:

Question 10 [extra information]
Which of the following physical attributes does your department have?
(Multiple answers accepted)
a. Line of sight from the nursing station over the department
b. Insulated (double glazed) glass for the windows (shatter-proof or safety glass)
c. Doors that cannot be barricaded
d. Ability to make the rooms safe in the case of severely suicidal patients
e. Video surveillance in one or more rooms
f. Separation room
g. The department (entrance) door is locked (closed ward)
h. The department (entrance) door can be locked, but is opened if a patient insists (semi-closed ward)
i. Pagers for all nurses and reception

Question 11 [extra information]
Which of the following facilities do you have in your department?
(Multiple answers accepted)
a. Activities area
b. Sports area
c. Communal living area
d. Family area
e. Mother-baby rooms
f. Space for physical examinations/blood collection
g. Other/comments:

Table 2. Comparison between Kathol's typology and MPU questionnaire questions.

Domain	In questionnaire (question(s))
Core features	Yes (screening questions & A 8,9,10)
Location	Yes (B1)
Acuity	Yes (A 6, 8,9,10)
Staff nursing	Yes (C 3ab)
Staff medical	Yes (C1 B 9,11,12)
Procedures psychiatric	Yes (A 34)
Procedures medical	Yes (A 16-27)
Physical requirements	Yes (A 16, 17, 19, 22, 31)
Organization	Yes (B 9,11,12)
Admission criteria	No

APPENDIX B: MODEL 1

B.1 Model and Methods

Model 1 is based on the four standard types proposed by Kathol et al. (3, 4, 9): Type I can serve medium to high psychiatric acuity and none to low medical acuity; Type II can serve none to low psychiatric acuity and medium to high medical acuity; Type III can serve medium to high psychiatric acuity and low to medium medical acuity; Type IV can serve medium to high psychiatric and medical acuity.

For each of the 37 MPUs, we calculated the similarity with each of the four types by analyzing the answers to the questionnaire. Firstly, we selected questions to be considered that were relevant in distinguishing between the types. To this purpose, the first two authors selected questions independently and then resolved conflicts in the selection until consensus was reached, consulting the third author if necessary.

Next, the first two authors independently defined ideal answers per type on the basis of the original type definitions. Again, authors discussed their classifications until consensus was reached, consulting the third author in case of disagreement. The resulting answer sets for Kathol's Type I through IV can be interpreted as fictitious 'ideal-type' MPUs.

Model 1 classifies existing Dutch MPUs by comparing them to these ideal-types, using the following similarity measure d. For every Dutch MPU c (c=1,...,37) and for every ideal type t (t=I,...,IV), similarity function $d(c,t)$ is defined as the sum over all questions for which c has the answer required for t. Moreover, for questions with optional answers, fractional scores (e.g. 0.5) were added if the answer for unit c was optional for type t (see the raw material http://hdl.handle.net/1765/109342 for the selected questions and the answer scores per selected question).

The maximum attainable sum $M(t)$ per ideal type t may vary, depending on the required and optional answers for t. In fact, M(I) = 12.47, M(II) = 12.95, M(III) = 12.94, M(IV) = 13.83. We subsequently translated these absolute similarity scores into relative similarities $r(c,t)$ per MPU, which are defined as $r(c,t) = d(c,t)/M(t)$. For example, MPU 1 may have relative similarity 0.49, 0.68, 0.68, and 0.71 for type I, II, III and IV respectively.

B.2 Results

Figure 2 shows that Dutch MPUs are significantly more similar to Type III (relative similarity 0.794 on a scale from 0 to 1, range 0.885 – 0.664) and Type IV (0.787, range 0.987 – 0.636) than to Type II (average 0.670, range 0.753 – 0.532) and Type I (average 0.587, range 0.669 – 0.490). However, Types III and IV are hardly distinctive for the Dutch context as the average relative similarity difference of MPUs to Types III and IV is 0.032 (range 0.007 – 0.073).

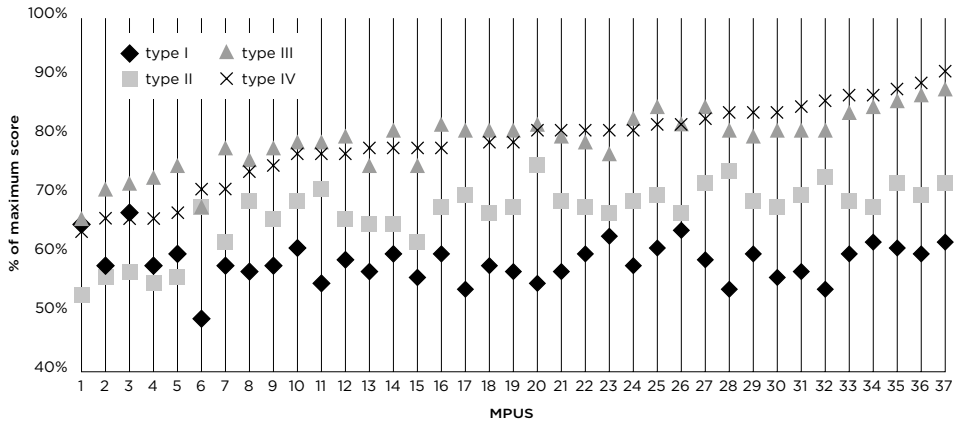

Figure 2. Relative similarity of each MPU to the ideal types – ordered according to relative Type IV similarity.

APPENDIX C: MODEL 2

C.1 Model and Methods

For Model 2, instead of defining 'ideal-type MPUs' and calculating relative distances to ideal-types, each MPU was plotted in the two-dimensional space defined by the axes of psychiatric (x) and general medical (y) care abilities. In order to achieve this, we classified each question as medical, psychiatric or both (again using a process where two authors classified independently and consulted the third author in case of disagreement). The answer scores can be found on http://hdl.handle.net/1765/109342. Thus, each MPU *i* received a score *pi* for psychiatric capabilities and a score *mi* for medical capabilities, thus forming a point (*pi*, *mi*) in the two-dimensional space defined by the corresponding axes. In addition, we scored the (ideal) Types I-IV, using the answers obtained as described above for Model 1. For ease of exposition, we normalized the scores so that Type IV has the score (1,1). For example, MPU 1 is plotted as (0.59, 0.83) in Figure 3. Moreover, we plotted Types I-IV in Figure 3 as points of reference. Thus, the (normalized) distances in this two-dimensional space can indeed be viewed to express the similarity among MPUs and between MPUs and ideal-types.

C.2 Results

Figure 3 shows an x,y-plot of psychiatric and medical capabilities. Some units score higher than all ideal-types, as they score points with answers that are not required by ideal-types. It is worth noting that two MPUs that are closely adjacent in Figure 3 may still score differently on many answers, as they may have accumulated the points scored via different questions. Overall, Figure 3 draws an inverted funnel shape of the Dutch MPU landscape, showing a greater dispersion of units in the left lower quadrant.

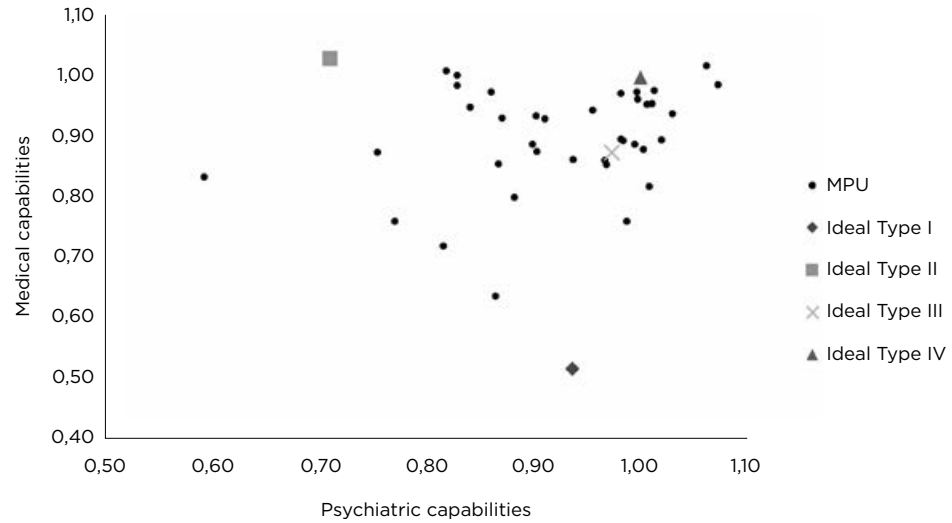

Figure 3. Model 2 shows the normalized scores of each unit and the ideal types for unit I-IV on medical and psychiatric capabilities.

APPENDIX D: MODEL 3

D.1 Model and Methods

In this model, distances between the 37 MPUs were calculated for all 225 questions. The total number of distances gathered in this manner equals 37 x 225 / 2 = 4144. Using these distances, we next applied k-means clustering (10) to partition the set of 37 MPUs into types. K-means clustering is a form of unsupervised learning and developed to partition unlabeled data into *k* clusters. The algorithm works iteratively to assign each data point to one of the *k* clusters, based on similarity with the already assigned data points, and initially estimated cluster centroids. K-means clustering is a common method and applied in several recent studies (11-14).

By definition, the mean distance between data points and their cluster centroid decreases with *k*. The largest *k* for which this mean distance diminishes sharply (decreases are, therefore, more modest after this point) is known as the elbow point. This elbow point is often viewed as a good estimator of the number of clusters (or, in our case, types) which best represent the data set. In our model, the elbow point was k=4 (http://hdl.handle.net/1765/109342). We therefore ran the k-means algorithm for k=2,...,5. For each cluster found, we studied which questions significantly contributed to the assignment of MPUs to the cluster by calculating significance of answers using a binomial distribution (X=0.5, alpha=0.05). For instance, for a cluster of size 10, a yes/no question was considered

significant if answered with yes or no at least eight times among the MPUs in the cluster. For each cluster, the significant questions were considered as characterizing.

The results for the k-means clustering for k=2,...,5 were presented to a panel of MPU experts. For this purpose, each of the resulting clusters was described through a narrative, which was developed based on the questions that were significant for that cluster, added with some more general observations (http://hdl.handle.net/1765/109342). The expert panel consisted of internists and psychiatrists from different MPUs in a university medical center and two major teaching hospitals. The expert panel was asked which number of clusters *k* (k=2,...,5) most meaningfully typified the set of all Dutch MPUs, and subsequently how to characterize the resulting clusters.

D.2 Results

Table 3 shows the results of the K-means clustering in terms of the number of characterizing questions and the number of MPUs per cluster.

The narratives corresponding to the clusters arising for each k were discussed by the expert panel and synthesized in cluster descriptions (when considered valid) as described in column 4 of Table 3. The panel valued the qualifications of personnel, available facilities, and the medical and psychiatric capabilities as the most important features when distinguishing clusters of MPUs from each other. From this viewpoint, the clusters of k=2 were not considered to be meaningfully distinctive on medical and psychiatric acuity capabilities. One cluster of the k=4 group could not be meaningfully described, while this was the case for most clusters of k=5. The panel therefore concluded that k=3 yields the most recognizable clusters.

Table 3. Overview of k-means clustering. The expert panel interpreted the k=3 and k=4 solutions around the elbow point of k=4.

k	Significant characterizing questions (n)	MPUs per cluster (n)	Describing name
2	39	Cluster 1 (16) Cluster 2 (21)	
3	88	Cluster 1 (7) Cluster 2 (16) Cluster 3 (14)	MPU-light CIUs with coercive admission facilities and 24/7 ECT availability Hospital-focused CIUs
4	135	Cluster 1 (4) Cluster 2 (24) Cluster 3 (6) Cluster 4 (3)	No meaningful descriptor identified Hospital-oriented psychiatry MPU Psychiatry-based MPUs, less medical capabilities than cluster 2 Low acuity MPUs
5	129	Cluster 1 (3) Cluster 2 (3) Cluster 3 (4) Cluster 4 (5) Cluster 5 (22)	

The three resulting clusters were named 'MPU-light' (cluster 1 in Table 3, n=7), 'CIUs with coercive admission facilities and 24/7 ECT availability' (cluster 2 in Table 3, n=16), and 'Hospital-focused CIUs' (cluster 3 in Table 3, n=14). The 'MPU-light' cluster contained MPUs with both low to medium psychiatric and low to medium medical acuity capabilities. Clusters 2 and 3 ('CIUs with coercive admission facilities' and 'Hospital-focused CIUs') are best distinguished based on their psychiatric acuity capabilities. Coercive admission facilities, i.e. seclusion rooms and closed doors, are available for a significant number of MPUs in cluster 2. All of the MPUs in cluster 2 can provide electroconvulsive therapy 24 hours a day, seven days a week. In terms of medical acuity capabilities, clusters 2 and 3 are roughly comparable.

Table 4 provides details on (significant) cluster characterizations, and enables direct comparison per design domain. In this Table '+' means that the characteristic occurs significantly frequent for MPUs in the cluster, while a '-' indicates that the characteristic is significantly rare for MPUs in the cluster. For instance, MPUs in cluster 2 are rarely situated in district hospitals, but frequently have a locked ward.

Table 4. Description of the k-means clustering solution (k=3) on the basis of significantly distinctive answer options.

	Cluster 1 (n=7) *Lower acuity MPUs*	**Cluster 2 (n=16)** *CIUs with coercive admission facilities and ECT*	**Cluster 3 (n=14)** *Hospital-focused CIUs*
Context	- University medical center - Top clinical teaching hospital	- District hospital - Organized from a mental healthcare institution	- District hospital - University medical center - Organized from a mental healthcare institution
Facilities	*None of the answers in this cluster were significantly distinctive*	+ Locked ward (coercive admissions under mental health act) + Lockable ward + Seclusion room + Sanitary facilities for bedridden patients + Medication preparation room + Sightlines from nursing station + Injury preventing glazing + Rooms can be made safe in case of severe suicidal behavior + Video monitoring in at least one room + Pagers for nursing staff and reception + Activities room	+ Lockable ward + Sanitary facilities for bedridden patients + Medication preparation room + Sightlines from nursing station + Injury preventing glazing + Rooms can be made safe in case of severe suicidal behavior + Video monitoring in at least one room + Pagers for nursing staff and reception + Activities room - Family room

	Cluster 1 (n=7) *Lower acuity MPUs*	Cluster 2 (n=16) *CIUs with coercive admission facilities and ECT*	Cluster 3 (n=14) *Hospital-focused CIUs*
Medical staff	**Attendings** - Somatic medical specialist associated to unit	**Attendings** - Somatic medical specialist associated to unit - Psychiatrist available on call	**Attendings**
	Experience of involved medical consultants *None of the answers in this cluster were significantly distinctive*	**Experience of involved medical consultants** *None of the answers in this cluster were significantly distinctive*	**Experience of medical specialists** - Most doctors have extensive experience in diagnosing and treating patients with medical-psychiatric comorbidity
	On consultation basis (by phone) *None of the answers in this cluster were significantly distinctive*	**On consultation basis (by phone)** + Anesthesiology + Gynaecology + Intensive care + Ophthalmology + Emergency room + Urology	**On consultation basis (by phone)** + Anesthesiology + Gynaecology + Hematology + Intensive care + ENT + Ophthalmology + Plastic surgery + Emergency room + Vascular surgery + Urology
	On consultation basis (co-treatment) - No other medical specialties involved	**On consultation basis (co-treatment)** + Anesthesiology + Cardiology + Dermatology + Geriatrics + Gynaecology/Obstetrics + Hematology + Intensive care + ENT + Emergency room + Traumatology + Vascular surgery + Urology - No other medical specialties involved	**On consultation basis (co-treatment)** + Anesthesiology + Cardiology + Dermatology + Geriatrics + Gynaecology/Obstetrics + Hematology + Intensive care + ENT + Traumatology + Vascular surgery + Urology
Nursing staff	+ 100% of nursing staff has psychiatric training - 100% of nursing staff has medical training	- 1-25% of nursing staff has psychiatric training - 100% of nursing staff has medical training + Both psychiatric and medical nursing expertise available every shift	- 1-25% of nursing staff has psychiatric training - 50-75% of nursing staff has psychiatric training - 75-100% of nursing staff has psychiatric training + 100% of nursing staff has medical training + Both psychiatric and medical nursing expertise available every shift

	Cluster 1 (n=7) *Lower acuity MPUs*	Cluster 2 (n=16) *CIUs with coercive admission facilities and ECT*	Cluster 3 (n=14) *Hospital-focused CIUs*
Psychiatric acuity capabilities	*None of the negative answers in this cluster were significantly distinctive* + Group psycho-education	+ Patients that need seclusion + Seclusion + Electroconvulsive therapy available 24/7 + Occupational therapy + Cognitive behavioral therapy + Group psychoeducation + System therapy	+ Occupational therapy + Cognitive behavioral therapy + Group therapy + Memory training
Medical acuity capabilities	+ Radiologic studies on the ward + Wound care: other/explanation - Cardiac monitoring on the ward - Childbirth on the ward - Nursing of patients with paraplegia - Bone marrow biopsy - Administration of cytostatics	+ Capable of diagnosing and treating any level of medical acuity that can be handled on a general medicine ward + Post Void Residual Test + PEG-tube feeding + Total parenteral nutrition + End of life care + Infectious isolation nursing + Medium care available in hospital + High care available in hospital - Telemetry on the unit	+ Capable of diagnosing and treating any level of medical acuity that can be handled on a general medicine ward + Radiologic studies on the ward + Post Void Residual Test + PEG-tube feeding + End of life care + Medium care available in hospital + High care available in hospital + Bone marrow transplant in hospital - Cardiac monitoring on the ward - Telemetry on the unit - Childbirth on the ward
Process	**Multidisciplinary meetings** - Multidisciplinary meetings at least once a week - Surgeons involved - Joint attending rounds (bedside)	**Multidisciplinary meetings** + Regular multidisciplinary meetings + Multidisciplinary meetings at least once per week - Multidisciplinary meetings less than once per week + Occupational therapists involved	**Multidisciplinary meetings** + Regular multidisciplinary meetings + Multidisciplinary meetings at least once a week - Multidisciplinary meetings less than once a week - Surgeons involved - Neurologists involved + Psychiatrists involved + Joint attending rounds (conference)

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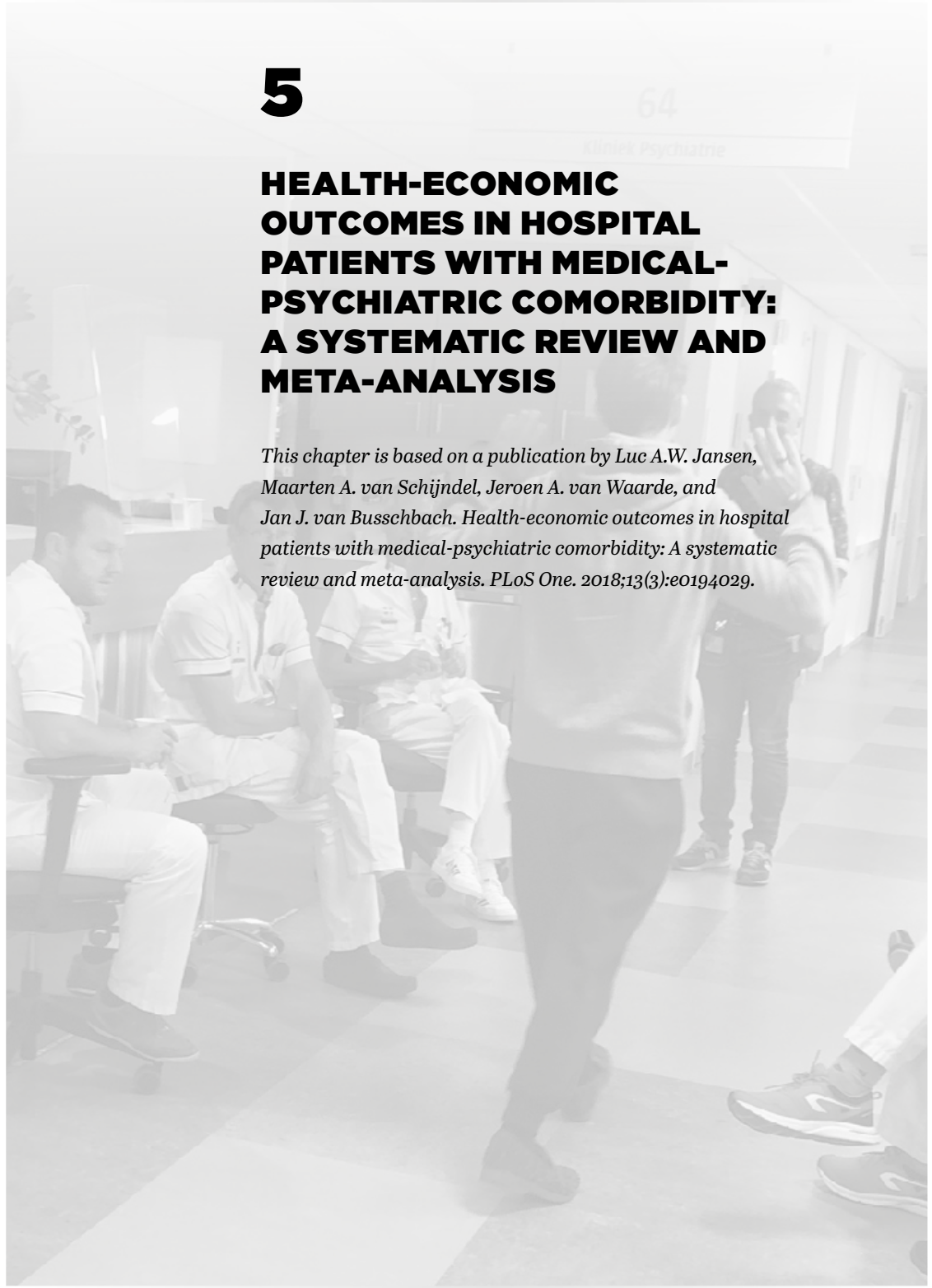
5

HEALTH-ECONOMIC OUTCOMES IN HOSPITAL PATIENTS WITH MEDICAL-PSYCHIATRIC COMORBIDITY: A SYSTEMATIC REVIEW AND META-ANALYSIS

This chapter is based on a publication by Luc A.W. Jansen, Maarten A. van Schijndel, Jeroen A. van Waarde, and Jan J. van Busschbach. Health-economic outcomes in hospital patients with medical-psychiatric comorbidity: A systematic review and meta-analysis. PLoS One. 2018;13(3):e0194029.



ABSTRACT

Background

Hospital inpatients often experience medical and psychiatric problems simultaneously. Although this implies a certain relationship between healthcare utilization and costs, this relationship has never been systematically reviewed.

Objective

The objective is to examine the extent to which medical-psychiatric comorbidities relate to health-economic outcomes in general and in different subgroups. If the relationship is significant, this would give additional reasons to facilitate the search for targeted and effective treatments for this complex population.

Method

A systematic review in Embase, Medline, Psycinfo, Cochrane, Web of Science and Google Scholar was performed up to August 2016 and included cross-references from included studies. Only peer-reviewed empirical studies examining the impact of inpatient medical-psychiatric comorbidities on three health-economic outcomes (length of stay, medical costs and rehospitalizations) were included. Study design was not an exclusion criterion, there were no restrictions on publication dates and patients included had to be over 18 years. The examined populations consisted of inpatients with medical-psychiatric comorbidities and controls. The controls were inpatients without a comorbid medical or psychiatric disorder. Non-English studies were excluded.

Results

From electronic literature databases, 3165 extracted articles were scrutinized on the basis of title and abstract. This resulted in a full-text review of 86 articles: 52 unique studies were included. The review showed that the presence of medical-psychiatric comorbidity was related to increased LOS, higher medical costs and more rehospitalizations. The meta-analysis revealed that patients with comorbid depression had an increased mean LOS of 4.38 days compared to patients without comorbidity (95% CI: 3.07 to 5.68, $I^2 = 31\%$).

Conclusions

Medical-psychiatric comorbidity is related to increased LOS, medical costs and rehospitalization; this is also shown for specific subgroups. This study had some limitations; namely, that the studies were very heterogenetic and, in some cases, of poor quality in terms of risk of bias. Nevertheless, the findings remain valid and justify the search for targeted and effective interventions for this complex population.

5.1 INTRODUCTION

Hospital inpatients often experience medical and psychiatric problems simultaneously. For patients who are admitted to hospitals for a general medical illness, the prevalence of a comorbid psychiatric disorder is estimated at 40% (1). Conversely, psychiatric patients are at increased risk of developing comorbid general medical disorders (2). The consequences of concurrent general medical and psychiatric illnesses include an increase in morbidity, mortality, healthcare utilization and costs (3). All psychiatric disorders are associated with increased morbidity, and mortality and patients who suffer from eating disorders and substance dependence have the highest risk (4-7). Numerous studies examined the relationship between medical-psychiatric comorbidities and health-economic outcomes. Most studies have evaluated the impact of comorbidities on three outcome measures: length of stay (LOS), medical costs and rehospitalization rates (8-12). These parameters are considered major cost drivers in healthcare (13). Although these studies suggest that medical-psychiatric comorbidities relate to health-economic outcomes, these outcomes have never been reviewed systematically. Furthermore, the nature of the relationship may be different for separate subgroups (8, 11, 14, 15). Meta-analyses on this subject have not been performed and, therefore, the overall pooled effect of the relationship between medical-psychiatric comorbidities and health-economic outcomes remains unknown.

5.1.1 Aims of the study

The aims of our study were as follows: 1) a systematic review of the literature to examine the relationship between medical-psychiatric comorbidity and health-economic outcomes; 2) an examination of possible differences in health-economic outcomes in patient subgroups; 3) an examination of the pooled-effect sizes for the effects of medical-psychiatric comorbidities on LOS, medical costs and rehospitalizations using meta-analyses. The importance of this review lies in its contribution to a cost-effective treatment of this complex and expensive population (16). Policy makers might use the estimation of pooled-effect sizes for the effects of medical-psychiatric comorbidity on the examined health-economic outcomes to improve the delivery of cost-effective care for patients with medical-psychiatric comorbidities. Furthermore, this review might stimulate future researchers to examine the impact of several subgroups with comorbidity on different health-economic outcomes more thoroughly.

5.2 METHOD

The literature was scrutinized by making queries in electronic literature databases and by examining cross-references in the included articles. Six electronic literature databases were examined: Embase, Medline, Cochrane, Psycinfo, Web of Science and Google Scholar. The data extraction was performed on March 3, 2015 by a biomedical information specialist and updated on August 1, 2016: the search terms used are shown in Table 1

Table 1. Search terms systematic review.

psychosomatics OR somatic* OR physical* OR medical* OR medicine NEAR psychiatr* OR mental* OR cognit* OR psychosomatic* AND comorbidity OR comorbid* multi* OR poly OR co NEAR morbid* OR patholog*OR co OR coexist* OR disorder* AND 'hospital patient OR hospitalization OR outpatient OR 'outpatient care' OR 'ambulatory care OR 'outpatient department OR hospital OR general hospital OR hospital admission OR 'hospital care OR 'university hospital OR 'hospital discharge OR hospital department OR ward OR hospital* OR inpatient* OR outpatient* OR ward* OR ambulatory*).

Table 2. Full electronic search strategy in Embase.

(psychosomatics/exp OR (((somatic* OR physical* OR medical* OR medicine) NEAR/6 (psychiatr* OR mental* OR cognit*)) OR psychosomatic*):ab,ti) AND (comorbidity/exp OR 'cluster analysis'/exp OR (comorbid* OR cluster* OR ((multi* OR poly OR co) NEAR/3 (morbid* OR patholog*)) OR (co NEXT/1 exist*) OR coexist* OR (mixed NEAR/3 disorder*)):ab,ti) AND ('hospital patient'/exp OR hospitalization/exp OR outpatient/exp OR 'outpatient care'/exp OR 'ambulatory care'/exp OR 'outpatient department'/exp OR hospital/de OR 'general hospital'/de OR 'hospital admission'/exp OR 'hospital care'/exp OR 'university hospital'/exp OR 'hospital discharge'/exp OR 'hospital department'/de OR ward/de OR (hospital* OR inpatient* OR outpatient* OR ward* OR ambulator*):ab,ti) NOT ([Conference Abstract]/lim OR [Letter]/lim OR [Note]/lim OR [Conference Paper]/lim OR [Editorial]/lim) AND [english]/lim.

and an example of a full electronic search is provided in Table 2. The search terms were adjusted to comply with the specifications of the different databases. Duplicates and non-English articles were removed. A literature search based on cross-referencing was performed on November, 27, 2015. As no new articles were included after updating the search on August 1, 2016, no new cross-referencing was performed after this point.

5.2.1 Inclusion criteria

Empirical studies that examine the effect of having either medical or psychiatric comorbidity in hospital inpatients are included. These hospital inpatients have to be either primarily medically or psychiatrically ill and aged 18 years or older. Studies had to measure the effect on any of three major health economic outcomes (length of stay and/or medical costs and/or rehospitalization), and must be published in a peer-reviewed journal. Any measure of LOS (days, mean, median, et cetera), all types of medical costs (direct and indirect), and all reports of rehospitalization (all relevant time-frames) were included as the aim was to broadly review the literature on these outcomes. Inclusion criteria were limited to these outcomes since these are most reported in literature. It was hypothesized that medical-psychiatric comorbidity has a significant impact on these outcomes; it was further expected that effects were most prominent for inpatients, because these patients are presumed to be the most severely ill. By focusing on these inclusion criteria, we aimed to decrease heterogeneity between included studies. Consequently, study design was not an exclusion criterion, and there were no restrictions on publication dates. Additionally, the examined populations had to consist of inpatients with medical-psychiatric comorbidities and controls. The controls were required to be patients without a comorbid medical or psychiatric disorder; however, the way the controls were sampled was not an exclusion criterion. Non-English articles were excluded.

Ideally, a comparison of comorbid patients (disease A and B) with patients that only have disease A or only disease B would be made. In this way, discerning whether the effect was additive or multiplicative could be estimated. However, only inpatients with disease A or B were included and compared with disease AB for reasons of feasibility.

5.2.2 Selection procedure

Two authors (LAWJ and MAvS) independently assessed 100 randomly selected titles and abstracts to validate the inclusion criteria. All obtained articles were then reviewed on the basis of title and abstract by the first author. Full texts of the included articles were then obtained. Subsequently, two authors (LAWJ and JAvW) independently assessed the selected articles in a standardized manner to further include or exclude articles for the review. Consensus was sought when disagreements between the authors on inclusion existed. When no consensus could be reached, the assessment of a third author (MAvS) was decisive. An intra-class correlation coefficient was calculated to examine the accuracy of match between the reviewers.

Thereafter, two authors (LAWJ and JAvW) read all included articles and extracted relevant data about nine predetermined characteristics: study design, patient characteristics, somatic diagnoses, psychiatric diagnoses, control group, moment of data collection (during or after treatment), LOS, medical costs, and rehospitalization rates. An electronic spreadsheet (Microsoft Excel) was used with these predetermined characteristics and available information for every included article was recorded. Again, disagreements on the collected data were resolved by discussion and, if no consensus was reached, the assessment of a third author (MAvS) was decisive.

The Newcastle-Ottawa Scale (NOS) for assessing the quality of non-randomized studies in meta-analyses was used to assess the risk of bias in each study (17). The NOS scale has been developed to assess the quality of non-randomized studies with its design. It uses a 'star system' that judges a study on three broad perspectives: selection of groups, comparability of groups, discernment of either the exposure or outcome of interest for case-control or cohort.

All included studies were rated by the first author (LAWJ) based on the NOS; using NOS, each article was rated on nine variables and could earn a maximum of '9 stars'. More stars indicates less risk of bias in the assessed article. Finally, in reporting this review, the 'Preferred reporting Items for Systematic reviews and Meta-Analyses' (PRISMA) checklist (18) was used. A review protocol was not used a priori to this systematic review.

Subgroups were selected based on the number of studies that researched the specific subgroup. Only the most extensive researched subgroups per health-economic outcome are presented in this study.

