

Hyperarousal in the hospital and what to do about it

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the other hand, the scientific understanding of multi-conditional pathways may profit from ESM-data too, especially if the course of complex symptoms in relation to treatment can be combined with repeatedly measured biomarkers or epigenetic changes. Eventually, ESM may serve as a reliable patient-related outcome measurement (PROM) tool, which may prepare the ground for reimbursement changes in the future, i.e., payment for performance instead of payment for service, that might help to overcome the current reimbursement dichotomy between soma and psyche

chapter15,342,361

Valorisation

This PhD thesis presents a series of studies and articles with diverse objectives: i) to investigate and describe the effect of psychosomatic integrated care on complex (functional) conditions at various clinical levels; ii) to develop an integrated transitional care model, i.e., the Med-Psych-Net, that enables care givers to accompany multi-conditional patients from the hospital to primary care and vice versa, in order to overcome the disadvantages of mono-disciplinary trajectories; iii) to conceptualize a system-based etiologic nosology of complex (functional) syndromes; and iv) to introduce a modern m-health tool, the ESM, that may advance the development of tailored personalized medicine, clinical reasoning and the scientific understanding of pleiotropic multi-morbidity.

This valorisation section places the outcomes of this thesis in a broader societal context in order to address how this transitional Med-Psych-Net may be further implemented in daily clinical practice. Its societal importance will be considered from three perspectives: 1) the relevance of scientific findings for clinical practice; 2) the clinical target groups to whom the findings are relevant; and 3) the translation of the findings into Med-Psych-Net activities concerning innovativeness, feasibility, implementation and perspectives for future research.

Relevance

Functional somatic disorders as well as mental disorders are highly prevalent³⁶²⁻³⁶⁴. Data from epidemiological studies indicate that depression and anxiety disorders as well as, for instance, functional urological and related gastrointestinal disorders are common comorbidities having adverse effects on patients' outcomes^{59,88,286,287,290,313,365-367}. Moreover, the common association between functional urological and gastrointestinal disorders affects the severity of experienced physical and mental symptoms in a dose-dependent fashion^{236-242,287,368,369}. Additionally, the prevalence of anxiety disorders and depression increases with the number of functional disorders and the frequency or severity of functional somatic symptoms^{284,288,312,313,315,370}. Thus, the more severe the

somatic symptoms are, the more prevalent the affective complaints become. Pain and depression are closely associated^{281,282,284-287,307,310,312}. Affective complaints might therefore complicate or amplify existing functional complaints, and the onset of anxiety and depressive symptoms might precede that of, for example, urological functional disorders^{59,371,372}. Similarly, depression and anxiety both dose-dependently increase the risk of developing urinary incontinence, and the number of neuroticism-associated conditions (i.e., functional as well as affective disorders) might be a marker of a complex psychosomatic multi-morbidity phenotype^{239,281,285,295,313,373,374}. Thus, in cases of (functional) clinical complexity, psychiatric comorbidity has to be taken into account in order to avoid misdiagnosis and treatment resistance. However, in the medical hospital, where complex cases will present themselves at a certain point in a patient's career, clinical complexity, including psychiatric comorbidity, is frequently under-detected. For example, at the emergency department, in the outpatient medical hospital setting and in clinical general hospital wards, affective comorbidities frequently go undetected, which has an impact on care utilization later on^{17,20,43}. This also applies to the most complex and severely ill patients in the intensive care unit (ICU), where psychiatric case detection concerning transitional care for delirium, which is traditionally considered organic and not functional, still deserves attention³⁷⁵.

Multi-morbidity and the characteristics of health care providers are predictors for complications of hospital interventions. Therefore, the length of hospital stay and the rate of unplanned hospital readmission are the main medical cost factors in complexity care that need to be kept in mind with regard to reducing the societal cost of care at the hospital level^{20,376-380}. The need for this focus has become more and more obvious; the percentage of hospital stays for multi-conditional patients increased between 2003 and 2014 in the US from approximately 65% to 80%, whereas hospital stays for adults without multi-conditional complaints decreased from roughly 35% to 20% during the same period³⁸¹. Moreover, given that hospital stays for adult patients with multiple conditions cost on average 20% more than stays for inpatients with a mono-conditional background, it would seem quite reasonable to pursue enhanced integrated hospital and transitional care from a hospital cost perspective³⁸¹. Furthermore, integrated care has to incorporate psychosomatic complexity, as almost one-third of inpatient hospital stays in the US involved mental disorders in 2012, whereby affective disorders were the most common mental disorder diagnoses³⁷⁹. Comparable trends have been noted for unplanned readmissions in the US: readmission rates increased substantially between 2009 and 2013, and their average cost was higher than the average cost of index admissions³⁸². This is also true for readmissions involving mood disorders compared with initial hospital stays³⁸³. Thus, hospital readmissions within 30 days of discharge represent a negative clinical outcome. They might be due to a lack of integrated hospital care solutions and poor access to adequate primary or community-based aftercare. Clearly, transitional integrated approaches concerning multi-morbidity in complex psychosomatic syndromes face a challenge^{156,384,385}. The level of comorbidity care and the