5.2.3 Meta-analyses

Meta-analyses were performed using Review Manager 5.3. In studies that reported continuous data, only those that stated means and standard deviations were included in the analyses. Furthermore, pooled-effect sizes were only reported if the (sub-)population was reasonable homogenous as this is not appropriate for heterogeneous studies (19). The heterogeneity was based on statistics where a cut-off point of an I^2 of 50% was used. A random-effects model was applied to calculate treatment effects. In order to express treatment effects, the (standard) mean differences and 95% confidence intervals (CI) were calculated. The X^2 test was used to determine the heterogeneity between included studies where I^2 values of <25% represent low heterogeneity, between 25% and 50% represent moderate heterogeneity and values >50% suggest severe heterogeneity between the studies (20). Statistical significance was assumed at $P<0.05$.

5.3 RESULTS

5.3.1 Study selection

The systematic literature search resulted in a total of 6163 articles. After removing duplicates and non-English articles, a total of 3165 studies remained. After reviewing all studies on title and abstract, a total of 86 articles were included for the full-text review. The reviewing authors agreed on the inclusion of 36 articles and the exclusion of 37 articles; an intra-correlation coefficient of 0.76 between the reviewers was estimated. Consensus was not reached for thirteen articles; after discussion, eight of these were included and five excluded. References in all 44 included articles were cross-checked. This resulted in ten extra articles to review in full text, eight of which were included. These studies did not appear in the search since the title did not refer to medical-psychiatric comorbidity but to a specific disorder. Finally, after the selection procedure, a total of 52 articles entered the definite literature review (Figure 1).

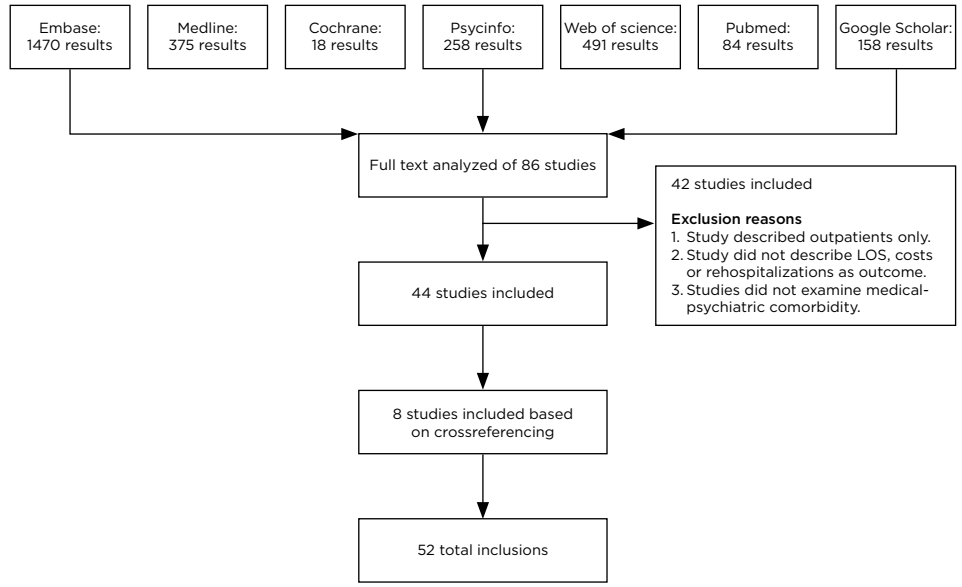


Figure 1. Flowchart of study results.

A variety of study designs were included, mostly observational in nature. Longitudinal cohort study was the most common design. No randomized clinical trials were found.

All studies compared either a medical or psychiatric index disorder, 48 articles examined patients with a medical index disorder and a psychiatric comorbid disorder and, conversely, four articles examined patients with a psychiatric index disorder and a medical comorbid disorder. The control groups consisted of inpatients without a medical or psychiatric comorbid disorder. The number of participants in the reviewed studies ranged from 63 to 1,617,710 patients. The impact of medical-psychiatric comorbidities on LOS was described in 42 (81%) articles, the impact on costs in 12 (23%) articles and on rehospitalization in ten (19%) articles. The risk of bias was assessed using the NOS and the scores ranged from the minimum (one star) to the maximum number (nine) of stars. Details of the individual studies are presented in Table 3, which is divided by outcome measure and sorted according to the NOS grading system. No additional risk of bias was performed: the risk of publication bias was low since both negative and positive findings were of interest for all measures (LOS, costs, rehospitalization).

5.3.2 Results of individual studies

Impact of medical-psychiatric comorbidities on LOS

Table 3 shows the results of the 42 included studies that examined the impact of medical-psychiatric comorbidities on LOS. Articles with the least risk of bias are shown at the top of the table and are arranged according to the NOS grading system (8, 9, 11, 12, 15, 17, 21-57). LOS was increased in patients with medical-psychiatric comorbidities compared to patients without comorbidity in 40 out of 42 (95%) articles; in 33 (79%) studies, this relationship was statistically significant (8, 11, 15, 23, 25, 26, 28-37, 39-45, 47-52, 55-57). In five (12%) articles, this relationship was non-significant (9, 12, 27, 46, 53) and in four (10%) articles, no information about statistical significance was given (21, 22, 24, 38). The remaining two (5%) studies did not show a relationship (9, 24).

Nineteen (43%) of 42 studies provided data for meta-analysis (Figure 2). The included studies appeared very heterogeneous: the range of the mean LOS in the comorbid group varied from 7.7-135.0 versus 7.2-69.8 in the control group. Because of this heterogeneity, the estimation of an overall pooled effect was not appropriate. Nevertheless, given that all results point in one direction, Figure 2 shows that medical-psychiatric comorbidities are related to increased LOS.

Impact of medical-psychiatric comorbidities on medical costs

Table 3 shows the articles that described the impact of medical-psychiatric comorbidities on medical costs. Out of 12 studies, nine (75%) showed a significant relationship (8, 11, 29, 32, 36, 53, 58-60) and three (25%) showed a non-significant relationship (10, 27, 59).

The results of five (42%) studies were included in a meta-analysis 'Fig 3'. These studies were very heterogenous and, therefore, an estimate of an overall pooled effect was not applicable. However, Figure 3 reveals that medical-psychiatric comorbidities are related to increased medical costs.

Impact of medical-psychiatric comorbidities on rehospitalization

Table 3 shows the impact of medical-psychiatric comorbidities on rehospitalization. This relationship was described in ten (19%) studies (8, 9, 44, 45, 51, 61-65); of these, nine (90%) revealed that medical-psychiatric comorbidities related to increased rehospitalizations. Seven (70%) studies found a significant increase (8, 9, 44, 51, 61, 62, 64), two (20%) noted a non-significant increase (45, 65) and one (10%) found neither an increase nor decrease (63). A meta-analysis was not executed since the data could not be used in a meta-analysis.

Table 3. Impact of medical-psychiatric comorbidity on length of stay (LOS), medical cost and rehospitalization.

Impact of medical psychiatric comorbidity on Length Of Stay						
Study	**N**	**Index disorder**	**Comorbid disorder**	**Control group**	**Length-of-stay (LOS) in days**	**NOS**
Mai et al. (21), 2011	433.388	Diabetes, COPD, congestive heart failure, convulsions and epilepsy.	Alcohol/drug disorders, Schizophrenia Affective psychoses, Other psychoses Neurotic disorders, Personality disorders Adjustment disorders, Depressive disorders, Other mental disorders.	No psychiatric comorbidity	Average LOS with comorbidity 6.1 vs. without comorbidity 4.4.	9
Furlanetto et al. (22), 2003	317	Cardiovascular, Gastrointestinal, Neoplasms, Pulmonary, Infectious.	Cognitive impairment, depressive disorders, substance related disorders, adjustment disorders, anxiety disorders.	No psychiatric comorbidity	Mean LOS with comorbidity 14.7 (SD 13.8) vs. without comorbidity 12.1 (SD 9.9), LOS with comorbid cognitive impairment significantly prolonged (F=17.8 P<0.01).	8
Bressi et al. (23), 2006	1.617.710	In order to identify patients hospitalized for medical conditions, patients having a primary mental diagnosis were excluded.	Schizophrenia, major mood disorders and substance abuse disorders.	No psychiatric comorbidity	Mean LOS with comorbidity 0.15 days longer (P<0.001) vs. patients without comorbidity. Mean LOS with comorbid schizophrenia 0.86 days longer (P<0.0001). Mean LOS with comorbid mood disorder 0.26 days longer (P<0.0001). Mean LOS with substance abuse 0.25 shorter (P<0.001).	8
Hansen et al. (24), 2001	157	Consecutive inpatients department of internal medicine.	Patients with comorbid mental illness.	No psychiatric comorbidity	OR LOS>=10 days with any mental disorder=0.5 (0.2-1.3). OR LOS>=5 days with any mental disorder=0.9 (0.4-2.4).	8
Saravay et al. (25), 1991	278	Patients from medical, surgical and gynecology floor.	Psychiatric illness; measured with MMSE, Zung Depression Inventory, SCL-90.	No psychiatric comorbidity	Mean LOS is significantly related with comorbid organicity (P=0.004), depression (P=0.03), and anxiety (P=0.05)	8
Bourgeois et al. (26), 2005	31.846	All medical diagnosis.	All psychiatric illness.	No psychiatric comorbidity	Mean LOS with comorbid adjustment disorder 5.68 (1999), 7.96 (2000) 8.85 (2001) vs. no psychiatric disorder and substance use disorders 3.29, 3.43, 3.51 respectively (P<0.001).	8
Benzer et al. (27), 2012	21.716	All medical diagnosis.	Patients with post discharge mental health care.	No psychiatric comorbidity	Mean LOS with post-discharge mental health care: 7.86 (SD 21.1) vs no mental health care post-discharge: 7.2 (SD 15.4) days (non sig.).	8

Fulop et al. (28), 1989	66.637	Craniotomy, nervous system neoplasm, cerebrovascular disorder, respiratory neoplasm, bronchitis and asthma, circulatory disorder, heart failure I, bowel procedure, digestive malignancy, cirrhosis, renal failure, chemotherapy, operation room procedure.	All psychiatric diagnosis.	No psychiatric comorbidity	All 13 somatic diagnosis related groups (DRG) with psychiatric comorbidity have significant longer mean LOS than without comorbidity.	8
Levenson et al. (29), 1990	455	All medical diagnosis.	Very depressed; very anxious; cognitive impairment; high pain levels.	Low level of psycho-pathology	Mean LOS in high level patients: 11.5 (SD 12.4) in low level 8.7 (S D11.9) (P<0.001).	8
Fulop et al. (30), 1987	59.259	All medical and surgical patients.	Organic mental disorder (delirium, substance abuse).	No psychiatric comorbidity	Mean LOS with comorbidity: 19.8 (SD 33.3) vs. without 9.2 (SD 15.3) (P=0.001) in NYC; 13.7 (SD 27.7) vs. 8.3 (SD 13.2) in Chicago (P=0.001).	7
Hochlehnert et al. (11), 2011	1063	Cardiovascular inpatients.	Depressive disorders, anxiety disorders, somatoform disorders, organic psychiatric disorders, adjustment disorders, substance dependence, schizophrenic disorders, and other diagnosis.	No psychiatric comorbidity	Mean LOS of patients with psychiatric comorbidity significantly longer compared to patients without psychiatric comorbidity (F1.11=34.04; P<0.001).	7
Schubert et al. (31), 1995	532	Psychosis, depression, personality disorder, anxiety disorder, adjustment disorder, bipolar disorder, other psychiatric disorders.	Physical illness.	No somatic comorbidity	Mean LOS significant longer with comorbidity 19.31 vs. without 13.13. Depression with somatic comorbidity significant longer 20.08 (SD 24.8) than without 11.48 (SD 11.88).	7
Zatzick et al. (32), 2000	10.561	Diabetes, hypertension, chronic liver disease, ischemic heart disease, degenerative nervous conditions, epilepsy, obesity, and coagulation defects, HIV infection.	Alcohol abuse, alcohol dependence, drug abuse, drug dependence, anxiety disorders, bipolar disorders, childhood disorders, delirium, dementia, depression, disorders attributable to organic brain damage, personality disorders, psychoses, stress disorders, and other disorders.	No psychiatric comorbidity	Mean LOS 10% shorter with alcohol abuse (P=<0.01) than without. Mean LOS 60% to 103% longer with delirium, psychoses and stress-disorder (P=<0.01) than without.	7
Koenig et al. (33), 1998	542	60 years and older cardiology and neurology patients.	Depressed patients.	No psychiatric comorbidity	Mean LOS with comorbid major depression 12.1 (SD 19.8) vs. without depression 5.7 (SD 12.8) (P=<0.001).	7

Fulop et al. (34), 1998	467	Patients 65 years or older with a medical disorder.	Cognitive impairment, depression or anxiety disorder.	No psychiatric comorbidity	Mean LOS with comorbidity 13.1 (SD 13.0) vs. without 10.5 (SD 11.7) (P=0.025). LOS with depressive disorder 11.0 (SD 13.1) vs. without 11.8 (SD 12.5) (P=0.51).	7
Adams et al. (8), 2015	12.283	Patients 65 years or older with a medical disorder.	Organic, substance abuse, schizophrenia, mood, neurotic/ stress, physiological/physical, personality disorder.	No psychiatric comorbidity	Mean LOS with comorbidity 16.06 vs. without 11.5 (P=<0.001).	7
Ismail et al. (12), 2014	477	All medical diagnosis.	Dementia; subgroup psychosis (with or without dementia).	No psychiatric comorbidity	Mean LOS geriatric dementia patients 74.7 (SD 93.7) without dementia 69.9 (SD 87.5). Geometric mean LOS 38.1 with dementia vs. 34.6 without (P=0.32).	7
Hosaka et al. (35), 1999	65	Malignancy.	Major depression.	No psychiatric comorbidity	Mean LOS benign with major depression 135.0 (SD 160.7) without 69.7(SD 61.9) (P=<0.05).	7
Sayers et al. (36), 2007	20.429	Patients 65 years of older with one acute care hospitalization of congestive heart failure.	Alcohol abuse, drug abuse, psychosis, depression, bipolar disorders, anxiety disorders, and other psychiatric conditions.	No psychiatric comorbidity	Comorbid psychoses additional mean LOS 1.06 days (P=<0.001). Comorbid depression additional mean LOS 0.89 days (P=<0.001). Comorbid bipolar disorder additional mean LOS 1.43 days (P=0.02).	7
Smith et al. (37), 2014	63	Idiopathic Pulmonary Fibrosis (IPF), COPD, C.F	Delirium.	No psychiatric comorbidity	Presence of delirium was associated with longer duration of hospitalization (P=0.006).	6
Wancata et al. (38), 2001	821	Diseases of the circulatory system, diseases of digestive and genitourinary system.	Dementia, minor depression and substance abuse disorders.	No psychiatric comorbidity	Mean LOS with comorbidity 17.6 vs. without 11.5. Dementia 1.35 (1.16-1.57) substance abuse disorders 1.24 (1.04-1.48) Alcohol- & drug related psychiatric disorders 1.54 (1.13-2.11) significantly associated with longer LOS.	6
Ceilley et al (39)., 2005	87	Depressive disorder, bipolar disorders, psychotic disorders.	Osteoarthritis, viral hepatitis C COPD.	No somatic comorbidity	Mean LOS with somatic comorbidity 12.3 (SD 5.2) vs. 9.1 (SD 3.7) (P=0.003).	6
Davydow et al. (40), 2011	3.591	Diabetes.	Depression.	No psychiatric comorbidity	Mean LOS no depression 7.9 (SD 9.9) major depression 12.2 (SD 16.8) (P<0.001).	6
Chwastiak et al. (9), 2014	82.060	Diabetes, Heart failure, renal failure, hypertension complicated, peripheral vascular.	Bipolar disorder, schizophrenia, psychotic disorders delusional disorder and nonorganic psychoses.	No psychiatric comorbidity	No comorbidity median 3 days Inter Quartile Rang (IQR): 2–4 vs. severe Mental illness: median 3 days IQR: 2–4.	6

Bourgeois et al. (41), 2006	155	All medical diagnosis.	Delirium, dementia, and both.	General hosp. population	Mean LOS with comorbidity 13 vs. 3 without.	6
Bourgeois et al. (15), 2009	157	Hospital population.	Cognitive disorders (primarily dementia and delirium or both).	No psychiatric comorbidity	Mean LOS with comorbidity 18.6 vs. 3 without.	6
Stevens et al. (42), 1998	42	All medical diagnosis.	Delirious patients.	No psychiatric comorbidity	Median LOS cases 20.0 (1-117) vs. controls 8.0 (1-171) , delirious LOS sig. longer 2.2 (1.5-3.3) than controls.	6
Uldall et al. (43), 1994	357	AIDS.	Mood disorders, substance use disorders, organic psychiatric disorders, anxiety disorders, and adjustment disorders.	No psychiatric comorbidity	LOS with comorbidity 16.8 (SD 15.0) vs. without 10.2 (SD 19.1) (P=0.01).	6
Borckardt et al. (44) 2011	10.865	All medical diagnosis except emergency room stays.	Patients receiving outpatient treatment.	No psychiatric comorbidity	Mean LOS with inpatient psychiatry consultation 9.39 vs. without 4.63 (P=<0.001).	6
Boustani et al. (45), 2010	995	Patients 65 or older admitted to medical services.	Delirium.	No psychiatric comorbidity	Mean LOS with comorbid delirium 9.2 vs. 5.9 without (P=<0.001).	5
Morris et al. (46), 1990	110	Peptic ulcer parenchymal liver disease intestinal malignancy.	General Health Questionnaire (GHQ) case.	GHQ noncase	Mean LOS with comorbidity 8.7 (SD5.9) vs. without 8.3 (SD5.7) (non-significant).	5
Verbosky et al. (47), 1993	48	All.	Depression.	No psychiatric comorbidity	Mean LOS with comorbid depression 20 (range 2-95) vs. without 10 (range 2-51) (P=0.02).	5
Erdur et al. (48), 2012	41	Anorexia Nervosa (AN).	Predominantly internal diseases.	No somatic comorbidity	Mean LOS with somatic comorbidity 66.6 (SD 50.3) vs. without 50.0 (SD 47.0) (P=0.05).	4
Sloan et al. (49), 1999	2323	Psychosis, depression, personality disorder, anxiety disorder, adjustment disorder, bipolar disorder, other disorders.	Physical illnesses were limited to those appearing in the (ICD 9).	No somatic comorbidity	Mean LOS with somatic comorbidity 20.0 vs. without 16.6 (P=<0.001).	4
Ackerman et al. (50), 1988	92	All medical diagnosis.	A form of depressive disorder.	No psychiatric comorbidity	Mean LOS with comorbid depression 2.52 days longer than without (P<0.001)	4
Uldall et al. (51), 1998	2834	AIDS.	Dementia, delirium, schizophrenia, psychosis, depression, bipolar-, anxiety-, adjustment-, personality-disorder, alcohol-, drug-dependence, alcohol-, drug-abuse.	No psychiatric comorbidity	Median LOS with comorbidity 9.0 vs. without 7.0 (P=<0.001).	4
McCusker et al. (52), 2003	359	Patients 65 or older with a medical admission.	Delirium.	No psychiatric comorbidity	Mean LOS prevalent delirium 16.2 (SD 13.2) vs. without 12.6 (SD11.8) (non sig.). Mean LOS incident delirium 20.2 (SD 14.2) vs. without 10.7 (SD9.8) (sig.).	4
Creed et al. (53), 2002	263	Patients admitted to an acute medical ward.	Depression and anxiety.	No psychiatric comorbidity	Median LOS with comorbidity 9.0 (6-20) vs. 7.0 (4-18) without (non sig.).	4
Schubert et al. (54), 1992	31	Stroke or Amputation.	Depression, according to the geriatric depression scale.	No psychiatric comorbidity	Correlation CVA and depression +0.575 (P<0.05) an between amputation patients and depression +0.266 (non. sig) indicating longer LOS.	4
Douzenis et al. (55) 2012	428	Schizophrenia and bipolar patients.	Endocrine Circulatory Nervous Respiratory Musculoskeletal Blood Skin.	No somatic comorbidity	Mean LOS with comorbid bipolar disorder 16.8 (SD 8.8) was significantly lower than comorbid schizophrenia 19.57 (SD 11.2).	4
Mojet et al. (57), 1989	17687	All medical diagnosis.	Consultation Liaison (C-L).	No CL consultation	Mean LOS with CL 26.1 vs. without 11.1.	4
Johansen et al. (56), 2012	*Not reported	Patients admitted to an acute care medical ward.	Patients with mental illness (most: organic (delirium/dementia), mood disorders and schizophrenia).	No psychiatric comorbidity	Average LOS with comorbidity 15.3 vs. without 5.8. Comorbidity 2.7-fold increase in LOS vs. without comorbidity.	1

Impact of medical psychiatric comorbidity on medical costs

Study	N	Index disorder	Comorbid disorder	Control group	Medical costs	NOS
Benzer et al. (27), 2012	21.716	All medical diagnosis.	Patients with post discharge mental health care.	No psychiatric comorbidity	Total cost (inpatient, outpatient and pharmacy costs) ($) with mental health care post-discharge: 29.566 (SD 31.577) vs. without 20.611 (SD 26.855) (non sig.).	8
Levenson et al. (29), 1990	455	All medical diagnosis.	Very depressed; very anxious; cognitive impairment; high pain levels.	Low level of psychopathology	Mean total hospital costs high level patients 7634 (SD 10484) dollar vs. low level 5643 (SD 7411) dollar (P=<0.003).	8
Hochlehnert et al. (11), 2011	1063	Cardiovascular inpatients.	Depressive disorders, anxiety disorders, somatoform disorders, organic psychiatric disorders, adjustment disorders, substance dependence, schizophrenic disorders, and other diagnosis.	No psychiatric comorbidity	Average total cost with psychiatric comorbidity 7663 (SE 571) vs. without 5142 (SE 210) (sig.).	7
Druss et al. (58), 1999	77.183	All medical diagnosis.	Major depression, depressive symptoms only, substance abuse, comorbid depression and substance abuse.	No psychiatric comorbidity	Total increased inpatient costs compared to patients without these comorbidities: depression/substance abuse 1033$, depressive symptoms 861$, major depression 1581$, substance abuse 1244$, depression with substance abuse 4681$ (P<0.001).	7

Haas et al. (10), 2012	127	Anorexia Nervosa.	All medical diagnosis.	No anorexia nervosa	Number of comorbidity groups per patient is not significantly related to increased costs gamma -0.018 (0.02).	7
Zatzick et al. (32), 2000	10.561	Diabetes, hypertension, chronic liver disease, ischemic heart disease, degenerative nervous conditions, epilepsy, obesity, and coagulation defects, HIV infection.	Alcohol abuse, alcohol dependence, drug abuse, drug dependence, anxiety disorders, bipolar disorders, childhood disorders, delirium, dementia, depression, disorders attributable to organic brain damage, personality disorders, psychoses, stress disorders, and other disorders.	No psychiatric comorbidity	Costs 10% decrease with alcohol abuse (p=<0.01) than without. Costs 60% to 103% increase with delirium, psychoses and stress-disorder (P=<0.01) vs. without. Total costs in patients with delirium, psychoses, and stress-disorders 46% to 93% higher costs vs. no comorbidity.	7
Adams et al. (8), 2015	12.283	Patients 65 years or older with a medical disorder.	Organic, substance abuse, schizophrenia, mood, neurotic/stress, physiological/physical, personality disorder.	No psychiatric comorbidity	Hospital costs with mental illness $24.076 (SD 49.320) vs without mental illness $10.473 (SD 17.391) (P=<0.001).	7
Sayers et al. (36), 2007	20.429	Patients 65 years of older with one acute care hospitalization of congestive heart failure.	Alcohol abuse, drug abuse, psychosis, depression, bipolar disorders, anxiety disorders, and other psychiatric conditions.	No psychiatric comorbidity	Psychiatric comorbidities, associated with higher total hospitalization costs 7.294$ (P=0.001)..	7
Shen et al. (59), 2008	2440	Asthma, diabetes, heart disease hypertension and osteoarthritis.	Affective disorders, anxiety, somatoform, dissociative, personality disorders; schizophrenia.	No psychiatric comorbidity	Mean inpatient costs with mental illness 2.731$ vs. without mental illness 2072$ (non sig.).	6
Borckardt et al. (44), 2011	10.865	All medical diagnosis except emergency room stays.	Patients receiving outpatient treatment.	No psychiatric comorbidity	Mean total costs patients receiving psychiatry consultation 25.773$ vs. without consultation 9672$ (P<.001).	6
Welch et al. (60), 2009	618.780	Asthma, back pain, diabetes, epilepsy, headache, hypertension, IVDD, obesity, joint pain, CHF, CAD.	Depressed.	No psychiatric comorbidity	Inpatient costs significantly increased in coronary artery disease 1890$, epilepsy 2.560$ and congestive heart failure 13900$ vs. no comorbid depression.	5
Creed et al. (53), 2002	263	Patients admitted to an acute medical ward.	Depression and anxiety.	No psychiatric comorbidity	Mean total healthcare costs cases $8,541 (SE $605) vs. without $5,857 (SE $859) (P=0.01).	4

Impact of medical psychiatric comorbidity on rehospitalization

Study	N	Index disorder	Comorbid disorder	Control group	Rehospiralizations	NOS
Kartha et al. (61), 2007	144	Medical inpatients.	Major depression.	Non-rehospitalisation	Comorbid depression tripled the odds of rehospitalization (OR=3.3) (95%CI=1.2 to 9.3).	8
Saravay et al. (62), 1996	273	Medical and surgical inpatients.	Depression, obsessive compulsive-, anxiety disorder, psychoticism, hostility, interpersonal sensitivity.	No psychiatric comorbidity	Compared to the rest of the study group, the cognitively impaired patients averaged twice as many rehospitalizations (sig.).	8
Adams et al. (8), 2015	12.283	Patients 65 years or older with a medical disorder.	Organic, substance abuse, schizophrenia, mood, neurotic/stress, physiological/physical, personality disorder.	No psychiatric comorbidity	Rate of readmission in elderly with mental illness 1.87 (SD=1.20) vs without 1.50 (SD=1.03) (P<0.001).	7
Chang et al. (63), 2001	164	Digestive and cardiovascular disease.	Major depression and anxiety disorders.	No readmission	No significant difference in readmission between patients with medical-psychiatric comorbidity and without.	6
Chwastiak et al. (9), 2014	82.060	Diabetes, Heart failure, renal failure, hypertension complicated, peripheral vascular.	Bipolar disorder, schizophrenia, psychotic disorders delusional disorder and nonorganic psychoses.	No psychiatric comorbidity	Increased odds of rehospitalization in patients with Serous Mental Illness vs. no SMI within next month (OR 1.24) (1.07-1.44) (P=0.006).	6
Jiang et al. (64), 2001	374	Congestive heart failure.	Mild or major depression.	No psychiatric comorbidity	Major depression associated with increased odds of readmission at 3 months (OR=1.9, P0.04) and one year (OR=3.07, P=0.005).	6
Borckardt et al. (44), 2011	10.865	All medical diagnosis except emergency room stays.	Patients receiving outpatient treatment.	No psychiatric comorbidity	Number of hospitalizations within 6 months with psychiatric comorbidity 1.6 vs. without 1.34 (P=.001).	6
Boustani et al. (45), 2010	995	Patients 65 or older admitted to medical services.	Delirium.	No psychiatric comorbidity	Readmission within 30 days after discharge with delirium 22.5% vs. without 17.8% (P=0.50).	5
Uldall et al. (51), 1998	2834	AIDS.	Dementia, delirium, schizophrenia, psychosis, depression, bipolar-, anxiety-, adjustment-, personality-disorder, alcohol-, drug-dependence, alcohol-, drug-abuse.	No psychiatric comorbidity	Median number of admissions with comorbidity 2 vs. without 1 (P<0.001).	4
Evans et al. (65), 1988	532	Medical/surgical patients.	Psychiatric comorbidity was defined as any of the ICD-9-CM/DSM-3 psychiatric diagnosis codes.	No psychiatric comorbidity	No significant difference in readmission rate between patients with mental disorders and without.	4

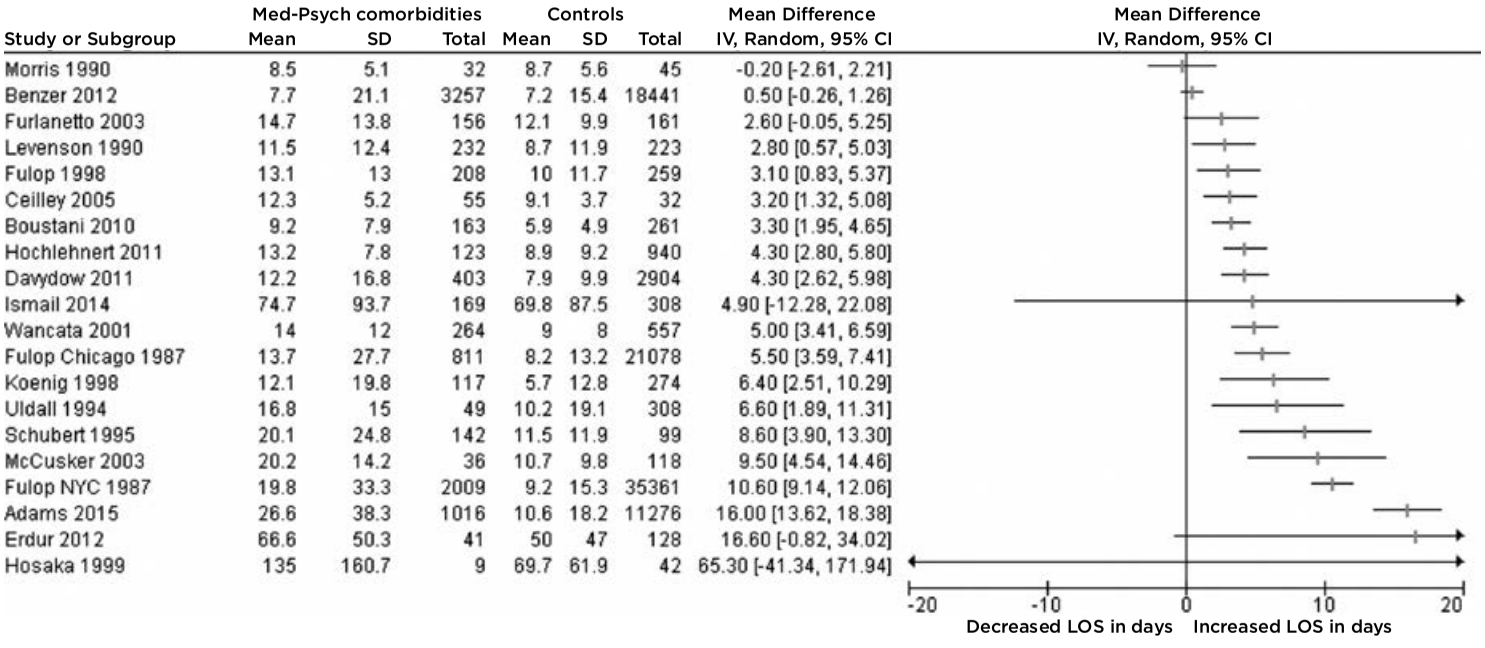


Figure 2. Relation of medical-psychiatric comorbidity and length of stay (LOS) (Because the study of Fulop et al. [1987] included two separate samples in two hospitals, both outcomes are included in the analyses).

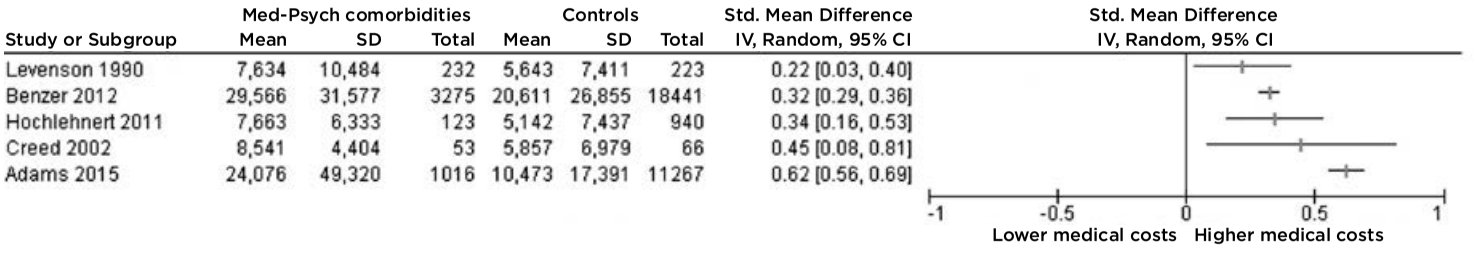


Figure 3. Relationship between medical-psychiatric comorbidity and medical costs.

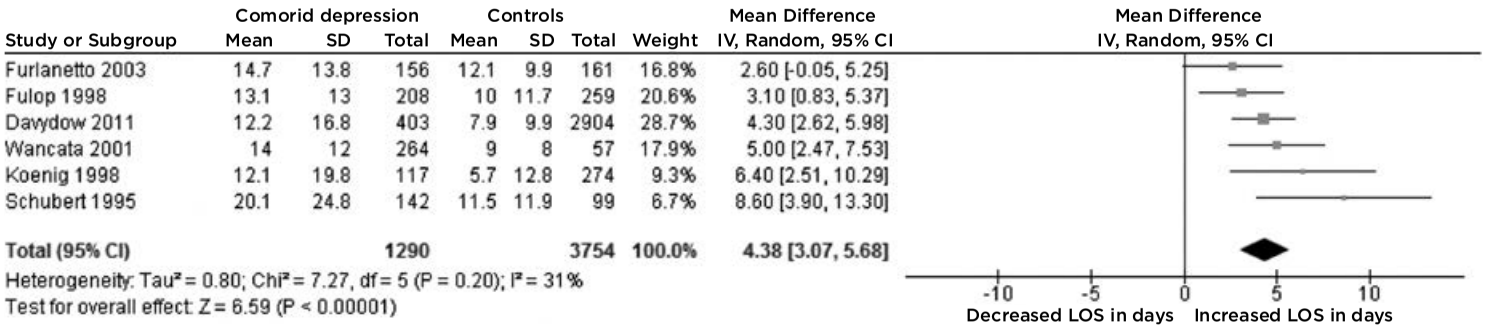


Figure 4. Meta-analysis in the subgroup depression examining the impact on length of stay (LOS).

Impact of different subgroups on health-economic outcomes
In the reviewed studies, two subgroups – depression and delirium – appeared to be extensively studied and were suitable for further subgroup analysis.

Impact of comorbid depression and delirium on LOS
The relationship between comorbid depression and LOS was examined in 16 out of 43 (37%) studies; of these, 11 studies (69%) showed a significant relationship (23, 25, 31, 33, 35, 36, 40, 47, 49, 50, 54); two studies (13%) showed a non-significant relationship (38, 51), two (13%) no effect (22, 26) and one (6%) study demonstrated a non-significant relationship between shorter LOS and comorbid depression (34).

Six studies provided suitable data for meta-analysis; the overall pooled mean difference in Figure 4 showed that patients with comorbid depression had an LOS that was 4.38 days longer than patients without comorbid depression (mean LOS: 4.38 days; 95% CI: 3.07 to 5.68 days). The weighted average mean LOS of the depressed group was 13.8 days as opposed to 10.5 days for the non-depressed group.

Another extensively studied subgroup consisted of patients with comorbid delirium. Seven (16%) articles found a relationship between comorbid delirious patients and increased LOS compared to patients without comorbid delirium; five studies (71%) showed a significant relationship (32, 37, 42, 45, 52) and two studies (29%) a non-significant relationship (41, 51). The data in these articles were not sufficient to perform a meta-analysis.

Impact of comorbid depression on medical costs
The relationship between comorbid depression and medical costs was examined in six (46%) studies; of these, five (92%) showed significantly higher medical costs in comorbid depressed patients compared to patients without comorbid depression (29, 36, 53, 58, 60). One (8%) study indicated a non-significant relationship (32). A meta-analysis was not performed as only two articles provided limited data.

Impact of comorbid depression on rehospitalization
The relationship between medical-psychiatric comorbidities and rehospitalization was, again, extensively examined in the subgroup with comorbid depression compared to patients without comorbid depression. This was described explicitly in four (40%) reviewed articles. Two (50%) studies found that the odds ratio for rehospitalization was significantly higher in patients with comorbid depression (51, 64). Another study (25%) showed that patients with comorbid depression and a history of prior hospitalizations within six months were three times more likely to be rehospitalized within 90 days (61). One (25%) study did not find a significant increase of the odds ratio for rehospitalization in patients with comorbid depression (63). Meta-analysis for this subgroup was not possible because only one article provided useful data.

5.4 DISCUSSION

To our knowledge this is the first review that examined the relationship between medical-psychiatric comorbidity and health-economic outcomes. Our analysis shows that hospital inpatients having medical-psychiatric comorbidities have a longer LOS, higher medical costs and more rehospitalizations. No randomized trials were found, however, and only one included study reached the highest standardized NOS quality score. The pooled-effect measures were often not appropriate to interpret since the available studies were very heterogeneous (19). Nevertheless, the (standardized) mean differences of all meta-analyses indicate that medical-psychiatric comorbidity is indeed related to increased health-economic outcomes. Moreover, the subgroup of depressed patients shows an increased mean LOS of 4.38 days compared to patients without depression: this outcome was moderately heterogeneous (I^2=31%) and was therefore considered appropriate.

5.4.1 Policy and clinical implications

Our systematic literature review elucidates the importance of medical-psychiatric comorbidities on health-economic outcomes. It is, consequently, disappointing to find that the quality of the included studies was mostly limited and that the heterogeneity of study samples was huge. Future studies on quality improvement strategies should therefore examine the impact of medical-psychiatric comorbidities on health-economic outcomes. This will help care providers and policy makers to organize care for patients with medical-psychiatric comorbidity in the most efficient way.

Our literature review suggests that the depressed subgroup of medical-psychiatric comorbid patients has stronger relationships with health-economics outcomes in comparison to non-depressed patients. For the first time in literature, we have established that, on average, hospital inpatients with comorbid depression stay in the hospital 4.38 days longer than non-depressed patients. In the Netherlands, the costs of a medical inpatient day range from €435 to €575 (66). Based on the results of our review, the average medical costs in this country for patients with comorbid depression are increased to €1905-€2520 compared to patients without comorbidity. Researchers, care providers, policy makers and health insurers might use these outcomes for future research and healthcare policy making to improve cost-effective care for this subgroup. Furthermore, future prospective and randomized research should examine the impact of specific subgroups on health-economic outcomes more thoroughly to help hospitals improve cost-effective care for different subgroups with medical-psychiatric comorbidity.

5.4.2 Limitations

Although a thorough and extensive electronic search was performed on 6163 titles, this systematic literature review had several limitations.

First, the included studies were highly heterogenic regarding the patient population, type of hospital, country and year; thus, the results were difficult to compare, which reduced the possibility of investigating a pooled effect. Therefore, the magnitude of the impact on health-economic outcomes remains uncertain.

Ideally, patients with medical-psychiatric comorbidity were compared to studies that examined the medical and psychiatric illness separately. In this way, it might be possible to examine whether the effect of different combinations of medical and psychiatric illness was additive or multiplicative. For reasons of feasibility, our search strategy was narrowed to the impact of medical-psychiatric comorbidity on inpatients (as opposed to inpatients without psychiatric comorbidity) on health-economic outcomes. It was anticipated that including all possible combinations of general medical and psychiatric illnesses in the search would lead to an unmanageable number of included papers.

Second, in the past decades, the average LOS in hospitals has been largely reduced, which made it harder to compare studies over time. Publication date was not an exclusion criterion; hence, some studies were published more than two decades ago. As such, the results in these studies could reflect hospital-care patterns that have since changed.

Next, the search in the literature list led to the inclusion of eight extra titles. These titles were not found in the extensive search strategy since they described a specific disorder and the focus of the search was on medical-psychiatric comorbidity in general. While developing the electronic search strategy, it was explicitly decided to not include specific disorders since there was no clear cut-off point to determine when to stop including specific disorders in the search terms. Furthermore, if all disorders that exist in the literature were included in the search, the results of the literature search would be too broad.

Subsequently, the studies that examined medical costs had some methodological variation in terms of sampling and reporting those costs. Some studies examined the impact of total costs (inpatient, outpatient, pharmacy) and some only the in-hospital costs. Nevertheless, the evidence of almost all studies concerning the relationship between medical costs and medical-psychiatric comorbidities pointed in the same direction. Consequently, it was suggested that comorbidity had an increasing effect on medical costs.

Moreover, the quality of the reviewed studies was variable and only one study received the full nine stars on the NOS (17). Thus, the strength of the evidence differed among the three health-economic outcomes. Most studies examined the impact of medical-psychiatric comorbidities on LOS. As 95% of these studies showed an increased LOS, this relationship with medical-psychiatric comorbidities seemed the most reliable.

Another limitation of our study was that only one author rated the included articles. However, since almost all individual articles found results that pointed in the same direction, the risk of bias in the studies did not seem to impact the overall findings of this review. Additionally, there is a possible publication bias since only peer-reviewed articles were included. A study protocol was not developed in advance of this systematic review; it would therefore be challenging to note deviations and to assess if the outcomes of the review are reported according to the original study plan.

Finally, two subgroups of patients (comorbid depression and delirium) were comprehensively researched and therefore the results of studies that described these subgroups were used in the meta-analysis. This analysis was not predetermined but carried out post hoc since these groups appeared to be the most extensively studied in the included papers. Since the search was not focused on these subgroups, some literature that describes the impact of depression and a somatic comorbidity on health-economic outcomes may have been overlooked. Nevertheless, future researchers can use the results of this research to examine the impact of subgroups with a specific psychiatric disorder and a medical comorbidity.

Despite these limitations, the main conclusions of this review remain valid and clearly indicate, firstly, that general hospital inpatients with medical-psychiatric comorbidities showed longer LOS, higher medical costs and more rehospitalizations and, secondly, that the subgroup of depressed patients showed an increased mean LOS of 4.38 days compared to patients without depression.

5.4.3 Conclusion

This systematic literature review found a relationship between medical-psychiatric comorbidities and health-economic outcomes (LOS, medical costs and rehospitalizations). The meta-analysis for the subgroup depression showed an increased LOS (on average 4.38 days longer inpatient stay) compared to patients without depression. These results demonstrate that, on average, the medical costs for this subgroup are between €1905 and €2550 higher than patients without a comorbid depression. Policy makers might use these results to improve cost-effective care for this subgroup. Based on our results, we suggest that future research should examine the impact of several subgroups with medical-psychiatric comorbidity on health-economic outcomes more thoroughly.

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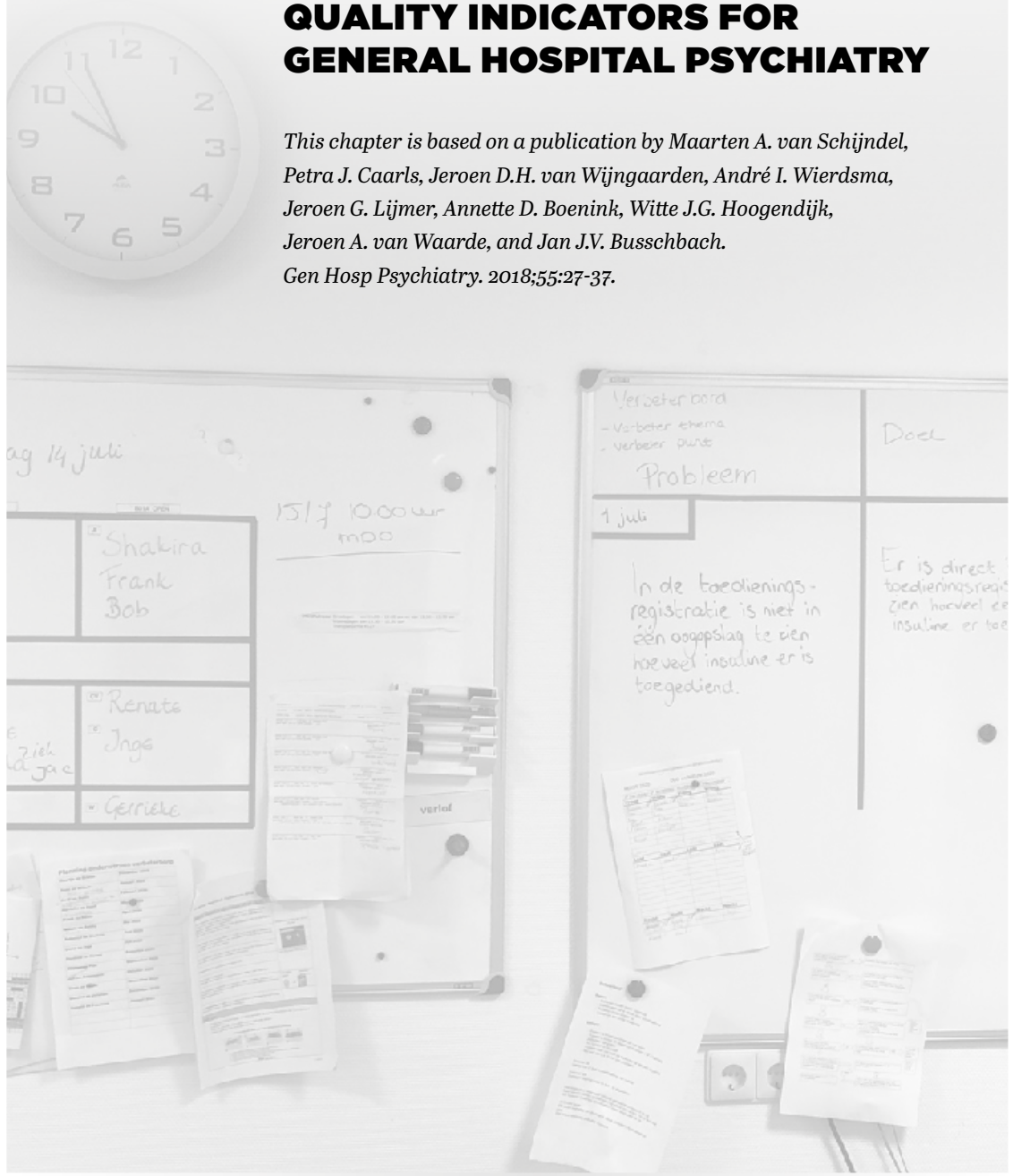
6

IDENTIFYING VALUE-BASED QUALITY INDICATORS FOR GENERAL HOSPITAL PSYCHIATRY

This chapter is based on a publication by Maarten A. van Schijndel, Petra J. Caarls, Jeroen D.H. van Wijngaarden, André I. Wierdsma, Jeroen G. Lijmer, Annette D. Boenink, Witte J.G. Hoogendijk, Jeroen A. van Waarde, and Jan J.V. Busschbach.
Gen Hosp Psychiatry. 2018;55:27-37.



ABSTRACT

Objective

To define generic quality indicators for general hospital psychiatry from the perspectives of patients, professionals (physicians, nurses, and managers), and payers (health insurance companies).

Methods

Quality variables were identified by reviewing the relevant literature. A working group consisting of patients', professionals' and payers' representatives was mandated by their respective umbrella organizations. The working group prioritized the quality variables that were identified. Core values were defined and subsequently linked to preliminary quality indicators. These were tested for feasibility in ten hospitals in a four-week period. Stakeholder consultation took place by means of two invitational conferences and two written commentary rounds.

Results

Forty-one quality variables were identified from the literature. After prioritization, seven core values were defined and translated to 22 preliminary indicators. Overall, the feasibility study showed high relevance scores and good implementability of the preliminary quality indicators. A final set of twenty-two quality indicators (17 structure, 3 process and 2 outcome indicators) was then established using a consensus-based approach.

Conclusion

Consensus on a quality framework for general hospital psychiatry was built by incorporating the perspectives of relevant stakeholders. Results of the feasibility study suggest broad support and good implementability of the final quality indicators. Structural indicators were broadly defined, and process and outcome indicators are generic to facilitate quality measurement across settings. The quality indicator set can now be used to facilitate quality and outcome assessment, stimulate standardization of services, and help demonstrate (cost-) effectiveness.

6.1 INTRODUCTION

Many medical specialties use quality indicators to standardize treatments and optimize quality. The lack of standardization in service delivery, quality assessment, and measurement of outcomes in general hospital psychiatry hampers the demonstration of (cost-) effectiveness (1-5). This places the field behind hospital peers (6).

Recently, several initiatives have been undertaken to close the gap. For standardization in service delivery, the UK PLAN standards (Psychiatric Liaison Accreditation Network) include service structure, service delivery and procedures, evaluation of quality, and scope of practice. In addition, peer-review inspection visits have been introduced (7). The recent Dutch 'Guideline on Consultation-Liaison psychiatry' includes both organization of care and clinical recommendations (8). Additionally, field norms were formulated in the Netherlands for the optimal organization of Type IV medical psychiatry units (9).

In general, outcome measurement in hospital psychiatry is directed towards clinical effectiveness, user views, and impact on health-service use (10). Because of the heterogeneity in patient population and organizational contexts, the challenge for our field is to define quality indicators that can be used for a broad range of patients and in a broad range of settings. Proper quality indicators should be well defined, relatable to clear goals, feasible, scientifically acceptable, and able to facilitate care improvements. The UK 'Framework for Routine Outcome Measurement in Liaison Psychiatry' (FROM-LP) is the only comprehensive national outcome measurement initiative for liaison psychiatry to date (11). We set out to develop a value-based quality measurement framework for the Netherlands. The main objective of this study is to define generic, value-based quality indicators for psychiatry in the Dutch general hospital context. The perspectives of patients, providers, and payers were considered in defining value and testing for feasibility.

6.2 METHOD

6.2.1 Overview of the development process

The development process started in March 2015 and was completed in December 2016. This research was funded by a formalized quality network of patients, mental healtcare providers, and health insurance companies (payers). These stakeholders were asked to join the advisory group of stakeholder umbrella organizations. This advisory group could suggest additional stakeholders and mandated individual working group members. The composition of the advisory and working group reflected all relevant perspectives (Appendix 1). The authors of this paper were designated as the 'core developers' by the working group.

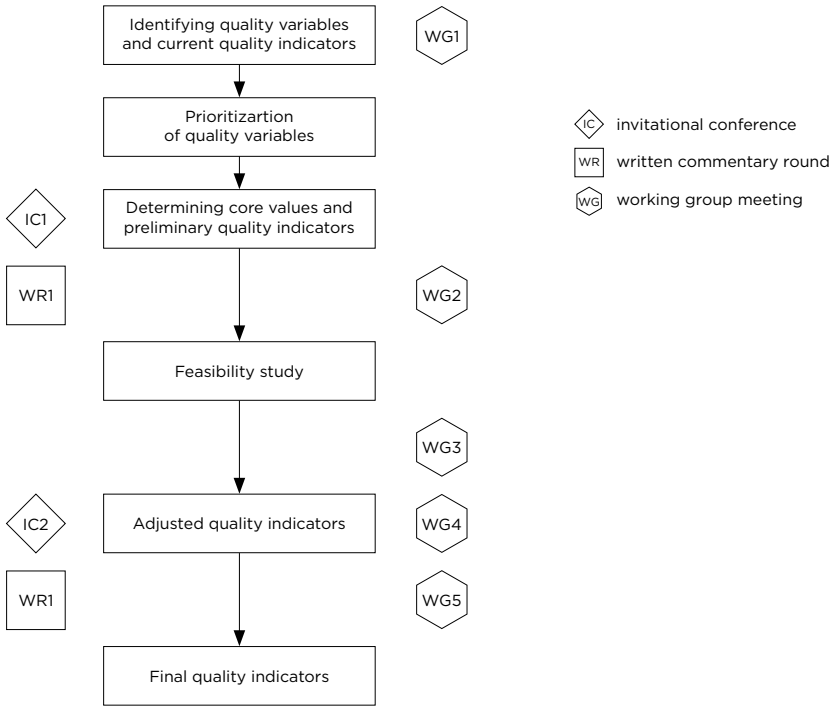


Figure 1. Development process.

Definition of core values was the primary focus of the working group following Porter's statement that healthcare should focus on adding value for patients (12). The literature was reviewed to identify quality variables in general hospital psychiatry (Appendix 2 and Appendix 3). Working group members then prioritized these quality variables (Appendix 3). In the first invitational conference, core values of good general hospital psychiatric practice were defined based on this prioritization. Donabedian's model (13) was applied to define structure, process, and outcome indicators based on the core values. Existing indicators were used if the working group thought it appropriate. The resulting preliminary quality indicators were sent to the advisory group for a written consultation round and piloted for feasibility in ten hospitals. Results of the written commentary rounds and feasibility study were processed into a set of adjusted quality indicators, which was discussed in the second invitational conference. These adjusted quality indicators were then sent to the advisory group for a final written consultation. After authorization by all advisory group organizations, the final quality indicators were published in May 2017 (14). Figure 1 gives an overview of the development process.

6.2.2 Identifying quality variables and current quality indicators

The core developers reviewed the literature for variables that define quality in general hospital psychiatry. Appendix 2 provides an overview of the search question, in- and exclusion criteria and the syntax-based search in multiple databases. Two authors derived 41 quality variables from 64 included papers (Appendix 3). The Dutch 'Guideline on Consultation-Liaison Psychiatry' (15, 16) and Dutch 'Field norms for Type IV medical psychiatry units' (9, 17) were reviewed for current Dutch quality indicators. Furthermore, the UK FROM-LP (11) was reviewed because it defines generic quality indicators consistent with the purpose of the present study.

6.2.3 Prioritization of quality variables into core values and design of the preliminary indicators

All working group members independently indicated their personal top five, allocating 5 points to a variable with first priority, 4 points to the variable with second priority and so on. Individual scores were collected and tallied. A mean score was then calculated per quality variable, and the variables were ordered accordingly. The top 10 variables were presented at the first invitational conference (Table 1).

Table 1. Top 10 prioritized quality variables. For the full list of quality variables used in the prioritization process, see Appendix 2. Fifteen working group members could each spend 5+4+3+2+1 points for their respective top five of quality variables, equaling 225 points in total. The third column shows the percentage of total points per variable, the fourth column shows the percentage of participants that included the variable in their top five. The top ten prioritized variables displayed here represents 65.9% of the total given points.

	Variables	% of total points	% in top 5 of participants
1	Independent functioning.	15.6%	33.3%
2	Patient experience and satisfaction.	12.4%	73.3%
3	Knowledge and skills of psychosomatic (including ethical and legal) care needs in the hospital.	8.0%	33.3%
4	Symptoms and signs.	5.8%	20.0%
5	Degree of collaboration between somatic and psychiatric nurses and doctors.	5.8%	33.3%
6	Evidence and consensus-based practice.	4.9%	20.0%
7	Waiting times and patient/caregiver satisfaction about waiting times.	4.4%	26.7%
8	Quality of life.	4.0%	20.0%
9	Clear and comprehensive record-keeping in referral and transfer.	4.0%	26.7%
10	Availability and distance to inpatient treatment facilities.	4.0%	13.3%

Degree of consensus was highest for the first three variables. In the discussion, patients were encouraged to add variables that are most relevant from their perspective. They added 'Autonomy', 'Destigmatization' and 'Patient-professional relationship' as distinct variables. The group also decided to add 'Adverse events' as a variable. Based on a group discussion, core values and a set of matching preliminary quality indicators were identified, taking existing indicators into account. In working group meeting 2, the definition of the quality indicators was discussed and described in more detail.

6.2.4 Feasibility study

Subsequently, the preliminary quality indicators were implemented into the daily practice of ten hospitals during a four-week period. Consultation-liaison physicians, nurses and managers (henceforth summarized as providers), were trained in the implementation of the quality indicators by means of an accredited course. Providers were asked to self-rate their compliance to the structural indicators using written semi-structured questionnaires. The construct of feasibility was broken down into relevance and implementability. Relevance was assessed by surveying patients, providers, and payers on relevance per indicator, using a 5-level Likert scale (ranging from 1=very irrelevant to 5=very relevant). Providers and payers were asked to score all preliminary indicators for relevance. Participating patients were surveyed only for the indicators to which they were actually exposed, which were the questionnaires on quality of life and satisfaction. Implementability was assessed by measuring the number of completed indicators as a percentage of the number of included patients. Reasons for less relevance or completeness were explored by giving participants the opportunity to explain their score and by qualitative analysis on the following questions: "Were there any situations where the indicator couldn't be measured?" (providers); "Could you suggest alternatives and improvements to this indicator or its operationalization?" (providers and payers); "Are there possible negative consequences of this indicator?" (providers); and "Are you willing to participate in repeated measurements of this outcome indicator?" (patients).

Participants

Of the 83 Dutch hospitals in 2015 (18), 79 had a medical psychiatry unit (MPU) and/or a psychiatric consultation service (PCS). The psychiatry departments of these hospitals were approached for participation, resulting in 20 responses. Eleven hospitals were selected based on hospital type, geographical spread, and 'psychiatric service level'. For this purpose, full psychiatric service level was defined as having an MPU, PCS, and an outpatient clinic. Intermediate service level was defined as having a PCS and an outpatient clinic. Basic service level was defined as only having a PCS. Three university medical centers (UMCs), and eight general hospitals agreed to participate. One UMC was classified as full psychiatric service level and two UMCs as intermediate service level. Of the eight general hospitals, one hospital delivered psychiatric care through a contracted mental healthcare institution. Six of the participating general hospitals were classified as full psychiatric service level and one as intermediate service level. One of the general hospitals with full psychiatric service level withdrew because of a lack of resources, resulting in ten participating hospitals. Seven of the MPUs at the hospitals with full service levels were located on a psychiatric ward and one MPU at the hospitals with full service levels was located on an internal medicine ward. Using convenience sampling, patients who were evaluated and treated by the psychiatric departments of the participating hospitals (on an MPU, by the PCS on a somatic ward, or on the psychiatric outpatient clinic) during the study period were asked for informed consent. Additionally, physicians, nurses, and managers of the involved psychiatry departments and all Dutch health insurance companies were invited to participate. Five out of ten Dutch health insurance companies participated. Each participating hospital had a local research coordinator and a local principal investigator. We asked them to give us the participant names and contact details of: one or two psychiatrists of their department, two referrers and one psychiatry department manager. The study was approved by the Erasmus MC ethics committee (MEC-2016-154, decision adopted by all executing hospitals).

6.2.5 Adjusted and final quality indicators

In working group meeting 3, the preliminary quality indicators were adjusted, based on results of the feasibility study. The adjusted quality indicators were then discussed in the second invitational conference and sent to stakeholder organizations of the advisory group for a second written commentary round. In working group meetings 4 and 5, the commentary from the second invitational conference and written commentary round were discussed, leading to a set of final quality indicators.

6.3 RESULTS

6.3.1 Core values and preliminary quality indicators

Participants of the first invitational conference identified seven core values of good general hospital psychiatric practice: 1. Quality of life and independent functioning, 2. Shared decision making, 3. Continuity and chain care, 4. Destigmatization, 5. Collaboration and integration of care, 6. Early detection and timely care, 7. Accessibility and availability of treatment facilities. These values were translated into preliminary quality indicators (Table 2). Indicator S1 introduces a short-term aftercare outpatient clinic as a means of a bridge to follow-up care. Indicator S2 states that emergency assessment by a psychiatrist must be available within 30 minutes; in several hospitals, no assessment is possible within that timeframe. Indicators S3 and S4 were established because, in the Netherlands, some hospitals purchase psychiatric care from other mental healthcare

institutions, resulting in separate medical records, limited availability of psychiatric staff, and poor integration of staff. A yearly training program in psychiatry for non-psychiatrically trained doctors was suggested as an operationalization of the core value of destigmatization (S5). A training program was also recommended for the value of shared decision making (S6), while the actual informing of patients was recorded in process indicator P1. S7 deals with information transfer when patients are referred to care providers outside the hospital. Timeliness of regular and emergency psychiatric consultations as well as emergency admissions to MPUs is measured in P2. The ten existing Dutch 'Field norms for Type IV medical psychiatry units' (17) were integrally adopted as indicators 'S8-S17'. In accordance with the first core value, the EQ-5D-5L (19, 20) was chosen as the most important outcome measure. EQ-5D-5L is a standardized instrument developed by the EuroQol Group as a measure of health-related quality of life that can be used in a wide range of health conditions and treatments. Patient satisfaction and referrer satisfaction were taken over from the UK FROM-LP (11).

Table 2. Preliminary quality indicators. *MPU=medical psychiatry unit. #=indicator number.

	Values	#	Summary of indicators
Structure	Accessibility and availability of treatment facilities	S1	Hospitals with a psychiatric consultation service and/or an MPU* have an outpatient clinic for short-term hospital psychiatry aftercare.
		S2	Emergency psychiatric consultation should be available within 30 minutes (24/7).
	Collaboration and integration of care	S3	All psychiatric professionals are employed or directly contracted by the hospital.
		S4	A common (electronic) medical record is used that is mutually accessible for general medical and psychiatric professionals.
	Destigmatization	S5	The hospital has a yearly training program in psychiatry, aimed at non-psychiatrically trained doctors and nurses.
	Shared decision making	S6	The hospital has a training program in shared decision making for all health-care providers.
	Continuity and chain care	S7	The hospital has a protocol on information transfer, specific to this patient population and in accordance with nationally established standards.
	Dutch Type IV MPU norms	S8-S17	See Table 4 for ten structural indicators concerning medical care, facilities, and organization of MPUs.
Process	Shared decision making	P1	The hospital informs patients, preferably before the first face to face contact, about the importance of three questions: 1) What are my treatment and evaluation options? 2) What are the pros and cons of these options? 3) Which considerations are applicable to my situation?
	Early detection and timely care	P2a	Regular psychiatric consultations are done within 24 hours.
		P2b	Emergency psychiatric consultations are started within 30 minutes.
		P2c	Delay in emergency admissions to MPUs is 24 hours maximum.
Outcome	Quality of life and independent functioning	O1	Difference score on EQ-5D-5L at beginning and end of treatment.
	Shared decision making	O2	Patient satisfaction survey at end of care: "How would you grade the care you received on a 1-10 scale? What did you think of the care provided by our department? What can be improved?"
	Continuity and chain care	O3	Referrer satisfaction survey at end of care: "In relation to the care for this patient, how do you rate the care by our department? (1-10 scale)? What did you think of the care provided by our department? What could be improved?"

6.3.2 Stakeholder consultation

Stakeholders expressed several concerns during the written commentary rounds. The requirement to offer short-term outpatient aftercare (S1) and timely emergency psychiatric consultation (S2 and P2a) could be less feasible for small settings. The norm on organizational embedding (S3) could not be met in hospitals that offer psychiatric consultation through contracting a mental healthcare institution. Hospitals that did not have an electronic medical record (as yet) foresaw difficulties in sharing medical records (S4), while some professionals believed that the sharing of medical records was legally prohibited because of privacy concerns. Implementation of timeliness norms for acute psychiatric care (P2a) involves adaptation of duty hours and hiring extra personnel for some hospitals. A general critique was the lack of a minimum service level definition. Professionals stressed that the indicators should not be used for outcome comparison in pay for performance, as the case mix differs between hospitals.

6.3.3 Feasibility study

Professionals were encouraged to approach all patients for participation during the study period. Of the 1174 patients who were evaluated and/or treated by psychiatry departments in the participating hospitals, 572 patients were approached, and 282 patients could be fully included in the study for measurement of preliminary process and outcome measures as well as for a survey on relevance. Two hundred and ninety patients did not give consent and could only be included for anonymized measurement of process indicators. From the providers' perspective, 23 professionals (11 psychiatrists, 9 nurses, 2 interns and 1 psychologist) and three managers participated in surveys on the indicators. On behalf of the payers, six health procurement managers and four medical advisors participated. All participating providers completed the survey. For assessing relevance and implementability from the providers' perspective, we asked for at least one representative from each insurance company. On behalf of the payers, six health procurement managers and four medical advisors representing all large Dutch health insurance companies completed the survey.