quality of illness management across settings are very relevant to attempts to avoid every kind of hospital readmission³⁸⁶⁻³⁸⁸. This consideration is indirectly supported by our own hospital evaluations (MUMC) concerning wards which are still running without a transitional network approach, especially without routinely integrated psychosomatic care for patients with a high chance of medical and psychiatric comorbidities^{174,175}.

Target groups

Besides complex multi-conditional patients, health care providers from in- and outside the general hospital and the patients' environment (i.e., family and social network) are important target groups for integrated transitional care in psychosomatic medicine. From our clinical experience, patient and social network empowerment due to a "warm handover" across settings by case managers as well as the availability of medical skills guaranteed by integrated medical staff-guidance are essential. Transitional care by case managers can be effectively realized by medical staff-guided care givers from outside the MUMC, as suggested by our investigation^{chapter7}, or instead by multi-disciplinarily guided care managers related to general hospital-based disease management programmes. Primary care-based collaborative care is very well suited to long-distance communication between care givers and patients in rural areas. But the Med-Psych-Net approach may be especially productive in urban areas, where complex patients accumulate at the hospital level and where GPs as well as mono-disciplinary general hospital-related treatment options might fail. Depending on the severity and complexity of patients' multi-conditional complaints, the Med-Psych-Net approach would start in the ICU setting, for example, in multi-disciplinary delirium care (i.e., proactive CLS involving integrated multi-disciplinary medical staff-guidance and transitional case management by nurse practitioners), or at the MPU and at medical wards for comorbidity care. Most importantly, all clinical settings require guided CM in order to accompany inpatients from care at a higher to a lower level of complexity, depending on the patients' state of clinical severity. In complex but less severe multi-conditional cases, integrated multi-disciplinary care would start with the integrated outpatient setting (e.g., the pelvic care centre, the multi-disciplinary pain team) for comorbid (functional) somatic and psychiatric conditions, as evidenced by the findings reported in this thesis^{chapter7,38,43,162,163}. The most important part to focus on with regard to complex psychosomatic patients concerning LOS, unplanned hospital readmissions and frequent outpatient care utilization is the transition of inpatient or outpatient hospital care back to primary care^{chapter7}. For instance, in complex patients with a pleiotropic presentation of functional somatic complaints, the successful transition of care after intensive outpatient-based psychotherapy may profit from integrated staff-guided CM back to the patients' GPs^{35,38,chapter7}. Moving case managers into the frontline of care transition may improve the engagement, compliance and treatment adherence of patients, whose performance may eventually translate into better outcomes and more favourable economic evaluations^{2,100,102,chapter7}.

The Med-Psych-Net - innovativeness, feasibility, implementation and future perspectives