Relevance

Based on medians, providers considered all preliminary quality indicators relevant or very relevant, with a small interquartile range (IQR) as shown in Table 3. Payers showed

Table 3. Feasibility of the preliminary quality indicators: relevance scores for providers, payers, and patients and completeness of data collection. Tf = Transfers, SDM = Shared decision making, QoL=Quality of Life. For relevance, the median score is provided (interquartile range between brackets). A score of 5 indicates very relevant for quality of care, 1 means very irrelevant for quality of care. The range in completeness for SDM (P1) and the outcome indicators is from the different settings (outpatient, psychiatric consultation service and MPU).

	Structure indicators														Process indicators				Outcome indicators		
	Availability		Embedding		Training		Tf	Field norms for Type IV medical psychiatry units							SDM	Timeliness			QoL	Satisfaction	
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	P1	P2a	P2b	P2c	O1	O2	O3
Relevance providers	4 (1)	4 (1)	5 (1)	4 (1)	4 (1)	4 (1)	4 (1)	4 (1)	5 (1)	5 (1)	5 (1)	4 (1)	4 (1)	4 (1)	5 (1)	5 (1)	5 (1)	4 (1)	4 (1)	4 (1)	4 (1)	4 (1)	4 (1)	4 (1)
Relevance payers	5 (1)	5 (1)	4 (1)	5 (1)	5 (2)	4 (2)	5 (1)	4 (2)	5 (0)	5 (1)	5 (1)	5 (2)	4 (1)	2 (3)	3 (2)	4 (1)	4 (2)	5 (1)	5 (1)	5 (1)	5 (2)	5 (1)	4 (2)	4 (2)
Relevance patients	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4 (1)	4 (1)	N/A
Complete response (%)	100	100	100	100	90	100	100	100	100	100	100	100	100	80	100	100	100	88 (79-98)	97	96	82	44 (21-78)	30 (14-74)	16

more variation in their relevance ratings. In particular, payers were less supportive of structure indicator S14, which encompasses a nursing census of 1.0 FTE per bed and structure indicator S15 that describes which paramedical and psychological disciplines (at minimum) have to be available on an MPU. Payers found the reasoning behind these norms unclear and saw a risk of 'overutilization'. The payers that gave S6, S8, S17 and O2/O3 a lower rating commented about lack of precision. Some payers considered the patient satisfaction questionnaire (O2) less relevant because patients – in their opinion – "have different ideas about quality of care".

Implementability

Self-rated information on all structure indicators (S1 through S17) could be collected for nearly 100% of participants. Collection of the process indicators also proved to be feasible, with completion rates of over 80%. In the psychiatric consultation settings, only 33% of patients were given the leaflet on shared decision making (P1) versus 75% in the outpatient and 55% in the MPU settings. Psychiatric professionals working in this setting explained that they believed shared decision making should be the responsibility of the consultee. Other suggestions on the implementation of shared decision making (S1) included extra training on the subjects, and the instruction of patients before seeing their doctor or other healthcare professional. Registration of timeliness was found to be most complete for the psychiatric consultation setting (see Table 3, indicators P2a and P2b for regular consultation and consultation on emergency rooms). There was some discussion by respondents on how to measure the timeliness of regular consultations (P2a) and emergency admissions to MPUs (P2c). For P2a, respondents wondered whether the best timestamp would be the time of arrival, the time of first medical notes in the (electronic) medical record, or the time of complete reporting. For P2b, most respondents thought that it should be the consultation-liaison staff who determine whether an admission should be considered urgent, and not the referrer.

For the outcome indicators, the number of completed indicators as a percentage of study participants was considerably lower, ranging from 44% completed difference scores on the EQ-5D-5L (O1), to only 16% of referrers returning the referrer satisfaction questionnaire (O3): see Table 3. Although the time investment for filling out the EQ-5D-5L was generally small (median 3 minutes, IQR 3), the poor condition of patients and discharge before follow-up were the main reasons for non-completion in the consultative setting (21% completed). For the same reasons, it was not feasible to administer the patient satisfaction questionnaire in the consultative setting (14% completion). Completion of the EQ-5D-5L was more feasible in the MPU and outpatient settings (62% and 75% completion, respectively). Referrers were variably supportive (median relevance 3.5, IQR 1.5) of their satisfaction questionnaire, mainly because they prefer to provide overall instead of 'per patient' feedback.

6.3.4 Adjusted and final quality indicators

Based on the stakeholder consultation and the results of the feasibility study, the preliminary indicators were adjusted (Table 4, final quality indicators). Type IV MPU norms set by the Netherlands Psychiatric Association remained unchanged as these were the result of a previous consensus (17). Minimum service level was defined as the availability of psychiatric consultation within 24 hours on weekdays for all general and university hospitals. The structure indicator dictating 24/7 availability of emergency psychiatric consultation was replaced by a process indicator specific to the ER setting (P3a). The more general formulation of 'emergency consultation' was abandoned due to difficulty in determining the definition of 'emergency' and difficulties with registration of timeliness on general wards. In the set of final quality indicators, timeliness norms for emergency psychiatric consultation apply only to hospitals that have an ER. The organizational embedding indicator (S3) was mitigated into minimum requirements for collaboration within the hospital medical staff. For feasibility reasons, the training program for non-psychiatrically trained doctors and nurses was confined to professionals of the emergency room (S5). The ER was thought to be of greatest importance for destigmatization. Instead of informing patients about shared decision making through a leaflet, the indicator for shared decision making is aimed at local implementation of shared decision making (P1).

Because every Dutch hospital has to measure patient satisfaction with existing measures, the outcome measure on this topic was replaced by a process measure, stressing measurement requirements and annual discussion of the results. Referrer satisfaction will be measured annually, by means of a telephone interview with all referrers during a one-month period.

6.3.5 Setting norms and exemptions

Achievable norms were set for the process and outcome indicators using data from the feasibility study and invitational conferences. Timeliness indicators for emergency room psychiatric consultation, regular consultation, and MPU admission (P2a, b, c) must be met in 85% of cases. EQ-5D-5L difference scores (O1) and measurement of patient satisfaction (P2) must be complete for 50% of cases. Patients treated in the context of psychiatric consultation services were frequently discharged without notice, leading to relatively low completion rates in the feasibility study. This setting was therefore exempted from collecting indicators O1 and P2.

Table 4. Final quality indicators. # = indicator number.

	Values	#	Summary of indicators
Structure	Accessibility and availability of treatment facilities	S1a	Hospitals with a psychiatric consultation service also have at least one outpatient clinic for short-term care.
		S1b	Hospitals with an MPU have both a psychiatric consultation service and an outpatient clinic for hospital psychiatry.
		S2	Psychiatric consultation should be available within 24 hours.
	Collaboration and integration of care	S3	Proper embedding of psychiatric professionals in the hospital implies that psychiatrists participate in the hospitals' staff committees and protocol development as well as accreditation, visitation, and training programs.
		S4	A common (electronic) medical record is used that is mutually accessible for general medical and psychiatric professionals.
	Destigmatization	S5	At minimum, the hospital has a training program in psychiatry, aimed at non-psychiatrically trained doctors and nurses working on the emergency room.
	Continuity and chain care	S6	The hospital has a protocol on good and timely information transfer, specific to this patient population, in accordance with nationally established standards. The protocol describes information transfer both within the hospital and between the hospital and other healthcare providers.
	Type IV MPU norms	S7a	An MPU provides 24 hours a day, seven days a week integrated psychiatric and general medical diagnostics and treatment to inpatients.
		S7b	Acuity corresponds to that of a regular psychiatric and general medical ward.
		S8	The medical specialists are trained and experienced in treating patients with complex general medical and psychiatric health needs.
		S9	An MPU is capable of handling at least a non-limitative list of ten care needs and treatment methods.
		S10	Specialist medical care on the MPU is organizationally completely embedded in the relevant hospital.
		S11	The management and operation of an MPU should be based on both business and medical expertise and should comply to the usual organizational form of the hospital.
		S12	Hospitals with an MPU have both a psychiatric consultation service and an outpatient clinic for hospital psychiatry (=S1b).
		S13	An MPU has chain care agreements inside and outside the hospital with both referrers and aftercare agencies.
		S14	General medical and psychiatric nursing expertise of sufficient level is guaranteed.
		S15	Availability of psychological and paramedical disciplines.
		S16	Facility design enables both psychiatric and general medical specialist care.
		S17	Electroconvulsive therapy (ECT) is readily available for MPU patients, 24 hours a day, seven days per week.
Process	Shared decision making	P1	Shared decision making is implemented in all hospital psychiatric settings. Progress of implementation is discussed in the treatment team at least annually.
	Shared decision making	P2	At the end of care, patient satisfaction is requested in writing. The instrument used must contain at least a combination of quantitative and qualitative evaluation. Improvement points are discussed at least annually within the treatment team.
	Early detection and timely care	P3a	Emergency room psychiatric consultation starts within 30 minutes after call, in 85% of patients.
		P3b	Regular psychiatric consultations are done within 24 hours on working days.
		P3c	Delay in emergency admissions to MPUs is 24 hours at maximum.
Outcome	Quality of life and independent functioning	O1	Difference score on EQ-5D-5L at beginning and end of treatment for at least 50% of patients. Psychiatric consultation services are provisionally excluded based on feasibility study.
	Continuity and chain care	O2	Annual sample of referrer satisfaction regarding all newly seen patients in a one-month period: "In relation to the care for this patient, how do you rate the care by our department? (1-10 scale)? What did you think of the care provided by our department? What could be improved?"

6.4 DISCUSSION

Given the increasing focus on patient safety, quality improvement (21), and (cost-)effectiveness (2, 6), this study developed value-based quality indicators for general hospital psychiatry. Heterogeneity in activities, environments, and clinical problems, as well as the problem of attributing a change in health status to any effort in the complex environment of a hospital (22, 23) could possibly contribute to the lack of consensus on measuring quality and outcome in general hospital psychiatry (10, 24). This framework standardizes quality and outcome assessment (4, 5) in general hospital psychiatry for a variety of patients, service settings, and types of intervention (25). The literature was reviewed for quality variables that were prioritized into core values. Quality indicators were based on these values, tested for feasibility and adjusted, following the feasibility study and comment rounds using a consensus-based approach. This is the first indicator set of its kind that was based on core values and examined by a representative feasibility study preceding the actual decision to implement these indicators in all Dutch hospitals. Results of the stakeholder consultations and the feasibility study show broad support and good implementability. It took 26 months to deliver a fully authorized set of quality indicators that consists of 17 structure indicators, 3 process indicators and 2 outcome indicators.

Although all relevant perspectives were incorporated, the patients' perspective was given extra priority. This is perhaps an important reason why the seven core values developed in this study fit with the current conceptualization of patient-centered care (PCC). For example, PCC demands mutual participation between patients and professionals: this corresponds to shared decision making as a core value in this project. Patient-centered healthcare organizations should deliver coordinated and integrated care (26). These characteristics correspond well to the core values of 'continuity and chain care', 'collaboration and integration of care', 'accessibility and availability of treatment facilities' that were defined in this study.

The current study adopted a comprehensive premise from the recently published UK FROM-LP (11, 25): quality indicators in general hospital psychiatry must be applicable to a range of patients and service settings. Structural requirements and also process and outcome indicators were deliberately defined in a generic and preconditional manner. Instead of describing in detail the standards that services have to meet, these quality indicators allow room for differences; however, they do define a minimum service level contributing to the emphasis on structural indicators in this quality indicator set. As the process and outcome indicators selected in this quality indicator set are generic and applicable across service settings, these indicators are usable in other healthcare systems. A more detailed description of structure and process requirements for all general hospital psychiatric settings in the Dutch context is available through the recently published 'Generic Module for General Hospital Psychiatry' (14) that accompanies the quality indicators developed in this study and is comparable to the recently updated UK 'Quality Standards for Liaison Psychiatry Services' (27). A major difference between this project and the UK FROM-LP is the primary outcome measure. Patients, providers and payers in this study valued quality of life and functioning over symptom level, the latter being the primary outcome in the UK FROM-LP. The EQ-5D-5L (www.euroqol.org) has a scientific track record in both medical and psychiatrically ill populations but has not been used extensively in general hospital psychiatry. The EQ-5D-5L can be completed by patients and proxies. A major advantage for its inclusion in the quality indicator set is that it allows for the calculation of cost per QALY (quality-adjusted life year) gained, which is the standard measure used for assessing the cost-effectiveness of health-service interventions (10).

6.4.1 Limitations

It may be argued that the emphasis on structural indicators in this set represents not so much current good practice, but rather a desired level and standardization of service organization (4). Additionally, most of the structural indicators are deliberately formulated in general terms. This way, hospitals are given the opportunity to move towards the minimum service level within the revision period of the indicators (set at four years). The working group did not think it a good idea to describe the quality indicators at a detailed level as they had little faith in the yield and feared an increase in administrative burden. This also applied to the peer review inspection visit that is advocated by PLAN (27). More detailed recommendations can be found in other quality documents, including the accompanying Dutch 'Generic Module for General Hospital Psychiatry' (14), the updated Dutch 'Guideline on Consultation-Liaison Psychiatry' (8), and the UK PLAN standards (27). A recurring discussion during the development of these quality indicators concerned the balance between establishing a minimum service level and applying more ambitious standards to target. Working group members feared that defining more ambitious quality indicators would mean infeasibility for some hospitals. These discussions explain the apparent poor link between some of the indicator categories and their descriptions; for example, in the case of destigmatization (Table 4, indicator S5).

The high density of MPUs in the Netherlands (9) could be unique in the world and, therefore, these indicators may be less relevant for other countries. The use of self-rating questionnaires, rather than assessment by an independent researcher at the time an outcome measurement took place, could have introduced bias. In addition, the feasibility results from providers' and payers' perspectives should be interpreted carefully due to the lower number of participants compared to the patients' perspective. The use of convenience sampling in recruiting patients could have introduced selection bias. Furthermore, the (comparative) validity and reliability of the process and outcome

indicators were not extensively measured. The quality indicators developed in this study nevertheless address important domains in which an effect can be expected: clinical effectiveness, users' views and timeliness (10). With the choice of generic indicators instead of symptom-focused or disease-specific measures, precision is lost. The positive side of this choice is that the indicators can be used in heterogeneous patient populations and service settings while avoiding excessive strain from the implementation of multiple symptom-focused or disease-specific indicators.

6.4.2 Future directions

Future evolution of the indicator set towards a focus on outcome assessment requires validation of the EQ-5D-5L as an outcome instrument in this population, as well as a standardization of interventions (4) can help to attribute change in outcome to general hospital psychiatry efforts in a complex hospital environment (22, 23). Feasibility might be further improved by electronic computation of process (timeliness) indicators and integration of registration in electronic patient files (28).

6.4.3 Conclusion

To conclude, this study shows that it is possible to develop a widely supported quality indicator set for general hospital psychiatry. This set proved to be feasible in Dutch university and general hospitals; moreover, it gives priority to patient values and facilitates professionals, health-care organizations and health-care payers in evaluating the quality and outcomes of their care. Implementing this quality indicator strengthens value-based, integrated mental healthcare in the general hospital environment.

APPENDICES

The appendices can be retrieved from http://hdl.handle.net/1765/128811.

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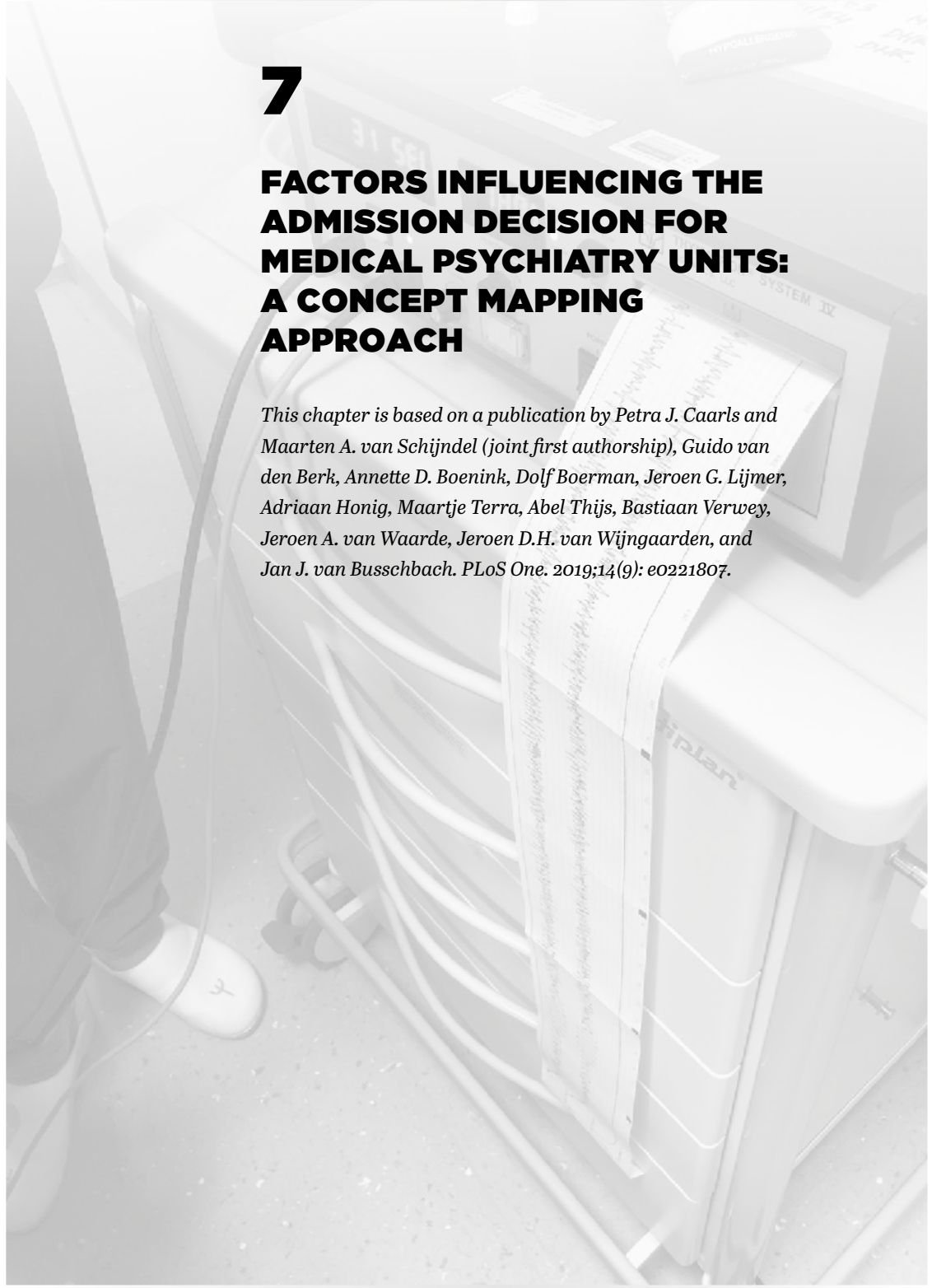
7

FACTORS INFLUENCING THE ADMISSION DECISION FOR MEDICAL PSYCHIATRY UNITS: A CONCEPT MAPPING APPROACH

This chapter is based on a publication by Petra J. Caarls and Maarten A. van Schijndel (joint first authorship), Guido van den Berk, Annette D. Boenink, Dolf Boerman, Jeroen G. Lijmer, Adriaan Honig, Maartje Terra, Abel Thijs, Bastiaan Verwey, Jeroen A. van Waarde, Jeroen D.H. van Wijngaarden, and Jan J. van Busschbach. PLoS One. 2019;14(9): e0221807.



ABSTRACT

Objective

Medical psychiatry units (MPUs), also known as complexity intervention units (CIUs), provide care for complex patients suffering from both psychiatric and physical disorders. Because there is no consensus on the indications for admission to an MPU, daily practice and effectiveness research are hampered. This study therefore used a concept mapping approach to investigate which organizational and medical factors determine the decision to admit a patient to an MPU.

Methods

The first step of the concept mapping approach was to create a list of factors determining MPU admission from literature. Secondly, clinical experts sorted and ranked these factors. The sorted and ranked data were then analyzed, and a draft conceptual framework was created. A final conceptual MPU admission framework was then drawn during an expert consensus meeting and recommendations for implementation were suggested.

Results

Thirteen clinical experts defined 90 factors from literature, which were sorted and ranked by 40 experts from 21 Dutch hospitals. This concept mapping approach resulted in a five-cluster solution for an MPU admission framework based on: 1. Staff competencies and organizational pre-requisites; 2. Patient context; 3. Patient characteristics; 4. Medical needs and capabilities; and 5. Psychiatric symptoms and behavioral problems. Furthermore, three inclusion and two exclusion criteria were formulated to help the clinicians decide whether or not to admit patients to an MPU. These criteria can be implemented in daily practice.

Conclusion

Implementing the five criteria derived from this conceptual framework will help make the admission decision for complex patients with psychiatric and physical disorders to an MPU more correct, consistent, and transparent.

7.1 INTRODUCTION

High acuity medical psychiatry units, also known as complexity intervention units (CIUs), (1), cater for patients that are too psychiatrically ill to be treated on medical wards in conjunction with consultation-liaison psychiatry and too medically ill to be on a conventional psychiatric inpatient service (2). The underlying common purpose of all MPUs is that these are geared towards both the medical and psychiatric care needs of a patient, thus providing integrated care to the 'whole' patient (3). Goals of these MPUs include improving physical and psychiatric care, reducing the stigma of psychiatric disorders, and increasing the effectiveness and cost-effectiveness of inpatient stays by decreasing length of stay and readmissions (4-6). The term MPU is generic and as such allows for extensive medical and organizational variation (7). In practice, this results in considerable uncertainty about treatment options and referral criteria among patients, their caregivers, referrers, and health insurers.

MPUs have existed in North America for 25-30 years (8). A recent study found 64 such clinical inpatient units for integrated medical and psychiatric care (van Schijndel et al. 2020, under review). In Europe, similar programs were implemented in the 1990s (8-11). In the Netherlands, an evolution has recently been taking place from general hospital psychiatry inpatient wards to MPUs (12). This development was enhanced by the establishment of consensus-based Dutch quality standards for MPUs ((12, 13) and S1 Appendix) and a change in the reimbursement as well as procurement policies of health insurers, focusing on integrated medical and psychiatric care as of 2012. A recent study in the Netherlands showed that of the 90 Dutch hospitals in 2015, 37 had a ward for integrated medical and psychiatric care (12). Of these units, 30 were classified as MPUs (14).

To date, there has been no research on the clinical reasons for admitting a patient to an MPU. It is unknown which medical and organizational factors may influence this clinical decision. Admission criteria for MPUs may depend on the target population, the focus on acute or chronic care, and both general medical and psychiatric care abilities of the specific unit. Some MPUs that have been described in literature reported detailed admission criteria, including criteria for continued stay and discharge (15, 16), while other MPUs reported a general target population (6) and still others reported no criteria (17, 18). The lack of consensus on admission criteria hampers proper descriptions of MPUs, communication about treatment options, and studies about their effectiveness and cost-effectiveness. Consensus about inclusion and exclusion criteria for admitting a patient to the MPU may allow for more meaningful comparisons between MPUs in different settings (7, 19). The Dutch context offers an opportunity to empirically elucidate the factors that influence admission decisions thanks to the high 'MPU-density' in the Netherlands and a clear consensus-based description of medical and organizational

standards (Dutch quality standards for MPUs). The aim of this study, therefore, is to define which medical and organizational factors relate to MPU admission decisions.

7.2 METHOD

7.2.1 Concept mapping method

Concept mapping can provide insight into initially unclear complex decisions (20-22). The concept mapping method is a standardized procedure used to clarify, describe, and visualize underlying cognitive structures of a task, such as medical decision making. The method uses both qualitative methods (group discussion) and quantitative methods (multidimensional scaling and cluster analyses) in a stepwise manner.

We chose the concept mapping methodology because it is an efficient way to explicate, structure, and prioritize tacit knowledge about topics on which the research literature is inconclusive (22). In this study, we used it to explore the clusters of factors that influence the decision to admit a patient to an MPU. The results could be of value to patients, clinicians, and the scientific field. Improved referral could yield better outcomes by improved matching of care needs and the actual care that is provided. Understanding the relevant factors in admission decisions to MPUs may lead to more transparency in the care capabilities (and lack thereof) of MPUs, which is relevant from a referrer's perspective, but also from a quality perspective because transparency will facilitate debate and discussion about desired capabilities versus the actual ones. Gaining insight into the implicit factors that currently guide the admission decision can also be relevant in advancing the evidence base on MPUs, by clarifying which properties of MPUs are relevant when comparing their outcomes in future studies.

The method consists of six phases that are summarized below. In this project, phase six was only partly carried out because we clearly recommended the use of the concept map and its further utilization is beyond the scope of this article. An extensive description of the six phases can be found in Trochim 1989 (23). We sought informed consent from all the participants. Because there were no patients involved in the study and completion of the online task was not burdensome for the participants, Institutional Review Board approval was not required under Dutch law (Medical Research Act, article 1b).

7.2.2 Participants

A 'core group' of Dutch MPU experts was formed to guide the process of preparation, statement generation, interpretation, and utilization of the concept maps (see sections 7.2.3, 7.2.4, 7.2.7, and 7.2.8). Subsequently, a more extensive 'expert group' of MPU clinicians was formed for the actual sorting task (see section 7.2.5). The following criteria were used to select the core group members: authoritative MPU clinicians (both psychiatrists and their somatic medical specialist coworkers) with a clinical as well as scientific background with diverse affiliations; from both academic and teaching hospitals and from MPUs with different organizational embeddings (internal medicine as well as psychiatry-based MPUs). Core group participants were selected from the professional network of the first author, with the addition of the only Dutch professor of General Hospital Psychiatry (AH), a psychiatrist representing the Dutch Psychiatric Association (BV), an organizational expert (JvWi), and a professor in Health-related quality of life (JB) with prior experience in concept mapping.

In addition, an expert group of psychiatrists and somatic specialists was recruited to participate in the study. In previous research studies, all MPUs in the Netherlands were assessed and their compliance with Dutch quality standards for MPUs was investigated (12). MPUs could participate in this study if they complied with at least five of the ten MPU norms (30 out of 37 MPUs) defined in the quality standard. All psychiatrists that participated in our previous research (12) were also asked to participate in this study. Of the 30 psychiatrists that were approached, 20 agreed to participate, with the most common reason mentioned to decline being lack of time. Furthermore, the psychiatrists were asked to provide contact details of two or three of their most important somatic specialist coworkers. Thirty-seven somatic medical specialists were sent an invitation to participate, resulting in the participation of 21 somatic medical specialists.

7.2.3 Phase 1: Preparation

The focus question formulated by the core group was: "Which factors contribute to the decision of physicians to admit a patient to an MPU?"

7.2.4 Phase 2: Generating statements

The aim of this stage was to generate an exhaustive list of potential factors that represent the entire conceptual domain of the MPU admission decision (23). Two methods were used: 1) a literature search and 2) experts' opinions. First, a systematic literature search was conducted to gather all available literature on MPUs up to May 2014. Peer-reviewed articles in English describing an inpatient hospital ward aimed at diagnosing and treating a broad group of patients with active medical and psychiatric disorders were included. Based on title and abstract, 93 of the 4591 records were included and 78 full text articles were retrieved so that three of the authors (PC, MvS, and JvWi) could search for relevant factors. These factors were checked for overlap, relevance, and correct level of abstraction by four authors (PC, MvS, JvWi, and JvB). New articles were checked for factors until saturation of the factor list was achieved. Saturation occurred at 58 articles as the additional 20 articles that were checked for factors did not contribute further to the factor list. Secondly, all experts of the core group were asked to check the

selected statements, add statements to the factor list, and remove irrelevant factors or change statements, but not to discuss the added value of each factor.

7.2.5 Phase 3: Structuring the statements: sorting and rating

All members of the expert group were invited to participate in the sorting and rating of the statements, which they could carry out on a personalized web application (www.conceptsystemsglobal.com). Participants were first asked five background questions, including their specialty, years of experience, and the type of hospital they worked in. The participants were then asked to group the factors influencing the admission decision in a way that made sense to them. Subsequently, they had to name each group based on a common characteristic. Sorting restrictions were: 1) factors could not be sorted according to importance; 2) not all factors could be placed in one group, nor could a group consist of only one factor; and 3) groups could not be named 'other' or 'miscellaneous'. Participants were then asked to rate the importance and the commonness of each factor on a scale of 1 to 7. We emphasized that the factors could have a positive and/or a negative impact on the admission decision.

7.2.6 Phase 4: Statistical analyses and representation of statements

To analyze the results of the sorting and rating, four steps were taken. First, the individual sorting responses were represented in 'individual binary similarity matrices'. The number of rows and columns in these matrices are the same as the number of factors (90). If a participant sorted two factors together in one cluster, a matrix cell was given the value (1); otherwise it was (0). The sum of all individual matrices resulted in a 'combined within group similarity matrix'. This matrix represents the degree of similarity between a pair of factors over all participants. Secondly, a nonmetric multidimensional scaling (MDS) procedure on this 'combined within group similarity matrix' was used to represent each factor as a point on a two-dimensional map. The smaller the distance between points on the MDS map, the more frequently factors had been sorted together by the participants. The relationship between the distances on the point map and the similarities found in the original data was calculated in a stress value of the MDS map. The stress value can range from 0 to 1, where a higher score indicates a weaker relationship between the created point map and the original data. Thirdly, clusters of factors were constructed using a hierarchical cluster analysis according to Ward's algorithm (24). The average and median number of clusters made by the participants were checked. Furthermore, the clusters were checked for their bridging value, where a high value (near 1) indicates that the factors in that cluster were often sorted with factors from other clusters. In order to create distinct clusters, clusters with lower bridging values are preferred. A particular number of clusters is called a cluster solution; an optimum cluster solution has distinct and clinically relevant clusters. Lastly, the factors with the highest scores for importance and commonness were looked up.

7.2.7 Phase 5: Interpretation of the concept map

The core group was invited to determine the final concept map by discussing the appropriate number of clusters, the division of factors over the clusters, and the most appropriate names for the clusters.

7.2.8 Phase 6: Utilization of the concept map

How to implement the final concept map for use in daily hospital practice was discussed during the interpretation session.

7.3 RESULTS

7.3.1 Participants

The expert group consisted of 20 psychiatrists and 21 other medical specialists from 21 hospitals, the response rate was 62%. Table 1 confirms that we were able to include a diverse group of appropriate participants: from all relevant specialties, from different hospital settings, and mainly clinicians who were very experienced clinicians and responsible for both referral and admission decisions to MPUs in daily practice.

Table 1. Characteristics of the 41 participants.

	N	%
Sex, female	10	24%
Specialty		
A. Psychiatry	20	49%
B. Internal Medicine	8	20%
C. Neurology	5	12%
D. Surgery	3	7%
E. Other medical specialty	5	12%
Type of hospital		
F. University Medical Center	10	24%
G. Teaching, top clinical hospital	25	61%
H. General hospital	6	15%
Years of experience with comorbidity		
I. 0-3 years	5	12%
J. 4-6 years	5	12%
K. 7-10 years	4	10%
L. More than 10 years	27	66%
Referrer and/or decision maker for admission		
M. Only referrer	8	19.5%
N. Referrer and decision maker	24	58.5%
O. Only decision maker	8	19.5%
P. Neither referrer nor decision maker	1	2.4%

7.3.2 Generation of statements

A total of 58 articles (S2 Appendix) from the literature study were included and each article contributed between 4 and 274 factors. A list of 154 factors was distilled from these, sent to the core group, and discussed in the first meeting (March 2014). The excluded factors, which were deemed irrelevant or of an incorrect level of abstraction, were also sent to the core group to be checked. The core group stated that factors describing fixed MPU characteristics (i.e. total number of beds at the unit) should be excluded because these factors are irrelevant for admission decisions for individual patients. After removing these static factors, a list of 117 factors remained. During the second meeting (May 2014), a decision was made about whether specific physical symptoms or disorders should be included or combined. Several factors were removed, combined, or renamed, which resulted in a list of 77 factors. During the third meeting (August 2014), it was decided that psychiatric symptoms should be separated from psychiatric disorders, which resulted in an expanded list. A sorting and rating pilot session with field experts from one of the hospitals resulted in three additional factors (September 2015). The final list consisted of 90 factors and is shown in S3 Appendix.

7.3.3 Sorting and rating of the factors

Forty participants took part in the sorting procedure, however, the sorting by two of the participants was excluded because their sorting violated the restrictions set a priori (do not sort based on importance and do not put all factors in one group) and technical and time constraints hampered making improvements. The 38 participants made a median of 7 clusters (average 7.8 clusters, standard deviation (SD) ±3.0, range 3 to 17). The rating of the importance of the factors was completed by 41 participants. On a scale of 1 to 7, the average importance was 4.8± 0.7, (range 2.8-6.7) suggesting moderate importance. The physicians stated that the most important factors were: competent nurses available on the MPU to meet patients' care needs; medical facilities and skills on MPU, i.e. competent physicians available on the MPU to meet patients' care needs; and behavioral or psychiatric problems that hamper other medical treatment. The rating of commonness of the factors was completed by 38 participants. On a scale of 1 to 7, the average commonness was 4.4± 0.7 (range 2.9-5.9). The factors that had the greatest impact on the admission decision were: patient needs somatic specialist care; number of MPU beds available at the time of referral/patient admission to the MPU; and competent nurses available on the MPU to meet patients' care needs.

7.3.4 Statistical analyses and representation

The nonmetric multidimensional scaling (MDS) procedure was used to draw a point map using the online Concept Systems Global software. Points that lie close together indicate that these factors were often sorted together. The stress value of the MDS map was 0.16, indicating a strong relationship between the distances on the point map and the similarities found in the original data. A point map drawn using only the psychiatrists input was relatively similar to the point map using the input of only non-psychiatrist physicians. At the interpretation session, various cluster solutions where shown to the experts, e.g. 4 cluster solutions, 5 cluster solutions, 6 cluster solutions, et cetera. They concluded that in shifting from five to six clusters, some factors were distributed over different clusters while they actually belonged together. The sixth cluster would also have an unfavorably high bridging value (0.94), which means that the factors in that cluster are often sorted with factors from other clusters. On the other hand, moving back from five to four clusters, factors on patient context and patient characteristics were clustered together, while the core group stated that they may have a different meaning in clinical practice.

7.3.5 Interpretation session

An interpretation session with the core group was held in December 2017. The eight participants decided on the number of clusters, named them, and briefly described the different clusters. Figure 1 shows the final cluster map, starting at the center (1. Patient characteristics) and then clockwise, from the bottom. Clusters that lie closer together contain factors that were more often sorted together, which means that these clusters are more likely to be related. Clusters that lie further apart describe more distinct aspects of the decision-making process. The full list of factors and clusters is shown in S3 Appendix.

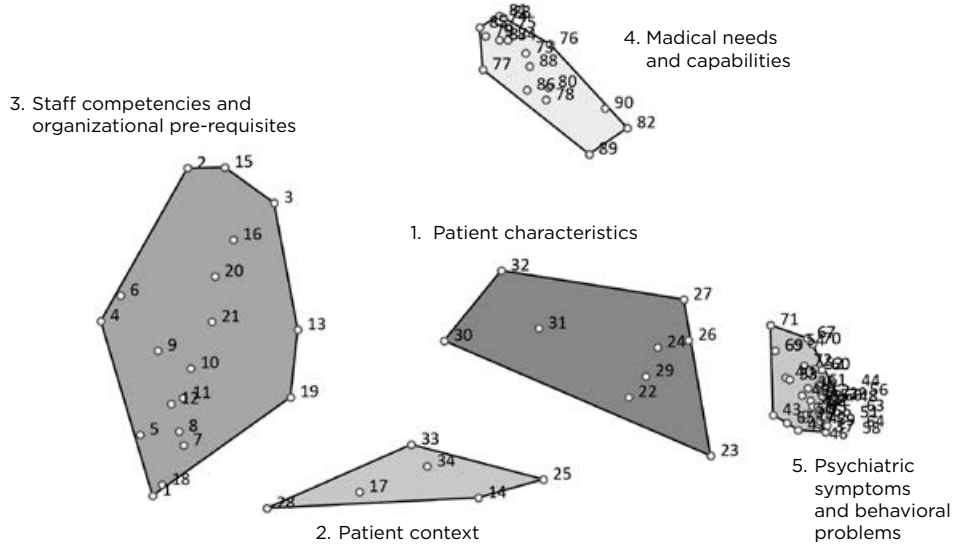


Figure 1. The 5-cluster solution.

The five clusters in Figure 1 can be described as follows:

1. The 'Patient characteristics' cluster is at the center of the map, and it describes the characteristics of the individual patient, for example: 'aged over sixteen' (number 32) and 'psychiatric history' (number 23). Furthermore, the cluster contains general characteristics matching the MPU admission, such as diagnostic dilemma: 'either organic explanation of disturbed behavior or psychiatric explanation of somatic symptoms' (number 26) and 'improvement in clinical status is expected within reasonable time frame on the MPU' (number 30).
2. The cluster at the bottom was called 'Patient context'. This cluster contains factors describing the interaction between patient and environment. It contains factors about the acceptability of MPU admission for both patients and family/caregivers (number 25 and 34) and also the factor 'problematic patient-staff interaction' (number 14). The experts decided that this cluster is different from the nearby cluster, 'Patient characteristics'. They therefore choose a five rather than a four cluster solution.
3. The cluster on the far left in Fig. 1 was called 'Staff competencies and organizational pre-requisites'. This cluster contains the two factors that were rated as the most important: 'competent nurses available on the MPU to meet patients' care needs' (number 1); and 'medical facilities and skills on MPU, i.e. competent physicians available on the MPU to meet patients' care needs' (number 2). This cluster contains factors related to general availability of facilities and staff, e.g., 'number of available beds' and 'number of patients per nurse'. Furthermore, some organizational characteristics were incorporated this cluster, e.g. 'specialization of the ward'.
4. The cluster on the upper right-hand side was called 'Medical needs and capabilities'. It contains many factors describing medical needs based on physical problems and some factors that may require specific facilities to provide good care for a patient. For example, 'patient has been diagnosed as needing coronary care unit' (number 73) or 'HIV with active disease' (number 78).
5. Lastly, the cluster on the lower right-hand side was named 'Psychiatric symptoms and behavioral problems' because some medical problems can be accompanied by behavioral problems without them having to be a psychiatric disorder. On the other hand, the cluster also contains many psychiatric symptoms and disorders. The three most important factors in this cluster appeared to be catatonia, suicidal behavior, and aggression.

7.3.6 Utilization

To implement the five-cluster solution for an MPU admission framework, the core group defined three inclusion criteria and two exclusion criteria, based on this framework. To facilitate rapid clinical implementation, the core group advised the field to use a short questionnaire involving all five clusters. The questions are shown in Table 2. For question A, on disruptive behavior, the core group mentioned six aspects that particularly need to be addressed: agitation/aggression; suicidal behavior or deliberate self-harm; disinhibition; absconding or wandering behavior; calling out, moaning, or making other sounds; and compliance with clinician's instructions.

Table 2. Short questionnaire to decide on admission of a patient to an MPU.

Inclusion
A. Is there disruptive behavior
B. Is there a somatic reason for admission
C. Are there no other social or professional options to deal with the situation?
Exclusion
D. Does the MPU have competent staff and sufficient/insufficient facilities?
E. Are there physical or psychiatric needs that cannot be addressed at the MPU?

Every MPU can further describe its own facilities and the needs that can and cannot be addressed at that specific MPU. The factors in the factor list (S3 Appendix) can be used to make a systematic local description. In order to admit a patient to an MPU the answers to questions A through C should be 'Yes', the answer to question D should indicate that the staff are competent and that there are sufficient facilities available, and the answer to question E should be 'No'.

7.4 DISCUSSION

Medical psychiatry units (MPUs) care for complex comorbid medically and psychiatrically ill patients in a hospital setting. Medical and psychiatric acuity capabilities as well as organization of these units may vary substantially (12, 25). The absence of research on admission criteria for MPUs hampers effective communication of diagnostic and treatment capabilities to patients and their caregivers, referrers, and payers. Furthermore, elucidating these factors will facilitate effectiveness and cost-effectiveness studies, by making MPUs comparable in terms of inclusion and exclusion criteria. This is the first study carried out to investigate the decision to admit to an MPU. We used a concept mapping approach, with the input of psychiatrists and other medical specialists, to establish factors influencing this decision, resulting in a five-cluster solution. The five clusters of criteria for the decision making on MPU admission appeared to be: 1. Staff competencies and organizational prerequisites; 2. Patient context; 3. Patient characteristics; 4. Medical needs and capabilities; and 5. Psychiatric symptoms and behavioral problems. These five clusters can be addressed by a generic, short questionnaire containing inclusion and exclusion criteria for admission to an MPU. The findings of this study enhance the ability to compare units, to perform effectiveness and cost-effectiveness

analyses, and to generalize these results. This can be an important result for this field of medicine, where effectiveness and cost-effectiveness research has not significantly progressed in the past decade (7).

Kathol and colleagues developed medical psychiatry units (MPUs) categories based on the level of psychiatric and medical acuity capabilities (1, 26-28). This classification in two dimensions distinguishes four types of MPUs. Type III and IV MPUs are considered 'high acuity' MPUs or complexity intervention units (CIUs) in the new vernacular (7), because they can handle both psychiatric and medical problems at moderate to high levels of acuity. These dimensions of psychiatric and medical acuity capabilities are clearly recognizable in the results of our current study: the availability of competent staff, adequate facilities, and the availability of medical and psychiatric care facilities are important factors for the admission decision (Table 2), mainly on the exclusion side. Psychiatric needs and capabilities did not arise as a separate cluster in the underlying concept map but were recognized as being important by the clinical expert group and, as such, was included in the questionnaire. A new finding of our concept mapping study is the incorporation of healthcare and social context, which was included in the question: "Are there no other social or professional options to deal with the situation?". This question illustrates that the need for MPU admission is context-dependent. Available alternative facilities in a specific hospital, such as adequately staffed, pro-active psychiatric consultation-liaison services, delirium units, psychogeriatric wards or neurologic high care units, can change the local need for MPU admission. In an ideal world, psychiatry would be integrated fully into hospital practice, and MPUs would not be needed.

7.4.1 Strengths and limitations

The systematic step-by-step concept mapping procedure, has previously been shown to be useful by making the decision processes of various health related contexts more explicit (21). Our project was carried out with a high number of participating experts. The diversity in specialisms of the participating experts, in the core group as well as in the entire clinical expert group, and the similarity of results between specialisms, improves the generalizability of our results. The use of multiple ways for generating factors, namely an extensive list of articles and experts' opinions, ensures that all relevant factors are included. Remarkably, the final number of clusters agreed upon (n=5), was below the average number of clusters resulting from the sorting of all participants (average=7.8). Although participants tended to make more distinctive clusters with very specific topics when sorting, fewer details were actually needed for the actual decision to admit a patient to an MPU, thus enabling quick and clear decision making.

A limitation of this study is that only Dutch experts participated in the concept mapping process, whereas experts from other countries may have rated the importance and commonness of factors differently, based on their specific health system contexts. However, this limitation is mitigated by conducting an extensive literature search that included articles, and thus factors, from the United States, Europe, Australia, and Japan. This Dutch conceptual model may therefore also be relevant for other countries.

It is possible that some 'politically sensitive' factors were rated lower when self-reported by medical specialists, while in reality these factors may subconsciously influence the admission decision. The impact of authority and the personality of participants on the rating of other participants was minimized by having participants do the ranking in private and using the results anonymously.

Finally, only physicians participated in this study, while in reality nurses influence the admission decision as well, and their competences play a key role in medical and psychiatric care abilities of MPUs (1). This was appreciated by the participants who rated the competences of the available nurses as being more important than the competences of the physicians available. The importance of a cross-trained, skilled nursing staff with character traits such as flexibility and adaptability is emphasized extensively in literature (1, 26, 29, 30).

7.4.2 Future research

A conceptual framework for the admission to high acuity MPUs has been established by this study. Future research should examine the generalizability of this Dutch framework to other countries. Furthermore, discrete choice experiments could be used to gain more insight into the trade-offs in the admission process. The actual use of our five questions for MPU admission decisions should be implemented, tested, and validated in daily practice so that the effectiveness and cost-effectiveness of these MPU facilities can be evaluated in prospective clinical designs. Effectiveness studies should include functional and disease-related outcomes, quality of life, the effect of MPUs on staff and caregivers, as well as the effect of MPUs in reducing stigma, care utilization, and costs.

7.4.3 Conclusion

A broad range of factors influence the decision to admit a patient to an MPU. Using a concept mapping approach, a consensus-based conceptual framework could be developed indicating the medical and organizational factors that determine the MPU admission decision. It is expected that by implementing the five criteria derived from this conceptual framework clinicians will find it easier to make a correct, consistent, and transparent admission decision for complex patients with psychiatric and physical disorders to an MPU.

APPENDICES

The appendices can be retrieved from http://hdl.handle.net/1765/128811.

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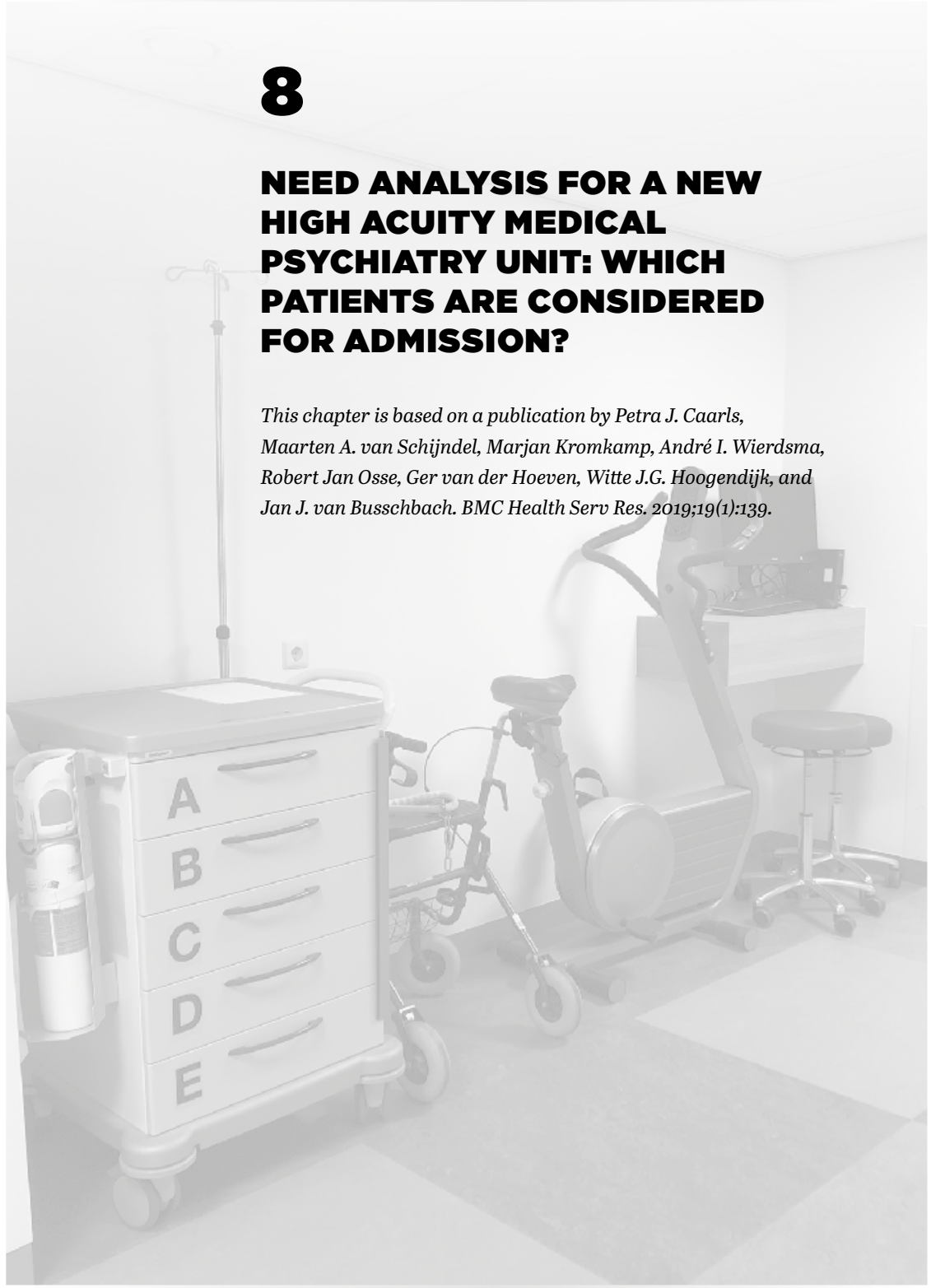
8

NEED ANALYSIS FOR A NEW HIGH ACUITY MEDICAL PSYCHIATRY UNIT: WHICH PATIENTS ARE CONSIDERED FOR ADMISSION?

This chapter is based on a publication by Petra J. Caarls, Maarten A. van Schijndel, Marjan Kromkamp, André I. Wierdsma, Robert Jan Osse, Ger van der Hoeven, Witte J.G. Hoogendijk, and Jan J. van Busschbach. BMC Health Serv Res. 2019;19(1):139.



ABSTRACT

Background

The study aims were: to estimate the proportion of patients with an indication for admission to a new high acuity medical psychiatric unit (MPU), to explore the reasons for MPU-admission according to different health disciplines, and to check for differences in patient characteristics. The results of this study are to be utilized in the proposed establishment of a high-acuity MPU in a University Medical Center. Such a unit currently does not exist at Erasmus MC.

Methods

Hospital inpatients were included if they received psychiatric consultation from the Psychiatric Consultative Service (PCS). As part of the study protocol, psychiatrists, other medical specialists, and nurses determined the need for admission to the proposed MPU. Patient groups were compared with respect to diagnoses, socio-demographic characteristics and patient routing.

Results

151 patients were included, 43% had an indication for MPU-admission, for the other patients PCS involvement was sufficient. There was agreement on suicide attempts as a reason for MPU-admission. For psychiatrists, the need for further diagnostic evaluation was a common reason for MPU admission, while other medical specialists more often emphasized the need for safety measures. Patients with an unplanned hospital admission had a higher chance of MPU eligibility (OR=2.72, 95% CI 1.10-6.70). The main psychiatric diagnoses of MPU-eligible patients were organic disorders (including delirium), mood disorders, and disorders related to substance abuse. The most common diagnoses found were similar to those in previous research on MPU populations.

Conclusion

Different medical disciplines have different views on the advantages of MPUs, while all see the need for such facilities. The proposed MPU should be able to accommodate patients directly from the Emergency Unit, and the MPU should provide specialized diagnostic care in an extra safe environment.

8.1 BACKGROUND

High acuity medical psychiatry units (MPUs) add value through their ability to institute aggressive, combined treatment for patients with complicated physical health and mental health/substance use disorders in the general-medical hospital setting. These units, also known as complexity intervention units, have moderate-to-high physical health and mental health/substance abuse acuity capabilities (1). MPUs close the gap between psychiatric wards, that are usually not equipped to deal with more than minimal medical or surgical problems, and medical wards that often have limited tolerance for patients with a psychiatric disorder or behavioral problems (2-4). These units are complementary to (pro-active) psychiatric consultation services when biopsychosocial complexity is severe (1, 2, 5).

Erasmus MC, a large University Medical Center in Rotterdam, the Netherlands, aims to inaugurate an MPU in 2019. The reasons for establishing such a unit fall into several categories: 1) managing the increasing complexity and behavior that is disruptive to somatic treatment in an aging and more often multimorbid population (6-9), 2) improving the quality of care (9), and 3) the promise of cost-effectiveness by reducing length of stay and readmissions (8, 10). A needs assessment is generally advised before establishing such a unit (11, 12).

MPUs appear in many forms. Some are able to treat the most severe patients, while others can only deal with light forms of somatic and/or psychiatric illness. Kathol devised a two-axes classification system to describe the different types of MPU, with one axis describing the psychiatric illness and one the somatic illness (5). Which type of MPU is required depends on the needs of the patient in a particular hospital (5, 13). Other locally influential factors are available staff, funding, and collaboration with other hospital wards (14-16). However, there is limited consensus on MPU-admission criteria and the target population (10, 17). The aim of this study was thus to investigate the perceived need – according to medical professionals – for an MPU in the context of a large university hospital. We investigated how potential MPU-patients differed from the group that was indicated for psychiatric consultation. Such a systematic assessment has not been described before.

8.2 METHODS

Erasmus MC, University Medical Center is a 1000-bed tertiary university referral center in Rotterdam, the Netherlands. It has many different wards, including a psychiatric ward with 57 beds. The Psychiatric Consultation Service (PCS) provides psychiatric diagnosis and treatment for medical inpatients. The PCS is staffed by a 0.8 full-time equivalent (FTE) research nurse, two 0.9 FTE residents and a 0.9 FTE psychiatrist, and has 24/7 coverage. The main senior consultation-liaison (C-L) psychiatrist (author RO) had been working

with this study population for 15 years and the research nurse worked at the PCS for 10 years, with extensive previous experience as a psychiatric nurse. Maximum frequency of patient contact is once a day. If necessary, the consultative nurse can provide extra support and coaching of the medical nursing team.

From 2019 onwards, a new 7-bed MPU will cater for the most complex in-patients with concurrent medical and psychiatric needs. It will occupy part of one of the Internal Medicine floors. Medical staff will include an internist and a psychiatrist using a co-attending model: admission will be a joint decision made by the attending internist and the psychiatrist, every patient being admitted under the care of the internist (18-21). The psychiatrist will be given full clinical authority for psychiatric diagnosis, psychiatric treatment and the ward milieu. Two designated internists and two designated psychiatrists will alternate as attending supervisors. House staff will consist of a psychiatric resident and internal medicine resident. The nurses will have a medical background with cross-training in psychiatric nursing.

8.2.1 Patients

All patients treated by the PCS between February 1 and June 30 in 2014 were asked consent for participation in this study after discharge from the hospital. The Medical Ethics Committee of the Erasmus University Medical Centre in Rotterdam (The Netherlands) stated the study is exempt from requiring approval under Dutch law (MEC-2012-531). Patients were asked to give informed consent in writing.

MPU-eligibility status was retrospectively assessed by employing a structured survey amongst attending physicians, consultation-liaison psychiatrists and senior nurses. Subsequently, groups were compared with respect to their medical and patient routing according to their MPU-eligibility status: MPU-eligible or PCS-only. Patients could only be included if at least a psychiatrist or another medical specialist had given their opinion on the MPU-eligibility of the respective patient. Patients who refused to participate were excluded.

8.2.2 Protocol

The attending medical specialist, C-L psychiatrist, and a senior ward nurse were asked their opinions on MPU-eligibility in retrospect. Both medical specialists and nurses were surveyed as these parties are most relevant to the admission-decision process. In the absence of the main senior C-L psychiatrist, another experienced psychiatrist colleague was asked for his/her opinion.

8.2.3 Measures

All opinions on MPU eligibility were registered on a standard form that gave a general definition of the proposed MPU: “The MPU will have the ability to care for patient physical needs as on a normal hospital ward and will have the ability to care for patient psychiatric needs as on a standard psychiatric hospital ward.” When one of the doctors saw an indication for MPU-eligibility, the patient was included in the MPU-eligible group. In general, the doctors and nurses decided on MPU-eligibility by considering there to be a need for both psychiatric admission and general hospital admission.

Socio-demographic data (age, marital status and country of birth), medical data, and patient routing were obtained from the electronic medical record and hospital information system retrospectively. Medical data contained the primary reason for admission, somatic main diagnosis, and psychiatric main diagnosis. ICD-10 chapter codes were used to describe the diagnoses and reasons for admission. Patient routing data consisted of: the type of referral, number of days until psychiatric consultation, the specialism requesting consultation, number of days in normal, medium, high and intensive care, length of stay, discharge destination, and readmissions until 22nd July 2014.

8.2.4 Statistical analyses

Data were reported for two groups according to MPU eligibility status: MPU-indication versus PCS-only. Univariate associations between admission decision and demographic and clinical covariates were analyzed using standard statistical tests: chi-square test for categorical variables and t-test or Mann-Whitney U test for interval- or ratio-level data. Following Hosmer and Lemeshow’s approach (22), multiple logistic regression analyses were performed using stepwise forward and backward procedures with 0.25 and 0.05 alpha levels of entry and removal, respectively. Interaction effects and collinearities were checked for all significant main factors. Model selection was based on likelihood ratio test statistics. This stepwise model selection procedure is appropriate for the explorative nature of this study. The fit of the final model was assessed using Nagelkerke R^2, the ROC curve, and the Hosmer-Lemeshow goodness-of-fit test. SPSS for Windows (version 21) was used to perform all statistical procedures.

8.3 RESULTS

We enrolled 151 patients in the study; 86 (57%) were allocated to the PCS-only arm. 65 patients (43%) were allocated to the potential MPU, for 37 of whom the C-L psychiatrist and medical/surgical specialist agreed on MPU-eligibility. The total agreement of eligibility (both MPU-eligibility and PCS-only eligibility) between medical/surgical attending personnel and the C-L psychiatrist occurred in 77% (n=116) of the cases. Figure 1 shows the flow of inclusion and exclusion of patients.

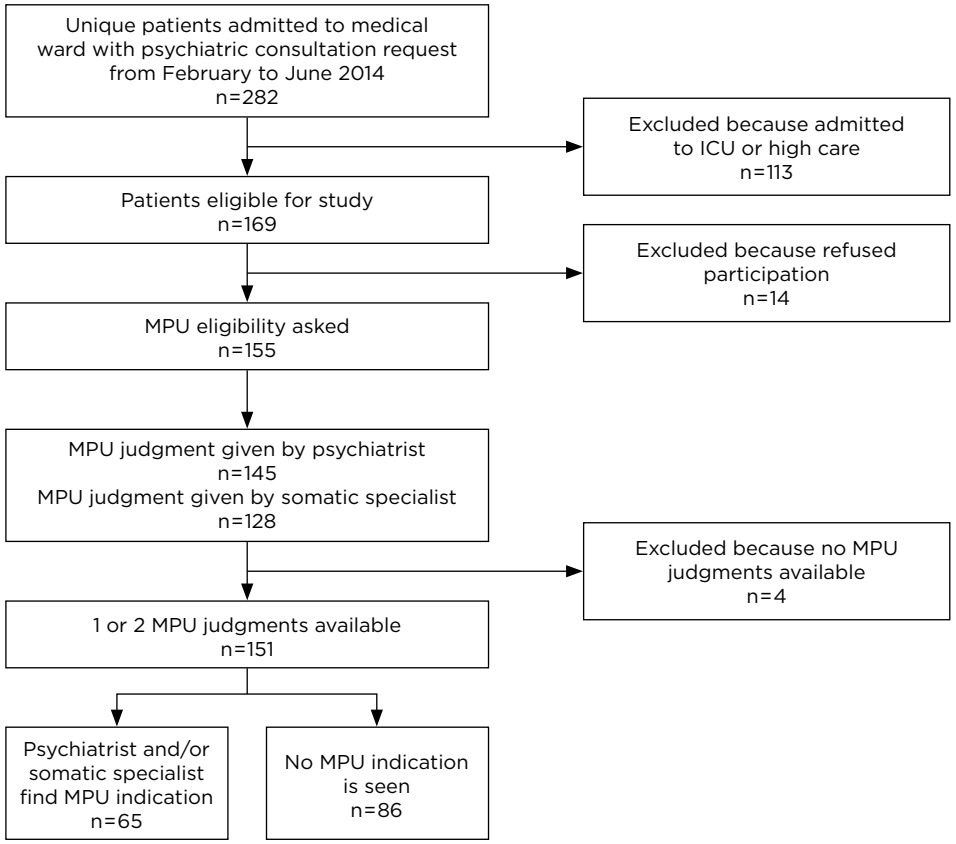


Figure 1. Flowchart of inclusion and exclusion.

Sixty different specialists from twelve different specialisms were surveyed: 16 surgeons, 14 internists, 5 Ear-Nose-Throat specialists, 4 neurologists, 3 neurosurgeons, 3 gynecologists, 3 hematologists, 3 urologists, 2 pulmonologists, 2 geriatrists, 1 cardiologist, and 4 psychiatrists. The medical/surgical specialists and ward nurses had varying levels of experience. For the psychiatrists the time between a consultation request and a decision on MPU-eligibility was a median of eight days (range 0 to 79 days), for the somatic specialists the median was 66.5 days (range 0 to 178 days).

In general, a patient was perceived as an eligible MPU-patient if this patient had both: a) an indication for a psychiatric hospital admission based on moderate or severe psychiatric symptoms and the need for treatment of these symptoms, or behavioral problems in a psychiatric hospital (for instance due to suicidal behavior, or lack of symptom control making ambulatory psychiatric treatment difficult), and b) an indication for general hospital admission based on moderate or severe somatic medical symptoms.

In the cases of agreement between medical/surgical attending personnel and the C-L psychiatrist, the main reasons for MPU-eligibility were suicide attempts and concurrent general medical and psychiatric illnesses (for example patients with HIV or Cushing disorder). The arguments of the C-L psychiatrist for MPU-eligibility focused more on the need for a diagnostic evaluation, while the medical/surgical specialist's motivation was more often based on a lack of expertise of psychiatric problems, or safety issues such as wandering behavior and suicidal behavior, and the consequent need for a closed ward. Agreement on MPU non-eligibility was seen mostly in patients with too severe medical problems, and the need for special facilities (i.e. isolation room, specialist oncology ward, or after complex cardiologic or neurologic operations). Furthermore, end-of-life care, non-complex delirium, no psychiatric disorder, and consultative services on a regular medical/surgical ward, were agreed reasons for no need for MPU admission. In situations with disagreement on MPU eligibility, it varied whether the psychiatrist or medical specialist would prefer MPU admission. For thirteen patients (9%) only a medical specialist preferred MPU admission, and for another thirteen patients (9%) only the psychiatrist preferred MPU admission. In 6 cases the medical specialist stated that the patient could maintain himself on their ward, while the psychiatrist saw the benefit of MPU admission.

A remarkable disagreement was seen for 4 patients who were admitted to the hospital because of suicide attempts. A particular internal medicine specialist stated that during the short time these patients were admitted, for none of these patients MPU admission would be necessary. The psychiatrist, and most other medical specialists, recommended MPU admission for around 90% of patients with suicide attempts.

For the other disagreements no distinct patterns appeared. For 3 cases the C-L psychiatrist or the other medical specialist involved suggested that geriatric admission would be more appropriate. For 49 patients (79%) with an indication for MPU admission according to either the psychiatrist or the other medical specialist, the nurse agreed with the physician on the MPU indication. The motivation of the nurse matched the motivation of the physician(s) for: MPU admission for patients with suicide attempts and suicidal behavior, concurrent general medical and psychiatric illness, and the lack of wards' expertise to handle severe psychiatric problems. Nurses more often stated psychiatric history and (prominent) behavioral, cognitive or psychiatric symptoms as reasons for MPU eligibility. Nurses also more often stated "acts like any other patient", "no psychiatric symptoms", or "no difficulties in handling behavioral problems", as reasons for non-necessary MPU admission. When physicians saw no indication for MPU admission, for 25

Table 1. Socio-demographic characteristics.

	Indication for MPU (n=65)		PCS-only (n=86)		P-value
	n	%	n	%	
Female	27	42%	33	38%	.694
Age (mean±SD)	47.9±16.4		56.2±16.2		.002
Marital status					.105
- married	20	31%	33	38%	
- never married	24	37%	20	26%	
- widowed	0	0%	5	6%	
- divorced	12	19%	10	12%	
- unknown	9	14%	19	19%	
Place of birth					.536
- Netherlands	41	63%	58	68%	
- foreign	16	25%	15	17%	
- unknown	8	12%	13	15%	

patients (36%) nurses did see an MPU indication. Reasons for admission according to nurses only were delirium, psychological aspects, treatment refractoriness, substance abuse and paranoia, suicidal behavior, prophylactic treatment, psychiatric comorbidity and treatment adherence problems. Table 1 shows that patients with an MPU indication were on average eight years younger. There were no significant socio-demographic differences between the two groups.