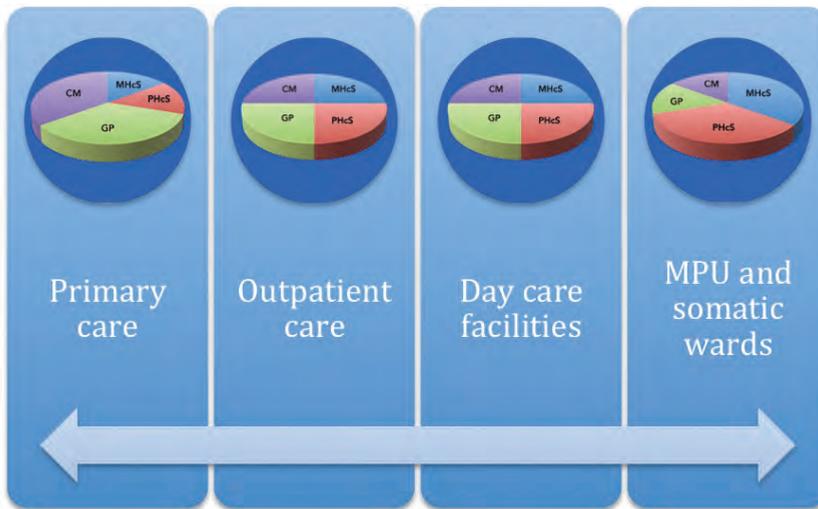
To avoid unintended negative outcomes due to under-detection of psychosomatic complexity or treatment refractoriness in mono-disciplinary care trajectories, integration of care (i.e., bringing together diverse specialty skills and expertise concerning health care in cases of multi-morbidity with comorbid psychiatric and somatic disorders) is deemed necessary at the hospital level and between hospital and primary care. Different organizational aspects of integrated care should be taken into account. The presence of multi-disciplinary teams is indispensable. Furthermore, shared multi-disciplinary clinical protocols and a specialty-transcending information system (with electronically accessible patient files) have to be available. Colocated work would be the ideal arrangement for co-operating services; if not feasible, liaison services operating bi-directionally would be needed to approach the multi-conditional patient. In order to guarantee clinical expertise on a consultant level, navigators (medical staff) and 'steersmen' (care managers) should deliver guidance on the clinical course, either in face-to-face contact with patients and/or care givers or via digital information transferred to patients and their care managers. Furthermore, a multi-component strategy should include efforts to combat stigmatization concerning psychiatric comorbidity²¹.

Various clinical scenarios may illustrate how access to health care can influence patients' outcome negatively. Both low and high levels of access can lead to unplanned readmissions. Patients who are vulnerable from a psychosocial point of view and also show complex multi-morbidity may easily relapse, even if they had received high-quality inpatient care³⁸⁹. When these patients receive outpatient care after discharge, they might be less likely to seek timely appointments and more likely to enter the emergency room (ER)³⁸⁹⁻³⁹¹. With a low level of access to resources that enable self-care and outpatient follow-up, these patients are at a higher risk of readmission and stay in the hospital. Paradoxically, hospitals with expanded access to post-discharge health services also see a rise in unintended readmissions, since increased health care utilization may also occur in multi-conditional patients who lack the resources that enable self-care and are therefore at higher risk of relapse^{389,390}. Thus, taking care of the patient and not just the disease is imperative in order to reduce costly hospital stays and unplanned readmissions^{20,392}. Primary care-based CM through collaborative care leaves problems with physical well-being unsolved and it is not advisable to treat complex functional conditions in primary care. The solution seems to lie in a hospital-based integrated care model, which incorporates medical staff-guided case management, leading vulnerable complex patients back to primary care^{20,35,103,104}. Therefore, we decided to create a psychosomatic network approach, which might be able to increase the patient flow through the hospital and could help bridge the gap between hospital and primary care in order to reduce length of stay or the rate of admissions^{43,162,chapter 7,393}.

The Med-Psych-Net consists of the inpatients' MPU, a proactive CLS, different outpatient-based liaison activities (e.g., the multi-disciplinary pain team, the pelvic care

centre) and most importantly the staff-guided CM-based transition of care to GPs. The engineering of care applications that would improve the affordability of hospital care has to incorporate mechanisms that enhance in- and outpatient flow through the medical hospital without proportionately adding staff³⁹³. Our Med-Psych-Net approach succeeded in that sense. Cost savings have been booked without changing the hospital's fulltime-equivalents among the psychiatry or medical psychology staff, since community mental health service care managers started to join hospital and primary care during that period. With regard to the Med-Psych-Net, it should be kept in mind that these CMHS care givers were only colocated in the MUMC and at GPs and were not additionally employed. For clarification, we engineered a care application that improved the affordability of hospital care via a guided CM mechanism, which enhanced the flow of outpatients through the medical hospital without proportionately adding staff. The Med-Psych-Net is the first comprehensive transitional health care network to address psychosomatic multi-morbidity across various health care settings, starting by picking up patients face-to-face at the medical hospital, as community mental health services' case managers ease the transition from hospital outpatient settings to primary care. In other words, the journey of complex and vulnerable multi-conditional patients across the health care (dis-) continuum has been finalized by placing the role of the hospital within the community context^{394,395}. Most programmes targeting care transition assume that hospital readmissions can be reduced by patient empowerment and improved relationships between the hospital and post-acute care settings³⁹⁴. The MPN adds another dimension which should not be underestimated: a clinical network approach based on etiologic medical concepts and implemented by medical staff-guidance. The approach might help establish integrated care by connecting specialty outpatient clinics in the hospital. It may also bridge the gap between the hospital and primary care via medical staff-guided transitional care managers without compromising the quality of consultants' etiologic conceptualization or treatment. Thus, in order to guarantee medical expertise across different settings, the MPN facilitates psychosomatic specialty skills in primary care and, vice versa, assures that the general practitioners have an overview of their patients' experiences in the medical hospital. This does not only happen via CMs as a link but also by multi-disciplinary direct or telephone/internet-based medical staff consultations independent from the setting.