8.3.1 Patient routing

Table 2 shows the routing of patients through the hospital. Patients with an indication for MPU admission were mostly admitted via the emergency room (N=46, 71%). Of the patients with a need for MPU admission, about one third was admitted at an internal medicine ward. Neurology was the second referring specialism for patients with a need for MPU admission, followed by traumatology and general surgery. The patients with an indication for MPU admission were visited for psychiatric consultation sooner (median 1 day versus 5 days, P<.001). Patients without an indication for MPU admission had a longer length of stay (LOS) at the hospital (median 15 days versus 6 days, P=.003). MPU eligible patients were more often discharged to a psychiatric hospital.

8.3.2 Medical data

Table 3 shows that almost half of the patients with an indication for MPU admission stayed in Erasmus MC because of injury or poisoning. The same trend was seen in the final diagnosis at discharge.

Table 2. Patient routing.

	MPU-eligible (n=65)		PCS-only (n=6)		P-value
Hospital entry					P=.015
- emergency room	46	71%	38	44%	
- from home	3	5%	7	8%	
- outpatient clinic	11	17%	26	30%	
- referred from other hospital	5	8%	14	16%	
- other	0	0%	1	1%	
Days until psychiatric consultation, median (min-max)	1	0-84	5	0-51	P=.000
Specialism requesting consult					P=.002
- internal medicine	22	34%	11	13%	
- general surgery	6	9%	14	16%	
- gastroenterology	5	8%	10	12%	
- traumatology	7	11%	8	9%	
- neurology	9	14%	2	2%	
- neurosurgery	2	3%	8	9%	
- ear, nose, throat	0	0%	10	12%	
- other	14	27%	23	27%	
Number of wards per admission, median (min-max)	1	1-8	1	1-10	NA
Admission on ICU, %	9	14%	23	27%	P=.046
Days at ICU, median (min-max)	0	0-13	0	0-54	NA
Admission on high care, %	1	1%	4	5%	NA
Days at high care, median (min-max)	2	-	0	0-11	P=.532
Admitted at medium care, %	0	0%	3	4%	NA
Days at medium care, median (min-max)	-	-	0	0-30	NA
Total length of stay, median days (min-max)	6	1-104	15	0-116	NA
Disposition location					NA
- home	44	68%	46	54%	
- nursing home	2	3%	14	16%	
- revalidation	1	2%	6	7%	
- other hospital	1	2%	2	2%	
- psychiatric hospital	8	12%	0	0%	
- died	4	6%	11	13%	
- other	5	8%	6	7%	
Readmission within one month	5	9%	20	27%	NA

ICU=intensive care unit. For readmission within one month 129 patients could be included in analysis. If the number of patients was too low no statistical test was performed, in the table this is shown as (non-applicable, NA).

Table 3. Medical data.

Admission reason (%)	Indication for MPU (n=64)		PCS-only (n=86)	
External causes of morbidity and mortality, XX	31	48%	19	22%
- Accident	4	6%	8	9%
- Intentional self-harm	21	32%	1	1%
Injury, poisoning and certain other consequences of external causes, XIX	30	46%	16	19%
- Injury of multiple body regions	4	6%	6	7%
- Poisoning by drugs, medicaments and biological substances	14	22	1	1%
Neoplasms, II	9	14%	20	23%
Symptoms, signs and abnormal clinical and laboratory findings, XVIII	12	19%	17	20%
Diseases of the digestive system, XI	6	9%	12	14%
Diseases of the circulatory system, IX	4	6%	11	13%
Certain infectious and parasitic diseases, I	4	6%	7	8%
Diseases of the nervous system, VI	3	5%	6	7%
Diseases of the genitourinary system, XIV	5	8%	1	1%
Mental and behavioral disorders, V	3	5%	1	1%
Diseases of the skin and subcutaneous tissue, XII	1	2%	3	4%
Pregnancy, childbirth and the puerperium, XIV	1	2%	3	4%
Diseases of the respiratory system, X	1	2%	2	2%
Endocrine, nutritional and metabolic diseases, IV	1	2%	1	1%
Diseases of the musculoskeletal system and connective tissue, XIII	2	3%	0	0%
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism, III	1	2%	0	0%
Diseases of the eye and adnexa, VII	0	0%	1	1%
Primary somatic conclusion (%)				
External causes of morbidity and mortality, XX	41	59%	26	30%
- Accident	4	6%	9	11%
- Intentional self-harm	24	37%	1	1%
- Medical	6	9%	17	18
Injury, poisoning and certain other consequences of external causes, XIX	35	54%	18	21%
Neoplasms, II	10	15%	21	24%
Symptoms, signs and abnormal clinical and laboratory findings, XVIII	12	19%	16	19%
Diseases of the digestive system, XI	7	11%	19	22%
Certain infectious and parasitic diseases, I	5	8%	15	17%
Diseases of the circulatory system, IX	4	6 %	16	19%
Diseases of the nervous system,	8	12%	9	11%
Diseases of the respiratory system, X	1	2%	15	17%
Diseases of the skin and subcutaneous tissue, XII	1	2%	10	12%
Diseases of the genitourinary system, XIV	5	8%	6	7%
Endocrine, nutritional and metabolic diseases, IV	2	3%	4	5%
Pregnancy, childbirth and the puerperium, XV	2	3%	3	4%
Diseases of the ear and mastoid process, VIII	1	2%	1	1%
Diseases of the musculoskeletal system and connective tissue, XIII	1	2%	1	1%
Factors influencing health status and contact with health services, XXI	1	2%	1	1%
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism, III	1	2%	0	0%
Diseases of the eye and adnexa, VII	0	0%	1	1%
Psychiatric conclusion, V (%)				
Any psychiatric conclusion	59	91%	69	80%
Organic, including symptomatic, mental disorders	16	25%	44	51%
Mood [affective] disorders	9	14%	8	9%
Mental and behavioral disorders due to psycho-active substance use	8	12%	3	4%
Disorders of adult personality and behavior	8	12%	3	4%
Neurotic, stress-related and somatoform disorders	4	6%	5	6%
Schizophrenia, schizotypal and delusional disorders	7	11%	1	1%
Behavioral syndromes associated with physiological disturbances and physical factors	1	2%	1	1%
Disorders of psychological development	0	0%	1	1%
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	0	0%	1	1%
Unspecified mental disorder	6	9%	2	2%

Diagnoses ordered from most frequent to least frequent. Roman numbers behind diagnoses correspond with ICD chapter code. ICD-10 subcategories were explored for the two categories wherein most patients were included. If someone had a diagnosis in chapter 'External causes of morbidity and mortality' a diagnosis in another chapter was also required, usually in chapter 'Injury, poisoning and certain other consequences of external cause'. This resulted in many patients having at least two diagnoses. Psychiatric conclusions described with ICD-10 blocks of chapter V mental and behavioral disorders (F00-F99).

A psychiatric diagnosis was found in a large majority of both groups. For both groups the most frequent psychiatric diagnosis was organic mental disorder, including delirium. Mood disorder was the second most frequent diagnosis, both in the MPU and the PCS-only groups. Disorders due to substance abuse were more often seen in patients with an MPU indication.

Logistic regression analysis explored the relationship between the MPU eligibility verdict and socio-demographic variables, hospital routing data and medical data. The

results indicated that psychiatric conclusion and hospital entry were independent explanatory factors (Nagelkerke R^2= 0.266; Hosmer and Lemeshow test=3.370, degrees of freedom=6, p=0.761; Area under the Curve= 0.751, 95% Confidence Interval 0.671-0.831). Psychiatric conclusion was grouped into four categories (no psychiatric diagnosis, organic mental disorders, mood disorders and other disorders) because some diagnostic groups were too small to be taken into account separately. The odds for MPU eligibility were higher for patients with a mood disorder (OR=4.62, 95%CI 1.12-19.08) and other psychiatric disorder (substance use, personality disorder, stress-related and somatoform disorders, schizophrenia and unspecified mental disorder (OR 5.85, 95% CI 1.86-18.42), compared to no psychiatric conclusion. Furthermore, odds for MPU eligibility were higher for patients who would be transferred from the Emergency Room (OR=2.72, 95% CI 1.10-6.70), compared to hospital admission after an outpatient visit.

8.4 DISCUSSION

Although there are some studies comparing patients admitted to a MPU with non-MPU admitted patients (7, 23), this is the first study describing the perceived need – according to professionals – for a high acuity medical psychiatry unit (MPU) within a PCS patient group in a hospital without an actual MPU. Professional medical personnel pointed to a need for MPU admission in 43% of the PCS patients admitted to a normal care or medium care unit. Frequent deliberations between physicians and with nurses will occur to decide on MPU eligibility. Diagnostic opportunities were a common reason for MPU admission according to the psychiatrist, while other medical specialists more often stressed safety concerns or lack of psychiatric treatment expertise as needs for MPU admission. Hence the proposed MPU will be secluded to provide a safe environment and staff will be trained to observe behavior and provide psychiatric treatment. The MPU should be prepared to care for patients with severe psychiatric adverse effects of medications for physical conditions (e.g. dexamethasone), and for diagnostic work-up for physical conditions with psychiatric symptoms (e.g. Cushing syndrome). Furthermore, patients with an MPU indication are likely to have an unplanned admission and transfer from the Emergency Room. The MPU should thus be prepared for acute admissions. Currently, more than half of the patients with an indication for admission to the proposed MPU are admitted to an internal medicine, neurology, or traumatology ward. Together with general surgery and gastroenterology wards, these wards will refer 75% of patients with an MPU indication in the future. Support from these departments and their specialists will be crucial to establish a well-functioning MPU. Since the Erasmus MC is a tertiary referral center, the MPU should be able to deliver the most complex physical and psychiatric care in order to provide added value and be acceptable for medical specialists. When both specialists agreed that there was no MPU-admission indication, they commonly stated that medical acuity was too high or specialist nursing care or equipment was needed. A Psychiatric Consultation Service should stay easily accessible for these patients to provide psychiatric assessment and treatment. Kishi et al. described the patient population of their type IV integrated medicine and psychiatry treatment program. The psychiatric conditions of their patients are similar to those of our MPU-eligible patient group, most common being substance-related disorders, delirium, mood disorders and dementia (7). Molnar et al. explored differences between patients using a Liaison-Consultative Service (LCS) and patients on an MPU (23). In our study organic mental disorder, including delirium, was a common diagnosis, while in Molnar's study delirium occurred in only small number of patients. In our study substance related disorders were frequently found in the need for MPU patient group, hence the proposed MPU might need collaboration and agreements with addiction treatment centers (1).

Our results are probably influenced by the patient population in the area of the Erasmus MC, Rotterdam. Rotterdam is a large European city, with a population of 630,000 inhabitants with a multicultural background, which may contribute to the high number of patients with substance abuse disorder. The Erasmus MC also provides centralized services for trauma-patients and tertiary medical problems for the surrounding region and rural areas with approximately 2.5 million inhabitants; this might, for example, have influenced the number of patients with delirium.

The finding that patients with an indication for MPU admission received psychiatric consultation sooner is probably explained by a greater number of management problems (prominent behavioral, cognitive and psychiatric symptoms) and safety risks in this group, leading to a greater sense of urgency for psychiatric consultation. A counter-intuitive finding, when compared to previous studies, is that patients with an indication for MPU admission had a shorter LOS than patients without such an indication (median 6 days versus 15 days). In our study, medical problems that were too severe and the consequent need for special facilities was a common exclusion reason for MPU eligibility. The longer LOS of the PCS-only patients is therefore probably explained by greater medical morbidity, supported by more intensive and high care stays (27 vs 14%) and higher mortality 13 vs 6%) in this group.

Improving cost-effectiveness will be a challenge since the current length of stay without an MPU is already quite short, probably related to early PCS involvement (24, 25). In a broader perspective, the proposed MPU may reduce the need for sequential admission in a psychiatric hospital (6, 7). Kishi et al found that their MPU was able to provide more improvement in psychiatric symptoms within a shorter length of stay than would have occurred with traditional sequential care (7). Hence, direct MPU admission is recommended, to avoid provider delay (7, 26).

8.4.1 Limitations and suggestions for further research

This pilot study has several limitations. First, MPU eligibility status was assessed in retrospect. Patients were considered MPU-eligible if either the medical specialist or the psychiatrist judged this to be the case. In future studies, MPU eligibility should be determined more consistently with the actual clinical process, by determining MPU eligibility repeatedly and in a dialogue between the C-L psychiatrist and the medical/surgical specialist, and to avoid recall bias. Second, although a definition of the proposed MPU was provided, it is possible that different specialists had different views with respect to the possibilities of the MPU.

An advantage of our study is that the results could not be influenced by factors such as the scarcity of MPU beds or the political pressure to admit 'difficult' patients. These factors however will be relevant during daily clinical practice. Another concern is the generalizability of results due to missing patients in various categories. First, there is a group of patients not visited by the PCS who might nevertheless benefit from MPU admission. This group includes patients with a known psychiatric disorder who could benefit from integrated care on an MPU, even though their behavior did not trigger a request for psychiatric consultation. This group of patients could be included if hospital admissions were screened proactively for the need for psychiatric consultation (1, 27, 28). Second, the patient group admitted to the intensive or high care units at the time of consultation might be considered MPU-eligible later in their journey through the hospital. An intensive care specialist who participated in this study suggested, some patients may be on a high-care unit due to the current lack of an MPU.

The results of this study could to some extent be generalized to other university medical centers: if they treat complex trauma, carry out complex operations, have a psychiatric ward, and are located in large multicultural cities with community mental care available. However, to determine the need for a local MPU a local needs analysis is recommended. If a hospital has, for example, a dedicated delirium team, the need for an MPU will be very different from that determined this study.

It could be argued that more objective measures are required to determine the need for MPU admission. However, Deson et al. note that professional chart review and close staff contact appear to result in shorter lengths of hospital stay, compared to using formal screening instruments (27). In future research, the different effects of PCS and MPU admission need to be studied. The value of an MPU should not be confined to a shorter hospital stay or fewer readmissions, because quality of care and reducing the burden on staff caused by disruptive behavior may be equally important arguments for establishing these units. From 2019 onwards, a randomized controlled trial is planned to study the value of the proposed MPU, compared to treatment as usual (PCS only).

8.4.2 Conclusions

This study shows that a group of patients who currently receive psychiatric consultation (PCS) appears to need admission to a high acuity MPU. This result, based on the judgment of professional medical personnel, supports the initiative of establishing an MPU at the Erasmus MC that must improve diagnostics, (psychiatric) management and safety for medical in-patients with prominent psychiatric symptoms as well as safety risks. The MPU must be equipped to accommodate acute admissions and should be able to cater for patients with complex medical and psychiatric problems in order to provide added value and be acceptable for medical specialists in a tertiary care setting.

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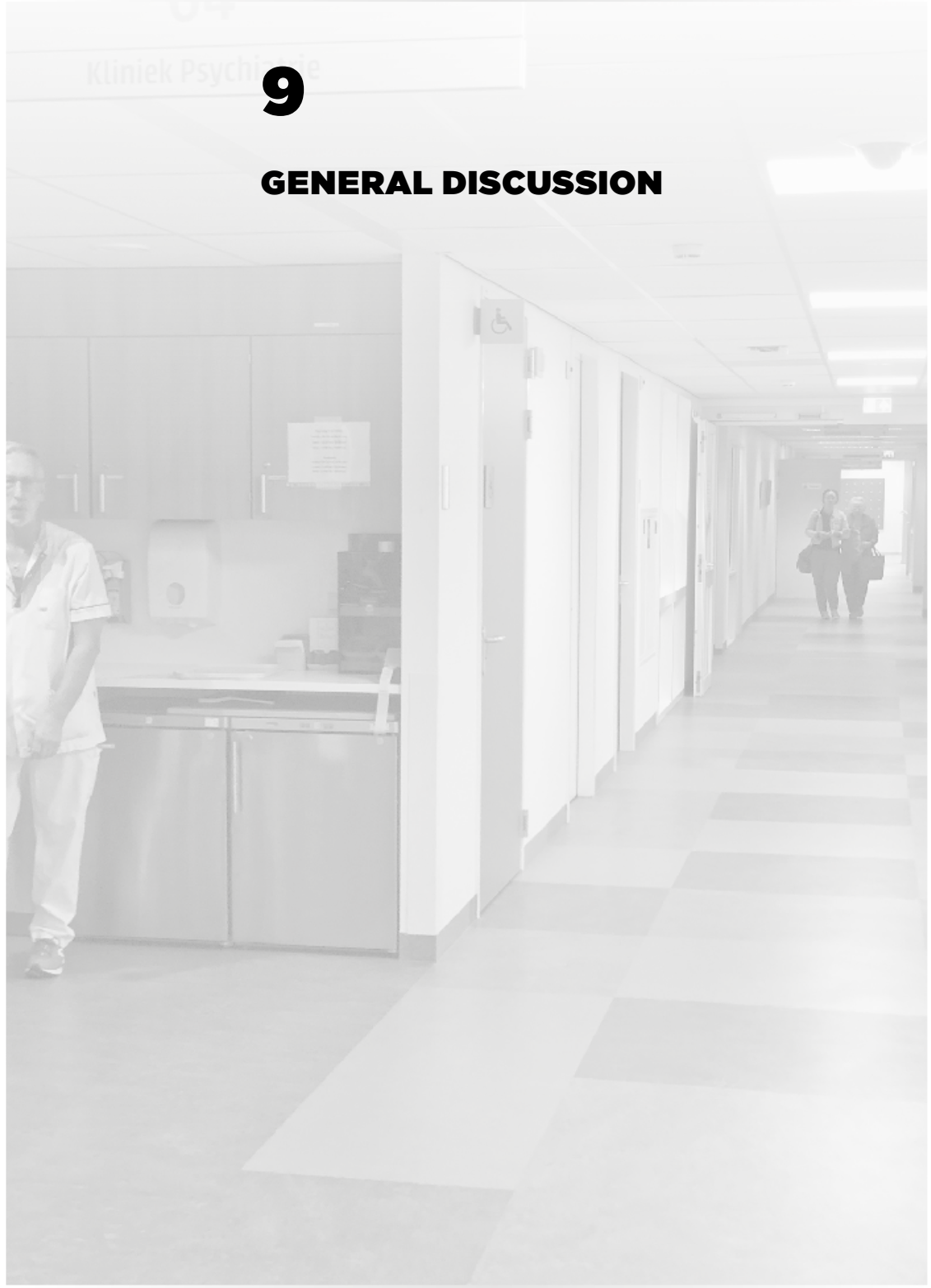
9

GENERAL DISCUSSION



This thesis stems from the daily practice of diagnosing, nursing and treating complex hospital inpatients with concurrent medical and psychiatric conditions. The focus, organization and value of this clinical work are explored using scientific methods. This chapter will first address the title and the outline of this thesis. Subsequently, the arguments for implementing MPUs, and the importance of additional studies are discussed, followed by a summary of the research findings and answers to the research questions. Finally, a perspective on the future of medical psychiatry units (MPUs) and the research into these units will be given.

9.1 THE SUBTITLE AND OUTLINE OF THIS THESIS

Ideally, aims and focus should guide the structure and process characteristics of an organizational intervention in medical care. The value of such an intervention can then be determined by examining to what extent the organization and outcomes are in line with its aims and focus (1). The subtitle of this thesis – 'Improving their organization, focus, and value' – indicates that many interventions, and certainly MPUs, only partially achieve this coherence of aims, focus, organization and value. Factors that shape the current organization of MPUs are: their history, their focus, the interests of the hospital and the professionals involved, the prevailing hospital politics, the needs of regional care networks, and the financing available (2-11).

The subtitle of this thesis furthermore indicates that our research started by gathering knowledge about the current organization of MPUs (Chapters 3 and 4), to subsequently conceptualize what a valuable focus (Chapter 2, 5, 7, 8), organization (Chapter 2, 6, 7, 8) and outcomes could be. Here this conceptualization will be presented in the 'ideal' order, namely 'from aim to value', to answer the research questions. In practice, however, we find that this order can differ from the ideal and/or that there is overlap in the time when these items are considered. Indeed, the thesis illustrates how practice evokes conceptual thinking. In planning to establish a new MPU at the Erasmus MC, the studies underlying this thesis aim to gain insight into the appropriate focus, organization and value of MPUs. In order to define the appropriate focus of MPUs, we studied their aims (Chapter 2), populations targeted by MPUs in the literature (Chapter 2), populations with worse health-economic outcomes when compared to medical inpatients without concurrent psychiatric illness (Chapter 5), and the target population of an MPU to be established within a university medical center (Chapter 8). To advance the evidence base underlying the organization of MPUs, we investigated organizational variation in the literature (Chapter 2) and in practice (Chapters 3 and 4). The interaction between the targeted population and the organizational context was investigated in Chapter 7 by explaining which factors contribute to the MPU admission decision. Finally, the value of MPUs was investigated by reviewing the outcomes of MPUs in relation to their organization (Chapter 2), and by developing a value-based quality framework supported by patients, professionals and payers (Chapter 6). These chapters' findings in relation to the appropriate focus, organization and value of MPUs are discussed below.

9.2 Arguments for implementing MPUs and the importance of additional studies

What are MPUs for? Most health systems worldwide use independent care delivery practices for psychiatric and medical care (12). This separation within health systems is remarkable because medical and psychiatric disorders are intimately related (12-16). Psychiatric disorders increase the risk for physical health conditions, including communicable and non-communicable diseases and injuries sustained both non-intentionally and intentionally (17). Conversely, many health conditions increase the risk for psychological distress and psychiatric disorders (13). The multimorbidity of medical and psychiatric disorders complicates help-seeking, diagnosis, and treatment, and can negatively influence prognosis (13, 17). People with severe mental illness are the worst affected, due to the severity and complexity of comorbidities, individual health behaviors, socioeconomic conditions, and sub-optimal accessibility quality of medical care (14, 15, 18). Financial costs, the fragmentation of care, and social stigma may further restrict the accessibility of secondary healthcare for people with mental illness (15). This unfortunate set of circumstances contributes to an excess mortality of 15-20 years compared to people without mental illness that is largely explained by the impact of physical health conditions (17). Patients with a psychiatric disorder often manage their illness less adequately, may be less motivated for treatment, can experience limited initiative or apathy, may experience decreased cognitive functioning, and may display challenging behaviors (12, 13, 15, 17, 19, 20). Although challenging behavior can be a symptom of both medical and mental illness, some health-care providers have stigmatized views towards people with mental illness (15). The consequences of such views involve a negative assessment of prognosis, wrongful attribution of somatic symptoms to a psychiatric disorder ('diagnostic overshadowing'), inadequate knowledge and skills of professionals, and even discriminatory behaviors (15). Moreover, among patients, social stigma can contribute to the experience of being treated unfairly and to self-stigmatization further impeding adequate health behaviors (15, 21-24). As rightly noted by Naylor and colleagues in their 2016 King's Fund report (14): "These striking and persistent inequalities serve as a powerful reminder that the case for integrated care for mental and physical health is an ethical one as much as an economic one."

In acute care hospitals, medical and psychiatric multimorbidity is common. Estimates of its prevalence vary between 15 and 50% (25). The clinical integration of medical and psychiatric care in MPUs is an answer to separated care practices for complex patients with medical and psychiatric multimorbidity that are frequently encountered in the hospital setting (26). MPUs aim to deliver such integration for complex hospital inpatients

and ideally form a continuous service together with psychiatric consultation, liaison psychiatry and outpatient care (19, 27, 28). MPUs have existed since the 1980's and originated in the United States. Nevertheless, in 1985 Goodman concluded that "the concept of medical psychiatry units is clearly not new, but nor has it flourished" (29). Renewed interest in MPUs has developed in the past decade, both in the United States (30) and in the Netherlands (a finding of this thesis), indicating that integrated treatment for the unmet health needs of these patients is increasingly recognized by both clinicians and policy makers.

9.3 SUMMARY OF THE RESEARCH FINDINGS AND ANSWERS TO RESEARCH QUESTIONS

The research findings can best be summarized using the key themes: focus, organization and value of MPUs.

9.4 FOCUS

The thesis provides evidence that the proper focus of MPUs can be based on their aims and the targeted population.

9.4.1 Aims

MPUs aim both to improve patient-related outcomes and to diminish the disproportionate resource use associated with medical and psychiatric multimorbidity (Chapter 2) by integrated medical and psychiatric care in a safe environment. In this respect, MPUs are a response to hospital care that is fragmented and sometimes poorly accessible for these patients (Chapter 2). Patients with medical and psychiatric multimorbidity are highly prevalent (12) and increasingly common (31-33) in the hospital environment. However, medical/surgical wards often have a limited tolerability for their disruptive behaviors, safety risks and severe noncompliance (34), and hence MPUs also have the aim of relieving these wards (Chapter 2). Similar to Consultation-Liaison (C-L) Services, MPUs thus both serve the patient and the hospital (35). In addition, MPUs aim to train physicians and residents in clinical management or medical and mental multimorbidity. This, in addition to treatment of these patients in a 'conventional' medical setting, contributes to reducing stigma (Chapter 2).

9.4.2 Targeted population

Different criteria can be used to delineate the target population of MPUs. These criteria, discussed in succession below, not only include the medical and psychiatric diagnoses made, reasons for admission, and the potential for diminishing 'excess' resource use, but also the degree of acuteness and complexity of the medical and psychiatric disorders encountered.

MPU admission diagnoses

In Chapter 2, we report that MPUs cater for a broad variety of psychiatric and general medical conditions. Age focus largely determines population focus. Three distinctive age focuses are identified. Most MPUs cater for adult and elderly patients. Children and adolescent units referred to in the published literature predominantly treat young patients with psychosomatic conditions, including eating disorders (Chapter 2), although the previous survey by Wamboldt in the United States suggested that their focus may actually be broader (36). Mood (affective) disorders are the most common group in both adult and elderly and elderly units (Chapter 2), in line with previous surveys and reviews (26, 34, 37). Other significant groups in adult and elderly units are psychotic, somatic symptom, substance abuse, organic and personality disorders. Elderly units focus on patients with mood and organic disorders, such as delirium and dementia (Chapter 2).

This thesis provides evidence that medical disease categories are broad and varying for different MPUs (Chapter 2). Our finding is in line with previous epidemiologic research that concludes that psychiatric patients have the same medical diseases as the general population, but their risk thereof is increased (38). Patients with severe mental illness (SMI) – such as schizophrenia, spectrum disorders, and bipolar disorders – and also patients with substance use disorders and eating disorders have an even higher risk for medical illness compared to patients with other psychiatric diagnoses (15, 17). It is thus remarkable that patients with SMI appear relatively less well represented on MPUs, compared to patients with mood (affective) disorders. Possible explanations include poorer care accessibility and quality of care for SMI patients (17, 23), as some authors have found that people with psychiatric disorders may be less likely to be screened or to receive the recommended care and monitoring for medical conditions (17).

In this thesis, we investigated the targeted population of a new MPU at the Erasmus MC (University Medical Center Rotterdam, the Netherlands). Chapter 2 gives an example of how a targeted population can be identified in the context of a large academic hospital. We found that the targeted population of the Erasmus MC MPU largely consists of adult and elderly patients with medical illnesses and accompanying organic, mood, substance use and personality disorders (Chapter 8). This finding appears to be largely in line with the results of our literature review (Chapter 2). Moreover, the population focus of the Erasmus UMC MPU is similar to the high acuity (Type IV) unit of the Iowa University Hospitals and Clinics (30, 39, 40) that is embedded in a similar university hospital context. Unlike the new MPU of the Erasmus MC, however, the Iowa MPU has coercive admission facilities (Chapter 2, (30, 39, 40)). Almost half of the patients with an indication for admission to the future Erasmus MC MPU will have a diagnosis of injury or poisoning (Chapter 8).

Admission because of disruptive behaviors, safety concerns or severe non-compliance

This thesis shows that the reason for MPU admission is often not a specific medical and psychiatric diagnosis, but disruptive behaviors, safety concerns or severe non-compliance (Chapters 2, 7, and 8). We found that behavior and symptoms that can disrupt medical treatment include agitation, suicidal behavior, aggression, confusion, deliberate self-harm, cognitive impairments (including intellectual disability), pica, depressive and anxious symptomatology, obsessions and compulsions, mania, severely disturbed eating habits, apathy and catatonia. The most important factors in the admission decision appear to be catatonia, suicidal behavior and aggression (Chapter 7). These behaviors can be challenging to the hospital staff when patients are, or appear to be, dangerous, frightening or distressing, sometimes invoking intolerable or overwhelming feelings within staff members (41). In our needs analysis for the new Erasmus MC MPU, we show that the medical specialists, the consulting psychiatrist (C-L), and the nurses agreed on MPU-eligibility in the case of suicide attempts and concurrent general medical and psychiatric illnesses (Chapter 8). The C-L psychiatrist more often stresses a need for diagnostic evaluation, while the other medical specialists and the nurses report a lack of expertise on psychiatric problems and safety issues as reasons for MPU-admission. Interestingly, nurses more often see an indication for MPU-admission when compared to the medical specialists. Nurses mention a psychiatric history, overt psychiatric symptomatology, psychological aspects, preventive treatment, and treatment adherence problems as additional reasons (Chapter 8) for admission to an MPU. It is not surprising that nurses state these reasons, because these professionals are in the front line of patient contact and will - therefore - experience the most impact from challenging behavior. From this (unilateral) perspective, one of the aims of MPUs is to manage 'problem patients' that either show disruptive behavior or have higher healthcare utilization (Chapter 2). The term 'problem patient' must be viewed from the perspective of a hospital staff, who often find themselves insufficiently equipped and without the required time to diagnose and treat psychiatric morbidity (14), hence resulting in a free play of unmet health needs, countertransference phenomena, diagnostic overshadowing and 'patient bounce' (Chapter 1 and 2, (41-44)).

Potential for improving health-economic outcomes

As MPUs aim to diminish the disproportionate resource use associated with medical and psychiatric multimorbidity (Chapter 2), we expect these units to focus on patients with potentially modifiable cost drivers (Chapter 1). Length of stay (LOS) is an important cost-driver for hospital care, a frequently used proxy measure for both the process and efficiency of inpatient stays, and the common outcome measure used in the limited number of studies on the effectiveness of MPUs (Chapter 2). It is known that hospital inpatients with psychiatric comorbidity have longer LOS and higher readmission rates compared with patients without such comorbidity (45). Before this thesis, such health-economic outcomes were neither systematically reviewed nor meta-analyzed. Proactive C-L psychiatry services have been shown to reduce LOS (46), indicating that this cost driver is potentially modifiable. Since the 1980s, an important aim of MPUs has been to remedy increased resource use (Chapter 2). Thus in Chapter 5 we set out to identify modifiable cost drivers in subpopulations of hospital inpatients with medical and psychiatric comorbidity. We establish a strong relationship between psychiatric comorbidity and increased LOS (95% of the studies included), medical costs (100%), and rehospitalizations (90%). Using meta-analysis, we show that hospital inpatients with comorbid major depressive disorder have a longer LOS, higher medical costs, and increased rehospitalization odds in most studies. Our review thus supports the idea that psychiatric comorbidity, and especially major depressive disorder, is accompanied by potentially modifiable cost drivers. Hospital inpatients with major depressive disorder are a useful focus for MPUs, as our review (Chapter 5) provides the most solid evidence for their increased LOS.

Patient acuity

Illness acuteness is commonly expressed as 'acuity', a concept that both refers to the 'severity' of a medical problem and to the 'intensity' of the care that is needed (47). Psychiatric patient acuity is largely determined by the severity of disruptive behavior in terms of the immediate risks to oneself or others, and hence this determines the amount of constant supervision of the patient, the level of behavioral control and coercion that is necessary (48-50), and the presence of severe non-compliance to medical treatment (Chapter 2). Medical patient acuity, in turn, is mainly determined by the severity of a medical disorder, mostly represented by its life-threatening nature (48). Moreover, in the case of medical and psychiatric multimorbidity, there is often a mutual negative influence from the somatic and psychiatric disorders. In the context of a hospital, this mutual negative influence may mean that medical treatment is, on the one hand, hampered by disruptive behavior and severe noncompliance and, on the other hand, by a lack of staff competencies with regard to psychiatric problems (Chapter 2, Chapter 7). Furthermore, patients with psychiatric illness (including substance use disorders) commonly suffer from multiple medical conditions. In addition, these patients are known to have extended LOS, and certain subgroups may have a greater chance to be admitted to the ICU for extended periods (51). Although C-L services also cater for patients with medical and psychiatric morbidity, these services have limitations with respect to the level of psychiatric acuity they can handle, because they lack the spatial and staffing facilities to treat psychiatric problems of higher acuity levels (Chapter 1).

To maximize health system value, Kathol and colleagues argued that MPUs should be able to target a patient group with serious medical and co-occurring psychiatric problems (19). In contrast to their argument, this thesis shows that most MPUs discussed in the literature focus on patients with medium medical and psychiatric acuity, thus excluding

the patient group with the most serious multimorbidity (Chapter 2). It is precisely this group that is known for premature death, poorer functioning, lower quality of life, and increased healthcare use and associated medical costs. Paradoxically, these patients have poorer access to somatic care (23), also shown to be of poorer quality in several areas (12, 15, 17, 18). Various MPUs have limited their admission criteria to patients who can benefit from a psychiatric therapy program, and hence exclude the more seriously (medically and psychiatrically) ill patients (Chapter 2). Other reasons for ignoring high acuity (medical or psychiatric) patients are related to the embedding and history of the MPUs, the competencies of the medical and nursing staff involved, the location within the hospital of the MPU, the regional health system context, and segregation in the financing of medical and psychiatric care. These themes affecting the acuity capabilities of MPUs are discussed immediately below.

9.5 ORGANIZATION

Prior to this thesis, a structured evidence base linking MPU aims to structure, process and outcomes was lacking (Chapter 2). In the literature, the appropriate organization of MPUs was extensively discussed in expert-based instructions, giving a wide variety of recommendations according to local needs and politics (2-9, 11, 52). As MPUs aim to provide integrated medical and psychiatric care in a safe setting, their structure and process will logically be aligned with their aims and the patient populations to be served (see section 9.1).

9.5.1 Structure and process characteristics

Consistent with the observations of Kathol (19), most MPUs examined in the literature are 'psych-med units', thus originating from or based on psychiatric wards (Chapter 2). The staffing model of MPUs, i.e. the attending physicians, any consulting medical specialists, and nursing staff, is largely congruent with the MPU type (Chapter 2), meaning that psych-med units have a dominant psychiatric staff orientation, while 'med-psych units' have a dominant medical staff orientation. Most MPUs in the Netherlands can be considered as 'psych-med units', and 89% have psychiatric personnel attending (Chapter 3). In 2015, the Netherlands had around as many MPUs as are described in the entire literature (37 out of 39 units; Chapters 2, 3, and 4). The relatively large (but decreasing) number of general hospital psychiatric departments ('PAAZ' and 'PUK', Chapter 3), supportive government policy (53), and the publication of Dutch Field norms for Type IV MPUs (Chapter 3, (54)) probably contributed to this finding. Precise descriptions of facility design are largely lacking, mainly because studies often focus on patient descriptions and/or care needs that can be addressed (Chapter 2). The treatment approaches of MPUs have not hitherto been studied systematically and are sparsely described in the literature (Chapter 2). These approaches vary from short term crisis intervention, process-oriented psychotherapeutic and milieu treatments, to treatment where there is combined medical and psychiatric illness that requires attention, to a single long-stay ward (Chapter 2). Much of the variation in LOS on the MPUs, as described in Chapter 2, will have been associated with the treatment approach, together with a varying population focus (Chapters 2, 3, 4, 7 and 8), the possibilities within different financing frameworks (e.g., a shorter LOS in acute medical hospital funding, a longer LOS in psychiatric funding (19)), and the quality of aftercare arrangements. Hence, it can be assumed that there are roughly two types of treatment approach. First, there are 'acute MPUs', targeting temporary intensive care in a similar manner to that of an intensive care unit (ICU). The patient is sent back to the referring ward as soon as concurrent care needs are resolved (i.e. 'closed-format ICU'). Examples of this approach are the Iowa University Hospitals and Clinics MPU (30, 39, 40), the VU Medical Center MPU in Amsterdam (55), and the new MPU of the Erasmus MC in Rotterdam (Chapter 8). Second, there are a larger number of MPUs emphasizing the 'process-oriented' treatment of patients which aim for functional recovery and accepting longer LOS. The possible advantages and disadvantages of both types of approaches will be discussed below (see section 9.6).

9.5.2 Acuity capabilities

As discussed in section 9.4.2, the term acuity refers both to the 'severity' of a medical problem and to the 'intensity' of the care that is needed. This thesis provides evidence that an MPU's medical and nursing staff is one of the most important determinants of acuity capabilities. Most of the MPUs considered in the literature to date have medium medical and psychiatric acuity capabilities (Chapter 2). Although Kathol's MPU typology failed meaningfully to structure the Dutch MPU landscape (Chapter 4), the underlying acuity capabilities of Dutch MPUs appear to be of a higher order. Our study shows that 81% of MPUs in the Netherlands have medium-to-high medical and psychiatric acuity capabilities, and that the psychiatric acuity capabilities (i.e., compulsory admission capabilities and the availability of electroconvulsive therapy [ECT]) are the most distinctive features of these MPUs (Chapter 4). It can be speculated that the publication of field norms (54) may have contributed to both the number and higher acuity capabilities for Dutch MPUs, as these field norms were based on Type IV (high acuity) units previously described by Kathol (Chapters 1 and 2, (48)).

Staffing is a major factor in facilitating care for high acuity medical and psychiatric patients. Both medical and psychiatric physicians should be actively involved, and nurses should have both medical and psychiatric nursing expertise (Chapter 2; (40, 48)). Notably, we find that the presence of competent nurses is rated as more important than the presence of competent physicians when considering admission to an MPU (Chapter 7). This finding is in line with previous literature stressing the importance of the nursing staff for MPU performance (2, 6, 7, 48, 56-59). Kathol defined the upper limit of high

medical acuity as the need for critical care (48). High psychiatric acuity capabilities do not have such a delineation in Kathol's model, probably because there were no facilities for critical level psychiatric care at that time. As described in the 'Focus' section, some MPUs exclude high acuity (medical and psychiatric) patients because it is likely that they will benefit less from the psychiatric therapy program. There is also tension between taking care of acutely ill patients and maintaining the conditions for psychiatric treatment, because recognizing and treating acute medical problems will rightly be given a higher priority than preserving the ward's therapeutic milieu (Chapter 2). Hence several MPUs limit the number of severely medically ill patients, or even exclude them in their admission criteria (Chapter 2). In this regard, MPUs in the Netherlands regularly lack available medical nursing expertise, parenteral nutrition abilities, facilities for terminal care, and percutaneous endoscopic gastrostomy (PEG)-probe placement (Chapter 3). Another important reason for limitations in medical acuity capabilities is the psychiatric origin of many MPUs, and therefore the predominantly psychiatric staffing model. In these cases, the willingness of nurses and psychiatrists to learn how to perform medical diagnostics and treatment, and the degree of involvement of other medical specialists/consultants, determine the actual and potential medical capabilities of an MPU. It often takes several years and investment in cross-training before a nursing team is sufficiently double-trained, leading to a gradual increase in acuity capabilities (Chapter 2). As many MPUs are located on psychiatric wards, and these wards are often not in the hospital's main center, this may hamper (acute) medical specialist (other than the psychiatrist) involvement, and thereby their medical acuity capabilities (Chapter 2).

Furthermore, the regional health system context will probably influence MPU acuity capabilities, as local needs and alternative medical and psychiatric facilities also determine which patients will be admitted to an MPU (Chapter 7). Most of these contexts have largely been determined historically, although the healthcare purchasing habits of insurance companies may also be an important factor (60). Separated medical and mental healthcare funding systems also have an impact on medical acuity capabilities, since not all MPU-designs can be financially viable (4, 5, 19). In MPUs under psychiatric licensure, behavioral health purchasers will often not pay for medical services. Conversely, MPUs under medical licensure will often have LOS-limitations (19). The lack of integrated forms of financing is a global problem (15). In the Netherlands, local funding solutions consist of an enhanced form of psychiatric or medical funding, or budget reallocation by the relevant hospital (Chapter 3). Relatively simple ways to improve the acuity capabilities of MPUs and thereby to better serve complex patients would be the introduction of compulsory admission facilities and ECT, and the active involvement of both psychiatric and medical staff (Chapters 2 and 3).

9.5.3 Consensus-based quality framework compared with the organization and dispersion of Dutch MPUs

We showed that it was possible to reach consensus among Dutch patients' representatives, professionals, providers and healthcare insurance companies on the core values, structure, and process requirements of psychiatric services in the general hospital (Chapter 6). The resulting core values that we found were based on prioritizing quality aspects that are described in the literature: 'quality of life', 'independent functioning', 'shared decision-making', 'continuity and chain of care', 'de-stigmatization' and 'collaboration and integration of care' were highly ranked. The patients' ranking gained extra weight. This caused 'quality of life', 'independent functioning' and 'shared decision making' to rank highest. Notably, patients valued 'independent functioning' higher than 'quality of life'. (Chapter 5). The explicit contribution of patients is probably also an important reason for the similarity of our Dutch core values to a contemporaneous conceptualization of patient-centered care (61).

Kathol's descriptions of high acuity MPUs (Type IV units (40, 48, 58)) formed the basis of the Dutch Field Norms for Type IV MPUs (54) that were adopted into the quality indicator set of Chapter 6. In summary: (i) An MPU offers 24/7 integrated care at the level of regular psychiatric and medical nursing units. (ii) Specific medical, nursing and paramedical expertise is available. (iii) An MPU does not stand alone but is part of a service that also provides consultation-liaison and outpatient care, so that the patient can be followed (27, 54). There are chain of care agreements with partners inside and outside the hospital. These conditions ensure that MPUs can handle a non-exhaustive list of 10 complex healthcare needs. Chapter 6 provides generic guidelines for both the structure and process of MPUs.

Although the 'accessibility and availability of treatment facilities' is a core value defined in Chapter 6, Chapter 3 shows that Dutch MPUs and MPU beds are unevenly dispersed across the Netherlands. In 2015, when the survey was deployed, several academic hospitals did not have an MPU, and in the north of the Netherlands there was a scarcity of MPU beds. Nowadays, six of the eight academic hospitals have an MPU. In relation to the core value of 'continuity and chain care' (Chapter 6), we show that most MPUs do not have extensive chain care agreements concerning their patients.

9.6 VALUE

From our results in Chapter 2, in line with Kathol (62), we conclude that the current MPU literature does not allow for evidence-based statements on the (cost-)effectiveness of the various MPU designs. There are, however, various starting points for maximizing the health care system value of MPUs by choosing the right focus and organization.

9.6.1 Value based on aims

Hussain and Seitz (26) concluded that there is preliminary evidence that MPUs may improve global functioning, LOS, and medical costs for inpatients with medical and psychiatric multimorbidity. However, based on their aims, the value of MPUs must be viewed in a much broader light (Chapter 2). As Chapter 2 shows, MPU aims encompass the improvement of patient-related outcomes, quality, safety, de-stigmatization, the relief of hospital staff strain and caregiver strain, and the training of professionals regarding the integrated biopsychosocial diagnosis and treatment of patients with medical and psychiatric multimorbidity (Chapter 2). These aims are especially important given the persistent and striking health inequalities of people with mental illness (see section 9.2). In most health care systems, the availability of integrated inpatient med-psych services is limited (16) and it is thus logical for MPUs to have a broad scope in terms of psychiatric and medical diagnoses (Chapter 2). Chapter 5 supports the dominant focus of MPUs on major depressive disorder from a health-economic perspective. It is, however, striking that patients with SMI – who have the greatest risk of multimorbidity and premature death – appear to be under-represented in MPUs (Chapter 2). In addition, many adult and elderly MPUs do not, or only to a limited extent, focus on serious psychosomatic pathology (Chapter 2). This is noticeable because 'persistent somatic symptoms', 'functional disorders' and 'somatic symptom disorders' are prevalent, and these conditions express themselves in both medical and mental disabilities and increased healthcare utilization patterns (63, 64). The rich psychosomatic tradition of our neighboring country seems to be partly missing in the Netherlands (65, 66). It has previously been argued that MPUs should target complex patients in order to maximize health care system value, and that these patients often have severe and acute ('high acuity') medical and psychiatric illness (19). These are the patients for whom proactive psychiatric C-L-teams in standard medical health care settings do not suffice (19). In this regard, it is important to reiterate that the concept of acuity refers to both the severity of an illness and to the intensity of the care needed (see section 9.4.2). The mutually negative influence of medical and mental disorders in the case of multimorbidity can ensure that, although the individual's problems do not always have to be serious in terms of acuteness ('acuity'), the interaction between medical and mental illness nevertheless poses major health risks (see section 9.2). In these complex cases, intensive (MPU) care may still be needed.

9.6.2 Value in relation to organization

Based on the considerations above MPUs must, thus, be able to treat high acuity patients but should not exclude patients with lower acuity. From an operations management perspective, Chapter 2 identifies the tension between delivering 'acute-type care' and maintaining a 'process-oriented treatment milieu'. The inclusion of many high acuity patients means that patients who are further on in their recovery process may not get the right attention, unless a disproportionate number of extra staff is deployed. This split probably plays an important role in MPUs with a process-oriented approach, and less so in the acute MPUs focusing on temporary intensive care (see section 9.5.1).

The value of these different approaches has not been explicitly investigated in this thesis. One can, however, hypothesize that from the patient's perspective there may be a preference for MPUs with a process-oriented approach, since these are aimed at continuity of care and recovery of functioning. From the perspective of acute care medical hospitals, there may be a preference for the temporary intensive-care model, because this emphasizes reducing the burden on the staff of regular nursing departments, and LOS-reduction, by facilitating medical treatment. For the purpose of clarification, these approaches are represented here as two extremes, while in daily practice a compromise has to be sought between the different interests.

9.6.3 Value in relation to costs

MPUs are generally viewed as 'expensive' units, because more staffing appears to be necessary compared to regular hospital wards. To date, nothing can be said about the costs and effects of high acuity MPUs (62). However, in view of the high morbidity and heavy economic burden of medical and psychiatric multimorbidity, the cost of MPU care may compare in a positive way to the other facilities of a modern hospital. These patients would otherwise require extra attention elsewhere in the hospital.

9.7 CONCLUSION

It is increasingly recognized that too strict a separation of physical and mental care does not do justice to patients, for whom multimorbidity of physical and mental disorders is common. MPUs feature clinical integration of medical and psychiatric care in the hospital setting. They typically cater for a broad range of psychiatric and medical conditions, although some psychiatric populations with high morbidity burdens from physical illness appear to be underserved. Because of the breadth of the targeted population, an MPU stands or falls by the flexibility and expertise of its staff. The nursing staff, especially, is of vital importance for the functioning of MPUs. MPUs aim both to improve the outcomes of complex patients, and to relieve insufficiently equipped hospital wards from the strain of disruptive behavior. In these aims, MPUs balance two approaches. At one end of the spectrum, the 'closed format MPU' features temporary intensive care to facilitate acute medical care. At the other end, the 'process-oriented MPU' aims for continuity of care and functional recovery and accepts longer lengths of stay. This thesis advances the evidence base on the organization of MPUs in order to facilitate future comparisons between the different MPU designs. At present however, no statement can be made about the costs and effects of the various types of MPU.

9.8 FUTURE (RESEARCH) DIRECTIONS

Several future directions derive from the results of this thesis.

9.8.1 Targeted population

MPUs should focus more on patients with severe mental illness and substance abuse, as these patients experience extreme health inequalities across a wide range of health conditions (Chapter 2, (15, 17, 67)) although paradoxically, as described above, their access to care and the quality of that care is suboptimal. While some of these patients use less care (23), there are also 'ultra-high utilizers' among these groups of patients (68). Future studies should investigate which patients are involved and whether MPUs can provide an answer to this problem.

Another population category that is currently underserved by MPUs, although experiencing high levels of disability and increased care utilization patterns, is patients with somatic symptom disorders (Chapter 2, (64)).

9.8.2 Acuity capabilities and the distribution and differentiation of MPU beds

To improve the ability of MPUs to care for these complex patient groups, their acuity capabilities can be enhanced by the introduction of compulsory admission facilities, ECT, and the active involvement of both psychiatric and medical staff (Chapter 2). When considering the future distribution of MPU beds across the Netherlands, it is important to take into account the accessibility of this care as well as the requirements of the care environment and the network in which an MPU is embedded (Chapters 3, 6, and 7). In doing so, tertiary care hospitals are more likely to house 'closed-format MPUs', while general (teaching) hospitals will focus more on process-oriented MPUs with longer lengths of stay that focus on restoring patients' functioning and quality of life.

9.8.3 Training of professionals

Now that multimorbidity is a growing problem, a holistic, biopsychosocial orientation of professionals is becoming increasingly important. As social stigma is an important cause of the reduced quality and accessibility of medical care for people with mental illness, MPUs can contribute to the reduction of such stigmatization by multidisciplinary evaluation and treatment in a medical setting, and by providing an invaluable learning environment for professionals that should be mandatory in many curricula (Chapter 6).

9.8.4 Integration in regional care networks

The establishment of MPUs is an important step forward in holistic care for the biopsychosocial needs of complex patients (horizontal integration), but these MPUs are still insufficiently focused on network care for their targeted populations (Chapter 3). This 'vertical integration' is necessary to improve the outcomes of this patient group in the longer term by proactively identifying unmet health needs, employing secondary prevention, and improving the continuity of care. In improving the care networks of patients with medical and psychiatric multimorbidity, a distinction can be made between continuity and the chain of care within the hospital and outside the hospital (e.g. transmural care, Chapters 3 and 6). Pro-active psychiatric consultation-liaison services are a means of early detection and timely care that might prevent MPU admissions and ensure continuity of care within the hospital (19, 69). MPUs themselves should provide timely and accessible inpatient care to patients for whom no alternative is available, and only for as long as inpatient care is necessary. To achieve this, on the one hand, it is necessary that care can be scaled down to day care and outpatient care services within the hospital (19, 27). On the other hand, a better and compelling connection with mental healthcare institutions, addiction care institutions and primary care is required, as the targeted patient population of MPUs will often receive their long-term treatment in these settings.

9.8.5 Integrated financial arrangements

Moreover, policy makers can contribute through integrated financial arrangements to resolve the financial constraints which presently limit the medical acuity capabilities required to effectively treat complex patients (Chapter 2). In the Dutch situation, local financing solutions have been devised that are effective (Chapter 3), but with the 'side effect' that MPU care is insufficiently visible from registrations at a national level. Integrated funding for such care can contribute to reducing this problem and is a step in the direction of better comparability of the costs and effects of MPUs. With respect to the major health inequalities of patients with psychiatric and medical morbidity, it is important to view MPUs not only in economic terms, but also from an ethical point of view (14).

9.8.6 Future research

Future research should focus on the different treatment approaches in relation to patient acuity needs and operations management restraints (see section 9.6.2), explore the role and embedding of MPUs in care networks, identify barriers to and facilitators in the establishment of care networks that are focused on those patients with a high morbidity burden, and clarify the actual costs of different MPU designs in relation to their aims.

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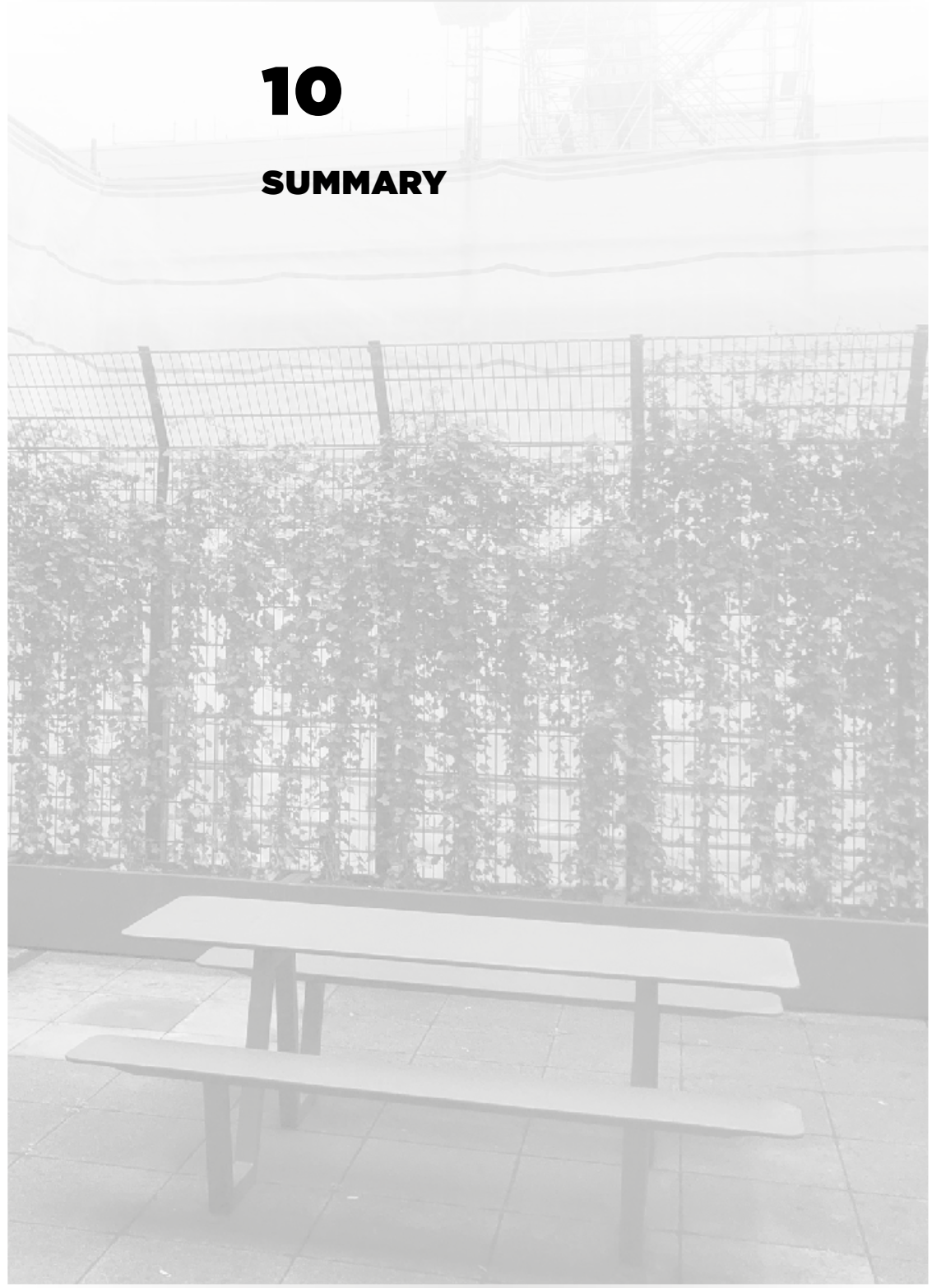
10

SUMMARY



Medical psychiatry units (MPUs) are hospital wards that cater for hospital inpatients that are too medically ill for a psychiatric ward, and too psychiatrically ill for general medical wards. Patients with psychiatric comorbidity or behavioral problems are frequently encountered in the hospital setting. MPUs have existed since the 1980s and originated in the United States. The term MPU is used in a generic way and can thus refer to quite different hospital units. From the medical perspective, the term not only refers to units that can evaluate and treat patients with a serious and acute multimorbid illness, but also to units that offer basic and non-acute general medical care. From the psychiatric perspective, some of these units have limited tolerability for disruptive behaviors. The diversity in organization, patients served, and unit settings suggests that MPUs are still in an early stage of their evolution. To date, no consensus has emerged regarding their appropriate focus or structure and evidence on cost and effects is scarce. The research presented in this thesis aims to arrive at a consensus about the appropriate focus and structure of MPUs, and to provide evidence about their costs and effects. More specifically, the following objectives are pursued: 1) improving the focus of MPUs by delineating patient populations that are currently treated by MPUs, and by identifying subgroups of medical inpatients with psychiatric comorbidity who have worse health(-economic) outcomes than medical inpatients without such comorbidity, since these outcomes are potentially modifiable by MPU admission; 2) improving the structure of MPUs by investigating their organizational variation in order to develop an empirical MPU typology; 3) improving the value of MPUs by reviewing what is known about the costs and effects of these units, and by defining quality of care from the perspectives of patients, professionals and payers.

This thesis consists of nine chapters, each of which contributes to the aforementioned aims. **Chapter 1** serves as an introduction to the prior evidence available on the focus, organization and value of MPUs, and elaborates upon the aims and outline of the thesis, including the research questions.

In **Chapter 2**, we review the literature with respect to the aims, structure and process characteristics and outcomes of MPUs. This review indicates that MPUs are commonly established to cope with fragmented care practices for complex hospital inpatients with medical and psychiatric illness. MPUs also serve hospitals by managing 'problem patients' who cannot be treated satisfactorily on a general medical ward, thereby relieving staff strain. The majority of units are 'psych-med' units under psychiatric licensure that originate from or are based on a psychiatric ward. A smaller proportion are med-psych, non-segregated, or combined units. Age focus largely determines the targeted population of these units. Child and adolescent units tend to cater for patients with psychosomatic disorders, whereas adult and elderly units largely focus on patients with mood disorders, and to a lesser extent on psychotic disorders, somatic symptom and related disorders, substance abuse, organic disorders, and personality disorders. Elderly units mostly cater for patients with delirium, dementia and depression. The medical diagnoses of patients are treated by MPUs are broad and varying. Because of the breadth of the targeted population, an MPU is significantly dependent upon the flexibility and expertise of its staff. The nursing staff, in particular, is of vital importance for the functioning of MPUs. Their staffing models correlate highly with either their psychiatric or medical origins, and have a major influence on their acuity capabilities. The treatment approaches reported range from short-stay crisis intervention, to a focus on process-oriented psychotherapeutic and milieu treatment, to treatment 'as long as there is high acuity combined illness', and finally to long-stay treatment. Furthermore, the varying length of stay between units indicates differences in the treatment process, as well as differences in patient populations. Most MPUs included have medium psychiatric and medical acuity capabilities and can improve their acuity capabilities by the introduction of compulsory admission facilities and the active involvement of both psychiatric and medical staff. Their actual operation often remains a 'black-box'. Moreover, the relationship between aims, structure characteristics, process characteristics and outcomes of MPUs remains implicit in many of the articles reviewed. The outcome research undertaken mostly displays a low quality of evidence and focusses on length of stay and – to a lesser extent – on functioning. Intended outcomes with respect to patient-related outcomes, unmet healthcare needs, quality and safety, continuity of care, and (de)-stigmatization are infrequently reported. There are indications that MPUs can shorten the lengths of stay of the targeted patient populations. Our review synthesis, however, provides little evidence on the cost-effectiveness of MPU designs.

In **Chapter 3**, the organization and dispersion of MPUs in the Netherlands was mapped using a nationwide telephone survey amongst hospital psychiatrists. The telephone survey was developed using the Dutch field norms for Type IV MPUs and the literature on the organization of MPUs. All 90 Dutch hospitals were screened for the presence of an MPU, resulting in the identification of 40 MPUs. Psychiatrists at 37 (92.5%) of these units were interviewed. We found that MPUs are distributed unevenly across the Netherlands, especially in the provinces Drenthe, Groningen, and Zeeland where there were few MPU beds, thus influencing the accessibility of such care. None of the departments we examined fulfilled all the field norms. However, this finding has more to do with facilities and organization than the primary care function of the MPUs. Many units did meet a large proportion of the sub-criteria standards that relate to their care function. Only one of the MPUs had integrated care arrangements with parties within and outside the hospital, indicating that the embedding of MPUs in care networks could be improved. Medical care in Dutch MPUs can be further improved by (i) emphasizing medical nursing care during every shift, (ii) training the medical specialists, and (iii) stimulating multidisciplinary collaboration.

In **Chapter 4,** we used the survey data of Chapter 3 to develop three models that provide a framework to analyze Dutch MPU provision. Each of the three models uses a different measure of similarity between the MPUs. We found that a previous categorization of MPUs by Kathol and colleagues (Model 1) failed to meaningfully characterize Dutch MPUs, especially since Kathol's Types III and IV do not appear to be distinctive. Model 2 relies more generally on the dimensions of medical and psychiatric acuity capabilities that underlie the categorization by Kathol and colleagues. Model 2 confirms that there are few MPUs with lower psychiatric or lower medical capabilities, and that most Dutch MPUs have moderate- to-high medical and psychiatric acuity capabilities, but also fails to structure the landscape of Dutch MPUs. Model 3 does not assume a theoretical framework (such as a typology or dimensions) but approaches the question empirically using the k-means clustering method. Based on our survey, an expert panel identified a clustering that most meaningfully distinguished clusters, or types, within the set of 37 Dutch MPUs. The expert panel identified the three clusters: 'CIUs with coercive admission facilities and 24/7 ECT availability' (n=16), 'Hospital-focused CIUs' (n=14), and 'MPU-light' (n=7). Psychiatric acuity capabilities appear as the most distinctive feature of these high acuity clusters, while medical acuity capabilities are comparable. There are only a modest number of low-acuity MPUs forming the third cluster.

Chapter 5 provides a systematic review and meta-analysis of health-economic outcomes in hospital inpatients with medical and psychiatric comorbidity. The review shows that the presence of medical-psychiatric comorbidity is related to increased length of stay (LOS), higher medical costs and more re-hospitalizations. The meta-analysis reveals that patients with comorbid depression have an increased mean LOS of 4.38 days compared to patients without comorbidity.

Chapter 6 reports on the development of a quality framework for general hospital psychiatry, including MPUs. The framework was developed to facilitate quality and outcome assessment, stimulate standardization of services, and help demonstrate (cost-) effectiveness. Quality variables were identified by reviewing the relevant literature and subsequently prioritized by patients', professionals' and payers' representatives. Patients' prioritization was given extra weight. The highest-priority quality variables were combined into seven core values: 1. Quality of life and independent functioning. 2. Shared decision making. 3. Continuity and chain of care. 4. De-stigmatization. 5. Collaboration and integration of care. 6. Early detection and timely care. 7. Accessibility and availability of treatment facilities. These core values were linked to 22 preliminary indicators. The structural indicators (including 10 Dutch Field norms for Type IV MPUs, see Chapter 3) were broadly defined, and process and outcome indicators were generic in nature to facilitate quality measurement across settings. Overall, the feasibility study showed high relevance scores and good implementability of the preliminary quality indicator set. A final set of twenty-two quality indicators (17 structure, 3 process and 2 outcome indicators) was then established using a consensus-based approach.

Chapter 7 uses a concept-mapping approach to elucidate which factors are relevant to clinicians in deciding whether or not to admit a patient to an MPU. A 'core group' of Dutch MPU experts was formed to guide the process of preparation, statement (factor) generation, interpretation, and utilization of the concept maps. In addition, an expert group of psychiatrists (n=20) and somatic specialists (n=20) was recruited to sort and rate the statements. A five-cluster solution was found to describe most meaningfully the relevant factors involved in the MPU admission decision: 1) patient characteristics, 2) patient context, 3) staff competencies and organizational pre-requisites, 4) medical needs and capabilities, and 5) psychiatric symptoms and behavioral problems. Based on this solution, a short questionnaire was developed to decide on admission of a patient to an MPU.

Chapter 8 maps the targeted population of a future MPU in the context of a university medical center (Erasmus MC). All patients that were treated by the psychiatric consultation service in a five-month period were asked consent for participation. Eligibility for the future MPU was retrospectively assessed by employing a structured survey amongst the attending physicians on medical/surgical wards, consultation-liaison psychiatrists, and senior nurses. Forty-three percent of the patients included had an indication for MPU admission, while for 57% psychiatric consultation was considered sufficient. The attending physicians and the psychiatrists agreed on suicide attempts as a reason for MPU admission. For psychiatrists, the need for further diagnostic evaluation was a common reason for MPU admission, while other medical specialists more often emphasized the need for safety measures. Patients with an unplanned hospital admission had a higher chance of MPU eligibility. The main psychiatric diagnoses for MPU eligible patients were organic disorders (including delirium), mood disorders, and disorders related to substance abuse.