Figure 16.3 The Med-Psych-Net - a transitional network approach fostering personalized care in psychosomatic medicine.



Legend: A Med-Psych-Net (MPN) is a virtual network of co-operating care givers who are treating patients with complex psychosomatic conditions, referring them from primary care to the hospital and vice versa. Care givers involved in this integrated approach provide treatment in different proportions depending on the severity and complexity of disease. Patients with the most severe conditions are admitted to the integrated hospital inpatient unit (Med-Psych-Unit (MPU)) or to somatic wards in co-operation with the mental health care consultation-liaison service (CLS). Patients with less impairment but whose medical and/or bio-psychosocial problems are still severe are followed on a day care or outpatient basis. The hospital-related integrated care, ranging from outpatient to inpatient interventions, is covered by the hospital-based Med-Psych-Centre (MPC). Transition of the patient back to primary care takes place at suitable moments when the roles of case manager (CM) and general practitioner (GP) can become more prominent. PHcS = Physical Health care Specialist; MHCs = Mental Health care Specialist.

In order to assess the feasibility of the MPN approach, it is necessary to chart the bottlenecks in psychosomatic complexity care related to primary as well as medical hospital care. As mentioned above, several bottlenecks in primary care are well known: i) the limited consultation time of general practitioners; ii) lack of GPs' specialty skills; iii) the need for a degree of diagnostic openness in psychosomatic patients; and iv) patients' stigma-related resistance to psychosomatic attributions³⁵. But others are less well known and are discussed in this thesis. As clinical experience reveals, comorbid mental and somatic illnesses may lead to misdiagnosis, delayed treatment and serious adverse events in the general hospital setting. Several factors have led to misattribution in this regard: i) patients' complex presentation; ii) consultants' lack of concepts concerning complexity; iii) patients' challenging behaviour; iv) clinical pressure due to a crowded medical ward environment; v) patients' resistance to psychosomatic explanations; and

last but not least, vi) the stigmatizing attitude of some staff members^{20,351}. In that context, some recommendations may be made to optimize the diagnosis and treatment of multi-conditional patients in the general hospital. In the first place, a pro-active psychiatric CL team has to be available 24 hours a day. This recommendation concurs with in-hospital findings that a pro-active CLS involvement may prevent comorbid patients from going unrecognized³⁵². Regarding the subsequent transition back to primary care at the end of hospital stays, GPs' compliance with CLS' recommendations may be enhanced by direct communication between the hospital and primary care providers³⁵³. Secondly, detailed multi-disciplinary guidelines for the assessment and treatment of multi-conditional patients should be prepared. Thirdly, the hallmark of integrated multi-disciplinary management is to hold regular meetings with staff members from all departments and across all of the settings involved. This should be realized at the in- and outpatient hospital level as well as in primary care to improve clinical reasoning^{20,43,354}. Fourthly, the importance of the therapeutic relationship should be emphasized by moving case managers into the frontline of treatment rather than offering mental health or somatic consultation by consultants or GPs alone^{2,100,102,355,chapter7}. Last but not least, given the patients' resistance to accepting psychosomatic explanations across all care levels, multi-disciplinary staff-guidance of CMs might help to overcome stigmatization regarding psychosomatic conditions and may guarantee the level of medical expertise across different settings.