Chapter 9 provides a general discussion of the research findings, setting the stage for future directions. People with psychiatric disorders experience severe health inequalities that ultimately lead to premature mortality. Individual health behaviors, socioeconomic conditions, social stigma, and sub-optimal accessibility and quality of medical care are contributors to this finding. MPUs aim to improve the outcomes for patients with concurrent medical and psychiatric illness in the hospital setting, and to relieve insufficiently equipped hospital wards from the strain of their disruptive behavior. MPUs must therefore find a balance between striving for functional recovery (patients' perspective) and facilitating acute medical treatment (hospital perspective). This thesis advances the evidence base with respect to the organization of MPUs in order to facili-

tate future comparisons between the different MPU designs. At present, however, no statement can be made about the costs and effects of the various MPUs. In the future, MPUs should focus more on patients with severe mental illness, substance abuse, and somatic symptom disorders, because the potential for better outcomes is high among these groups. To improve the abilities of MPUs to care for these patients, their acuity capabilities can be enhanced by the introduction of compulsory admission facilities, electroconvulsive therapy and the active involvement of both psychiatric and medical staff. In an era of increasing multimorbidity, a holistic, biopsychosocial orientation of professionals is vital. MPUs can contribute to the reduction of social stigma by treatment in a medical setting and by providing an invaluable learning environment for professionals that should be mandatory in many curricula. MPUs must invest in and join care networks that aim to improve the functioning and quality of life of people with medical and psychiatric multimorbidity. Future research should focus on the different treatment approaches in relation to patient acuity needs and operations management restraints (see section 9.6.2), explore the role and embedding of MPUs in care networks, identify barriers and facilitators in the establishment of care networks that are focused on these patients with a high morbidity burden, and clarify the actual costs of different MPU designs in relation to their aims.

Finally, **Chapter 10** provides a summary of this thesis.

NEDERLANDSTALIGE SAMENVATTING

Medisch psychiatrische units (MPU's) zijn verpleegafdelingen in het algemeen of academisch ziekenhuis. Op MPU's worden mensen met een combinatie van lichamelijke en psychische aandoeningen behandeld. Deze patiënten zijn lichamelijk te ziek voor een 'reguliere' afdeling psychiatrie, en psychisch zijn zij te ziek voor een 'reguliere' verpleegafdeling in het ziekenhuis. De combinatie van lichamelijke en psychische aandoeningen komt veel voor, juist in ziekenhuizen.

Medisch psychiatrische units bestaan sinds de jaren '80 van de vorige eeuw en vinden hun oorsprong in de Verenigde Staten. De term MPU wordt op generieke wijze gebruikt, en kan daarom verwijzen naar verschillende soorten afdelingen. Zo zijn er MPU's die zorgen voor patiënten met ernstige en/of acute (lichamelijke) multimorbiditeit, maar ook MPU's die zich richten op meer basale, niet-acute lichamelijke zorg. Op psychiatrisch vlak zijn er MPU's die beperkingen hebben ten aanzien van het behandelen van ernstige gedragsproblemen. De verscheidenheid in organisatie, doelgroep en context van deze afdelingen wijst erop dat deze afdeling zich nog in een vroege ontwikkelingsfase bevinden. Tot op heden is er geen consensus ten aanzien van de juiste focus of structuur van MPU's. Wetenschappelijk onderzoek naar hun kosten en effecten is bovendien schaars. Dit proefschrift is erop gericht consensus te bereiken over de juiste focus en structuur van MPU's en om wetenschappelijk bewijs te verzamelen rond hun kosten en effecten.

De doelen van dit proefschrift zijn: 1) het verbeteren van de focus van MPU's door te inventariseren welke patiëntenpopulatie op dit moment wordt behandeld op MPU's en door te onderzoeken of klinisch opgenomen ziekenhuispatiënten vanwege psychiatrische comorbiditeit slechtere (gezondheidseconomische) uitkomsten hebben; 2) het verbeteren van de structuur van MPU's door hun organisatorische variatie te onderzoeken, en door een empirische typologie te ontwikkelen op basis van de gevonden variatie; 3) het verbeteren van de waarde van MPU's door de literatuur ten aanzien van de kosten en effecten van deze units systematisch samen te vatten, en door kwaliteit van zorg vanuit de perspectieven van patiënten, professionals en verzekeraars te definiëren.

Dit proefschrift bestaat uit tien hoofdstukken die elk bijdragen aan bovenstaande doelen. **Hoofdstuk 1** is de inleiding van het proefschrift. Daarin wordt beschreven wat er wetenschappelijk bekend was ten aanzien van de focus, organisatie en waarde van MPU's voor aanvang van de onderzoeken uit dit proefschrift. Ook worden in dit hoofdstuk de doelen, de opzet en de onderzoeksvragen besproken.

Hoofdstuk 2 is een systematisch literatuuronderzoek waarin de doelen, de structuur- en proceseigenschappen, en de uitkomsten van MPU's worden onderzocht. Dit onderzoek toont aan dat MPU's vaak worden opgezet om patiënten met zowel lichamelijke als psychische aandoeningen geïntegreerde in plaats van gefragmenteerde of zorg te kunnen bieden. MPU's dienen ook het ziekenhuis door het behandelen van patiënten die vanwege hun gedrag of de interactie met ziekenhuispersoneel niet goed kunnen worden behandeld op een reguliere verpleegafdeling. De belasting van het personeel op reguliere afdelingen neemt hierdoor af. De meeste MPU's zijn 'psych-med units': afdelingen onder aansturing van een psychiater die gevestigd zijn op een psychiatrische verpleegafdeling. Een kleiner deel van de afdelingen is te karakteriseren als 'med-psych unit', 'niet-gescheiden unit' en 'gecombineerde unit' (het *unit type*). De patiëntenpopulatie van deze units hangt voor een belangrijk deel samen met de leeftijd van hun doelgroep. MPU's die zich richten op kinderen en adolescenten behandelen vaak patiënten met psychosomatische aandoeningen. MPU's die zich richten op volwassenen en ouderen behandelen vooral patiënten met stemmingsstoornissen, en in mindere mate patiënten met somatisch symptoom stoornissen, middelengebonden stoornissen, organische stoornissen en persoonlijkheidsstoornissen. MPU's die zich vooral richten op ouderen behandelen patiënten met delirium, dementie en depressie. De medische (somatische) diagnoses van patiënten die worden behandeld op een MPU variëren sterk. Vanwege de breedte van hun doelgroep zijn MPU's sterk afhankelijk van de flexibiliteit en expertise van hun staf. Met name de verpleegkundige staf is van vitaal belang voor het functioneren van MPU's. De bestaffing van MPU's hangt sterk samen met het *unit type* en bepaalt in grote mate hun behandelmogelijkheden op medisch (somatisch) en psychiatrisch gebied. De benadering van MPU's varieert van short stay en crisisinterventie tot een focus op psychotherapeutische en milieutherapeutische behandeling, tot behandeling 'zo lang als er een acute of complexe combinatie van lichamelijke en psychische ziekte is', tot 'long stay'. De variatie in opnameduur die door de verschillende MPU's wordt gerapporteerd duidt op verschillen in het behandelproces en op verschillen in de patiëntpopulatie. De meeste MPU's die werden geïncludeerd in het literatuuronderzoek behandelen patiënten met een gemiddelde psychiatrische en medische (somatische) zorgzwaarte. Deze afdelingen kunnen hun behandelmogelijkheden verbeteren door het toevoegen van faciliteiten voor gedwongen psychiatrische opname en door de actieve betrokkenheid van zowel psychiatrische als medische staf te garanderen. Over het daadwerkelijk functioneren van MPU's wordt vaak niet gerapporteerd. In veel van de gereviewde artikelen blijft de relatie tussen de doelen, structuur- en proceskenmerken en uitkomsten van MPU's dan ook impliciet. Onderzoek naar de uitkomsten van MPU's is vaak van lage kwaliteit en richt zich met name op opnameduur en – in mindere mate – op functioneren. Het effect van MPU's op andere beoogde uitkomsten, zoals functioneren en kwaliteit van leven, 'onvervulde' zorgbehoeften, kwaliteit en veiligheid, continuïteit van zorg en het verminderen van stigma worden nauwelijks beschreven. Hoewel er aanwijzingen zijn dat MPU's de opnameduur van de doelpopulatie kan verkorten levert ons literatuuronderzoek weinig wetenschappelijke onderbouwing voor de kosteneffectiviteit van de verschillende typen MPU's.

Hoofdstuk 3 brengt de organisatie en spreiding van MPU's in Nederland in kaart met behulp van een telefonisch interview. Dit interview werd ontwikkeld met behulp van de Veldnormen medisch psychiatrische units en de wetenschappelijke literatuur over de organisatie van MPU's. Alle 90 Nederlandse ziekenhuizen werden gescreend op aanwezigheid van een MPU. Veertig mogelijke MPU's werden geïdentificeerd. Psychiaters van 37 (92,5%) van deze afdelingen konden worden geïnterviewd. Wij vonden dat MPU's niet gelijk over het land zijn verdeeld. Deze bevinding is van invloed op de toegankelijkheid van MPU-zorg. Met name in de provincies Drenthe, Groningen en Zeeland is er een beperkt aantal MPU-bedden. Dat geen van de onderzochte afdelingen aan alle veldnormen voldeed hing niet zozeer met hun primaire zorgfunctie samen, maar vooral met hun faciliteiten en organisatie. Veel MPU's voldeden aan een groot deel van de deelcriteria gerelateerd aan het domein 'inhoud van zorg'. Slechts één van de afdelingen had ketenzorgafspraken met partners in en buiten het ziekenhuis. De inbedding van MPU's in zorgnetwerken kan dus nog worden verbeterd. De medische zorg in Nederlandse MPU's kan verder worden verbeterd door 1) beschikbaarheid van medische (somatische) verpleegkundige expertise tijdens elke dienst; 2) scholing van medisch specialisten en 3) het stimuleren van multidisciplinaire samenwerking.

Hoofdstuk 4 gebruikt de data van Hoofdstuk 3 om drie empirische modellen te ontwikkelen die de organisatie van het Nederlandse MPU-landschap beschrijven. Elk van deze modellen gebruikt een verschillende 'maat van gelijkenis' tussen de geïnterviewde MPU's. Model 1, dat is gebaseerd op de typologie van Kathol et al., kon de Nederlandse MPU's onvoldoende karakteriseren. Dit kwam vooral doordat Kathol's Type III en Type IV niet onderscheidend bleken voor het Nederlandse veld. Model 2 is gebaseerd op de medische (somatische) en psychiatrische behandelmogelijkheden van MPU's, die ook ten grondslag liggen aan Kathol's typologie. Dit model laat zien dat de meeste Nederlandse MPU's patiënten met een gemiddelde tot hoge zorgzwaarte kunnen behandelen, maar slaagt er evenmin in om het Nederlandse MPU-landschap te karakteriseren. Model 3 gaat niet uit van een theoretisch kader – zoals een typologie of dimensies – maar benadert de onderzoeksvraag empirisch door gebruik van clusteranalyse (k-means). Een expertgroep identificeerde dat een model met 3 clusters de set van 37 Nederlandse MPU's het meest betekenisvol typeert. Deze clusters werden omschreven als: 'MPU's met faciliteiten voor gedwongen opname en 24/7 ECT' (n=16), 'Ziekenhuisgerichte MPU's' (n=14) en 'MPU-light' (n=7). De eerste twee MPU-clusters kunnen patiënten met een gemiddelde tot hoge zorgzwaarte behandelen en worden in de recente literatuur ook wel complexity intervention unit (CIU) genoemd. Voor het onderscheid tussen deze clusters

bleken de psychiatrische behandelmogelijkheden van MPU's het belangrijkst, terwijl de medische (somatische) behandelmogelijkheden van beide clusters op groepsniveau vergelijkbaar zijn. Het derde cluster ('MPU-light') bestaat uit een kleiner aantal MPU's die patiënten met lagere zorgzwaarte behandelen.

Hoofdstuk 5 bestaat uit een systematisch literatuuronderzoek en meta-analyse. Dit onderzoek toont aan dat psychiatrische comorbiditeit is gerelateerd aan een langere opnameduur van patiënten in het ziekenhuis. Deze patiënten met zowel een lichamelijke als een psychische aandoening hebben bovendien hogere medische kosten en worden vaker heropgenomen. De meta-analyse laat zien dat patiënten met een comorbide depressieve stoornis gemiddeld 4,38 dagen langer in het ziekenhuis liggen dan patiënten zonder deze comorbiditeit.

Hoofdstuk 6 doet verslag van de ontwikkeling van een kwaliteitsraamwerk voor psychiatrie in het ziekenhuis. Dit raamwerk werd ontwikkeld om kwaliteit en uitkomsten te meten, om de organisatie van psychiatrische zorg in het ziekenhuis te harmoniseren en om toekomstig inzicht in de kosten en effecten van deze zorg mogelijk te maken. Kwaliteitsvariabelen uit de wetenschappelijke literatuur zijn geprioriteerd door vertegenwoordigers van patiënten, professionals en zorgverzekeraars. De prioritering van patiënten kreeg extra gewicht. Op basis van deze gezamenlijke prioritering werden zeven kernwaarden vastgesteld: 1) Kwaliteit van leven en zelfstandig functioneren; 2) Gezamenlijke regievoering; 3) Continuïteit en ketenzorg; 4) Destigmatisering; 5) Goede samenwerking tussen disciplines (integratie van zorgverlening); 6) Vroege opsporing en tijdige zorgverlening; 7) Bereikbaarheid en beschikbaarheid van behandelfaciliteiten. Aan deze kernwaarden werden 22 voorlopige indicatoren gekoppeld. De structuurindicatoren (inclusief de 10 Veldnormen medisch psychiatrische units, zie Hoofdstuk 3) werden ruim gedefinieerd. De proces- en uitkomstindicatoren zijn generiek zodat ze te gebruiken zijn in verschillende settings. De haalbaarheidsstudie toonde aan dat de voorlopige indicatoren over de hele linie relevant werden gevonden en goed implementeerbaar zijn. Met een consensus-gerichte aanpak werden uiteindelijk 22 kwaliteitsindicatoren (17 structuur-, 3 proces- en 2 uitkomstindicatoren) vastgesteld.

Met behulp van de concept mapping methode verheldert **Hoofdstuk 7** welke factoren relevant zijn voor clinici wanneer zij besluiten een patiënt wel of niet op te nemen op een MPU. Een 'kerngroep' van Nederlandse MPU-experts leidde het proces van voorbereiding, het genereren van 'statements', de interpretatie en de utilisatie van de concept maps. Vervolgens werden psychiaters (n=20) en somatisch medisch specialisten (n=20) geworven om de factoren te sorteren en te beoordelen. De relevante factoren konden volgens de expertgroep het best worden beschreven met behulp van vijf clusters: 1) patiëntkarakteristieken; 2) patiëntcontext; 3) competenties van de staf en organisatorische randvoorwaarden; 4) medische behoeften en behandelmogelijkheden en 5) psychiatrische symptomen en gedragsproblemen. Op basis van deze oplossing werd een korte vragenlijst ontwikkeld ter ondersteuning van de beslissing om een patiënt op een MPU op te nemen.

Hoofdstuk 8 brengt de beoogde patiëntengroep van een toekomstige MPU in een universitair ziekenhuis (het Erasmus MC) in kaart. Alle patiënten van de psychiatrische consultatieve dienst werden gevraagd om mee te doen. De studie duurde vijf maanden. Retrospectief werd door somatisch medisch specialisten, consultatief psychiaters en seniorverpleegkundigen ingeschat welke patiënten in aanmerking zouden komen voor opname op de toekomstige MPU. Drieënveertig procent van de geïncludeerde patiënten kwam in aanmerking voor MPU-opname, terwijl voor de overige 57% psychiatrische consultatie als voldoende werd ingeschat. Zowel de somatisch medisch specialisten als de psychiaters vonden (de gevolgen van) een suïcidepoging grond voor MPU-opname. Psychiaters vonden ook nadere diagnostiek een reden voor MPU-opname. Andere medisch specialisten noemden vaker veiligheidsmaatregelen als argument. Patiënten met een ongeplande ziekenhuisopname kwamen vaker in aanmerking voor de toekomstige MPU. De belangrijkste psychiatrische hoofddiagnoses van patiënten met een MPU-indicatie waren organische stoornissen (inclusief delirium), stemmingsstoornissen en middelengebonden stoornissen.

Tot slot worden in **Hoofstuk 9** de resultaten en conclusies uit dit proefschrift besproken. Ook bevat dit hoofdstuk aanbevelingen voor de toekomst van MPU's en het onderzoek naar deze afdelingen. Mensen met psychische aandoeningen zijn in het algemeen minder gezond dan mensen zonder psychische aandoeningen. Deze gezondheidsverschillen zijn ernstig en leiden uiteindelijk tot vroegtijdig overlijden. Individueel gezondheidsgedrag, sociaaleconomische omstandigheden, stigma en verminderde toegankelijkheid en kwaliteit van zorg dragen bij aan deze verschillen. MPU's zijn erop gericht de uitkomsten van mensen met een combinatie van lichamelijke en psychische aandoeningen in het ziekenhuis te verbeteren. Ook beogen MPU's reguliere ziekenhuisafdelingen, die veelal onvoldoende zijn toegerust voor de behandeling van deze doelgroep, te ontlasten. MPU's moeten een balans zoeken tussen het steven naar functioneel herstel (patiëntenperspectief) en het faciliteren van de somatische behandeling (ziekenhuisperspectief). Dit proefschrift draagt bij aan nadere wetenschappelijke onderbouwing van de organisatie van MPU's. De verschillende soorten of 'typen' MPU's worden daardoor beter vergelijkbaar. Op dit moment kan echter geen uitspraak worden gedaan over de kosteneffectiviteit van deze typen.

In de toekomst moeten MPU's zich meer richten op patiënten met ernstige psychiatrische aandoeningen, middelengebonden stoornissen en somatisch symptoomstoornissen.

De potentie om uitkomsten te verbeteren is, gezien hun slechtere lichamelijke gezondheid en/of hogere zorggebruik, in die groepen het grootst. Om MPU's beter in staat te stellen deze groepen te behandelen moeten deze MPU's de beschikking krijgen over faciliteiten voor gedwongen opname en elektroconvulsieve therapie, en moet de betrokkenheid van zowel psychiatrische als medische (somatische) staf bij deze afdelingen worden vergroot.

Nu het aantal mensen met multimorbiditeit toeneemt, is een holistische, biopsychosociale oriëntatie van professionals belangrijker dan ooit. MPU's kunnen bijdragen aan destigmatisering door behandeling in een medische setting, en door het bieden van een unieke leeromgeving voor professionals. Een dergelijke leeromgeving zou verplicht moeten worden gesteld in menig curriculum. MPU's moeten hun inbedding in zorgnetwerken verbeteren. Deze netwerken beogen het functioneren en de kwaliteit van leven van mensen met een combinatie van lichamelijke en psychische aandoeningen te verbeteren. Toekomstig onderzoek zou zich moeten richten op de verschillende benaderingswijzen en proceskenmerken die MPU's hanteren in relatie tot de zorgbehoefte en zorgzwaarte van patiënten en het spanningsveld tussen het leveren van acute zorg en het handhaven van een procesgeoriënteerd behandelmilieu (zie subparagraaf 9.6.2). Ook moet de rol en inbedding van MPU's in zorgnetwerken worden onderzocht, evenals belemmerende en bevorderende factoren in het optuigen van zorgnetwerken die zijn gericht op deze patiënten met een grote ziektelast. Tot slot kan toekomstig onderzoek de werkelijke kosten van de verschillende MPU typen in relatie tot hun doelen verhelderen.

CURRICULUM VITAE

Maarten Anton van Schijndel was born on August 1, 1984 in Arnhem, the Netherlands. He attended the Stedelijk Gymnasium Arnhem, where he graduated in 2002, and then started medical school in 2002 at the Katholieke Universiteit Nijmegen, now the Radboud Universiteit. He wrote his graduation thesis on 'Mood-congruent memory bias in patients with major depressive disorder (MDD)'. Maarten obtained his Master of Science degree in Medicine in 2009 and then started his Psychiatry residency at Erasmus MC in Rotterdam with prof. dr. Michiel Hengeveld and prof. dr. Walter van den Broek. Maarten was chairman of the national residents in psychiatry association (SAP, Netherlands Psychiatric Association), and assessor of the board of the Netherlands Psychiatric Association from 2010 to 2012. From 2012 onwards, he was project manager of the Erasmus MC medical psychiatry unit under the direction of prof. dr. Witte Hoogendijk, and was granted the Erasmus MC Cost-Effectiveness Research PhD grant in collaboration with the Erasmus School of Health Policy and Management. He developed his PhD-research with prof. dr. Jan van Busschbach, prof. dr. Joris van de Klundert, dr. Jeroen van Wijngaarden and prof. dr. Witte Hoogendijk. Maarten co-authored the Dutch Field norms for Type IV medical psychiatry units under the direction of dr. Jeroen van Waarde. The implementation of these Field norms was tested in Chapter 3 of this thesis. Between 2014 and 2016, Maarten worked as a staff psychiatrist in the Erasmus MC University Medical Center in Rotterdam. In 2014, he started the Master of Health Sciences, specialization in Clinical Epidemiology, and graduated in 2017. He was board member of the section of General Hospital and Consultation-Liaison Psychiatry of the Netherlands Psychiatric Association from 2015-2019, and project leader of a national quality document in the field of hospital psychiatry (the 'Generieke module ziekenhuispsychiatrie', Netwerk Kwaliteitsontwikkeling GGz) that was authorized in 2017 (Chapter 6 of this thesis). From 2016 onwards, he has worked as a psychiatrist in the Department of Psychiatry at Rijnstate hospital in Arnhem, where he is an attending physician to the Medical Psychiatry Unit and the Psychiatric Consultation-Liaison Service. From 2019 to 2020 Maarten also worked as a scientific staff member for the Health Council of the Netherlands, where he was secretary of an advisory report concerning the integration of medical and mental healthcare. During the 2020 Corona-virus outbreak, he chaired the COVID-19 Crisis Team of the Netherlands Psychiatric Association. Maarten lives in Nijmegen with his wife Wieneke and sons Lukas, Roelf, and Cees. He will publicly defend his PhD-thesis on the organization, focus, and value of medical psychiatry units on November 11, 2020 at the Erasmus MC University Medical Center Rotterdam, the Netherlands.

LIST OF PUBLICATIONS

Peer reviewed journals

1. Van Schijndel MA, Van Marle H. GGZ and the judicial system as communicating vessels; on treatable inmates. Tijdschrift voor Psychiatrie. 2011;53(3):190-1.
2. Van Schijndel MA, Gerrits WLJ, Niesink P, van der Gaag RJ. The state of psychiatry in the Netherlands: strength by quality, influence by capabilities. International Review of Psychiatry. 2012;24(4):321-7.
3. Van Schijndel MA, Jansen LAW, Caarls PJ, Van 't Veer F, Wierdsma AI, van Wijngaarden JDH, et al. Medisch-psychiatrische units in Nederland: een onderzoek naar kwaliteit en spreiding. Nederlands Tijdschrift voor Geneeskunde. 2017;161(29).
4. Van Schijndel MA, Caarls PJ, Van Wijngaarden JDH, Wierdsma AI, Lijmer JG, Boenink AD, et al. Identifying value-based quality indicators for general hospital psychiatry. Gen Hosp Psychiatry. 2018;55:27-37.
5. Van Schijndel MA, Jansen LAW, Van de Klundert JJ. Empirical types of medical psychiatry units. Psychother Psychosom. 2019;88(2):127-8.
6. Jansen LAW, Van Schijndel MA, Van Waarde JA, Busschbach JJV. Health-economic outcomes in hospital patients with medical-psychiatric comorbidity: A systematic review and meta-analysis. PloS one. 2018;13(3):e0194029.
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8. Caarls PJ, Van Schijndel MA, Kromkamp M, Wierdsma AI, Osse RJ, Van der Hoeven G, et al. Need analysis for a new high acuity medical psychiatry unit: which patients are considered for admission? BMC health services research. 2019;19(1):139.
9. Van Waarde JA, Van Schijndel MA, Cahn W. Integrale zorg vereist voor patiënten met complexe somatische, psychische en sociale problematiek. Tijdschrift voor Psychiatrie. 2019;61(1):12-3.
10. Van Verseveld M, Verheesen SMH, Van Schijndel MA, Van Waarde JA. Opvang van verwarde personen op de SEH. Ned Tijdschr Geneeskd. 2020;164:D3937.
11. Leue C, Van Schijndel MA, Keszthelyi D, Van Koeveringe G, Ponds RW, Kathol RG, et al. The multi-disciplinary arena of psychosomatic medicine – Time for a transitional network approach. The European Journal of Psychiatry. 2020;34(2):63-73.
12. Jansen LAW, Ellison AG, Nguyen F, Martina A, Spencer J, Specker A, Wierdsma AI, Kathol RG, Van Schijndel MA. Complexity interventions units in the US: organization and dispersion (accepted by Psychosomatic Medicine).

Submitted

1. Van Schijndel MA, Van Wijngaarden JDH, Van de Klundert JJ. The organization and outcomes of MPUs: a systematic review.
2. Verheesen SMH, Ten Doesschate F, Van Schijndel MA, Van der Gaag RJ, Cahn W, Van Waarde JA. Intoxicated persons showing challenging behavior demand complex facilities: a pilot study.
3. Ellison AG, Jansen LAW, Nguyen F, Martina A, Spencer J, Wierdsma AI, Kathol RG, Van Schijndel MA. Specialty psychiatric services in US emergency departments and general hospitals: results from a nationwide survey.

Book chapters

1. Van Schijndel MA. De medisch-psychiatrische unit [The medical-psychiatry unit]. In: Handboek Psychiatrie in het Ziekenhuis [Manual of psychiatry in the hospital]. Honig A, Lijmer L, Verwey B and Van Waarde JA (editors). De Tijdstroom, Utrecht 2018.
2. Van Schijndel MA and Van Waarde JA. Kwaliteit, organisatie en beschikbaarheid in Nederland [Quality, organization and availability]. In: Leerboek elektroconvulsietherapie. [Textbook of electroconvulsive therapy]. Verwey B and Van Waarde JA (editors). De Tijdstroom, Utrecht 2019.

Quality standards

1. Van Waarde JA, Van Schijndel MA, Lampe IK, Hegeman JM, Balk FJE, Notten PJH, et al. Veldnormen medisch psychiatrische units [Field norms for medical psychiatry units, in Dutch] Utrecht: Netherlands Psychiatric Association; 2014. Available from: http://www.nvvp.net/stream/veldnormen-mpu-juni-2014.
2. Van Schijndel MA, Boenink AD, Caarls PJ, Gerritse-Kattouw H, Kamevaar AM, Lijmer JG, et al. Generieke module Ziekenhuispsychiatrie [Quality standard on General Hospital Psychiatry, in Dutch]: Netwerk Kwaliteitsontwikkeling GGz; 2017. Available from: https://www.ggzstandaarden.nl/generieke-modules/ziekenhuispsychiatrie.
3. Van Schijndel MA, Honig A, Verwey B, Vergouwen T, Van Waarde JA. Veldnormen Psychiatrie in het Ziekenhuis [Field norms for hospital psychiatry]. Netherlands Psychiatric Association; 2018.

Reports

1. Health Council of the Netherlands; 2020. Integrated care for people with physical and mental disorders.

PHD PORTFOLIO

Summary of PhD training and teaching

Name PhD student: M.A. van Schijndel

Erasmus MC Department: Psychiatry

Research School: NIHES

PhD period: 2012-2020

Promotors: Prof. dr. J.J. van Busschbach and Prof. dr. W.J.G. Hoogendijk

Supervisor: Dr. J.D.H. van Wijngaarden

1. PhD training	Year	Workload (Hours/EC's)
BROK ('Basiscursus Regelgeving Klinisch Onderzoek')	2014	1.5
Study design (CC01)	2014	4.3
English language (SC01)	2014	1.4
Principles of Research in Medicine and Epidemiology (ESP01)	2014	0.7
Methods of Clinical Research (ESP10)	2014	0.7
Clinical Trials (ESP14)	2014	0.7
Health Economics (ESP25)	2014	0.7
The Practice of Epidemiologic Analysis (ESP65)	2014	0.7
Fundamentals of Medical Decision Making (ESP70)	2014	0.7
Advanced Topics in Decision-making in Medicine (EWP02)	2014	1.9
iMTA masterclass Introduction to discrete choice experiments	2014	0.3
Pharmaco-epidemiology and Drug Safety (EWP03)	2015	1.9
Diagnostic Research (EWP05)	2015	0.9
Topics in meta-analysis	2015	0.7
Psychiatric Epidemiology (EP12)	2015	1.1
Causal Mediation Analysis (ESP69)	2015	0.7
Clinical Practice-relevant Therapeutic Trials (ESP73)	2015	0.7
Quality of Life Measurement (HS11)	2015	0.9
Introduction to Psychology in Medicine (MP01)	2015	1.4
Preventing Failed Interventions in Behavorial Research (MP05)	2015	1.4
Advanced Topics in Clinical Trials (EWP10)	2016	1.9
Advanced Analysis of Prognosis Studies (EWP13)	2016	0.9
Principles of Epidemiologic Data-analysis (EWP25)	2016	0.7
Introduction to Data-analysis (ESP03)	2016	1.0
Regression analysis (ESP09)	2016	1.9
Survival analysis (ESP28)	2016	1.9
Conceptual Foundation of Epidemiologic Study Design (ESP38)	2016	0.7
Primary and Secondary Prevention Research (ESP45)	2016	0.7
Social Epidemiology (ESP61)	2016	0.7
Advances in Genomics Research (ESP63)	2016	0.4
Erasmus Summer Lectures	2016	0.4
Courses for the Quantitative Researcher (SC17)	2017	1.4
Women's Health (EP19)	2017	0.9
Development research proposal	2017	2.5
Specific courses		
Residency in Psychiatry	2009-2014	
NIHES MSc in health sciences, specialization Clinical Epidemiology	2014-2017	

1. PhD training	Year
Seminars and workshops	
Medisch Psychiatrische Units op weg naar standaardzorg (NVvP congres)	2016
Presentations	
Theatrum psychiatricum (Rijnstate)	2013
Eindreferaat Opleiding tot psychiater (Erasmus MC)	2014
Symposium Complexe Zorg, Samen Beter (MPU VUMC 10 jaar)	2016
Symposium Ziekenhuispsychiatrie in de praktijk (NFZP)	2016
Netwerkbijeenkomst onderzoek ziekenhuispsychiatrie	2017
Symposium Psychiatrie in het Ziekenhuis (Lemnion)	2018
Symposium Op het snijvlak van psychiatrie en somatiek (UMCG)	2019
Symposium European Association of Psychosomatic Medicine	2019
Opleidersbijeenkomst Union Européenne des Médicins Spécialistes	2019
Symposium European Association of Psychosomatic Medicine	2020
(Inter)national conferences	
Netherlands Psychiatric Association (Maastricht, NL)	2012-2013-2014-2016-2018
American Psychiatric Association (Philadelphia, USA)	2012
Berlin Consultation-Liaison Psychiatry course	2015
European Association of Psychosomatic Medicine (Rotterdam, NL, congress committee)	2019
Other	
Co-author Veldnormen medisch psychiatrische units	2012-2014
Project leader and principle investigator Generieke module Ziekenhuispsychiatrie	2016-2017
First author Veldnormen Psychiatrie in het Ziekenhuis	2018

2. Teaching	
Lecturing	
N/A	
Supervising practicals and excursions, Tutoring	
N/A	
Supervising Master's theses	
L.A.W. Jansen	2012
Y. Peters	2012
P.J. Caarls	2013
R. van Gink	2015
V.F. Ligtvoet	2015
C. Heldens	2017
F. van 't Veer	2017
Other	
Co-supervision of PhD-students P.J. Caarls and L.A.W. Jansen	2014-present
Co-supervision of PhD-student C. Pinto	2020

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Nijmegen, augustus 2020
Maarten van Schijndel