Future health care delivery and payment reforms may affect the care of complex multi-conditional patients more than programmes addressing clinical problems in mono-disciplinary settings. Bundled payment for services providing care across settings (i.e., hospital stay and readmission reduction programmes targeting care transition to primary care) should align incentives for hospitals and primary care^{394,395}. Given the exploding health care budget and the waiting lists for various hospital interventions in the Netherlands, the Med-Psych-Net approach may achieve multiple goals of care delivery; therefore, it deserves integrated reimbursement. The increasing patient flow through hospitals achieved by the transition of care may reduce frequent care utilization, the length of hospital stay and the amount of unplanned readmissions. Besides achieving favourable patient-related outcomes, the transitional MPN approach could reduce the cost of health care, which might have a societal impact without violating care givers' interests. For instance, the objection voiced by hospitals regarding a loss of income is unfounded. A decrease in the length of hospital stay and in readmissions is accompanied by an increase in first patient consultations at the medical hospital, as evidenced by existing waiting lists. Since health care policy and delivery is increasingly influenced by reimbursement changes to attenuate the health care-related financial burden, new models of care should be evaluated scientifically, taking special note of quality and safety, to minimize unintended outcomes. Thus, future research on care delivery concerning complex or multi-conditional (functional) disorders should take a perspective of complexity science as its point of departure³⁸⁰. Disease severity and complexity is

strongly associated with the intensity and frequency of care activities during patients' index admission but also with unintended readmissions^{380,386}. The lack of improvement in readmission rates over the past few years indicates that the relationships between risk factors, interventions and intended outcomes are more complex than hitherto acknowledged^{380,382}. In addition to current research efforts conducted with an eye to reducing hospital admissions or length of stay, a better scientific approach would entail studying intended outcomes of complex (functional) patients through the lens of complexity science³⁸⁰. Its focus is on the identification of participating 'agents', the unpredictability of agent actions, the interactions between multiple agents, and their effect on intended outcomes. In a complex system, it is deemed necessary to look beyond single causative factors and an expected linear response to interventions³⁸⁰. By this reasoning, the unintended outcome of unplanned readmissions or a long hospital stay is a result of a series of complex interactions among multiple agents. Hence the need to identify the factors in play: i) the complexity and severity of the underlying disease; ii) patients' openness to a psychosomatic diagnosis; iii) quality of care delivery (at all health care levels) including staffing; iv) co-ordination and continuity of care across settings; v) communication with care participants (between patients and care givers and mutually between care givers); and vi) assessment of the environment into which the patient is discharged³⁸⁰. The ability to initiate and sustain an integrated transitional care programme in psychosomatic medicine is increasingly important since the patients' psychosocial factors contribute significantly to the risk of unplanned readmission³⁹⁶. The transitional Med-Psych-Net may fulfil its expectations concerning its bridging function. However, the intended outcomes have to be further evaluated with complexity science models. Moreover, a tailored and therefore personalized care model should be constructed by incorporating modern m-health tools into transitional integrated care. Doing so may enable patients and care givers to investigate environmental influences on symptom formation and ways to prevent or overcome stressful threatening events. In this regard, the experience sampling methodology proves to be a valid tool for momentary assessment in complex psychosomatic syndromes^{chapter15}. Accordingly, ESM could be applied transdiagnostically for clinical purposes to gain insights that can be used therapeutically, such as in psychotherapeutic trajectories concerning exposure and response prevention in situations of exaggerated harm avoidance. In addition, repeated measures over time using ESM could help to unravel complexity pathways by applying network analysis methodology. In psychiatry, network analysis is currently used to move away from a concept of symptom-based diagnostics in the direction of elementary syndromes. Apparently, 'bridge symptoms' seem to be responsible both for combining symptoms into syndromes and for combining various syndromes into a network structure³⁹⁷. In that sense, complexity science may not only improve the efficacy of network approaches with regard to care delivery but might also explain comorbidity patterns. Therefore, network models may predict the clinical course of multi-morbidity phenotypes and might thus help to designate state- and

severity-related targets for complexity interventions. As in psychosis, affective symptoms may act as central network symptoms³⁹⁸, thereby moderating or amplifying complex (functional) somatic complaints and care utilization accordingly since stress-related disorders are associated with an increase in direct and indirect costs, depending on the complexity (i.e., comorbidity) and the severity of symptoms^{399,400}. Regarding potential causation, cumulative serious life threat has been linked with both mental and physical complaints and is associated with an increased number of doctor visits and hospital admissions⁴⁰¹. However, the individual variation in the temporal relationship between stress and complex functional somatic conditions and the dynamics of the body's stress matrix warrant further investigation to elucidate the temporal complexity between stress and multi-conditional complaints over time^{402,403}. Subjecting temporal complexity to time series analysis might contribute to the discovery of complexity pathways and, more importantly, to patient-tailored treatment⁴⁰². A complex functional somatic syndrome shows very high frequencies of comorbid mental disorders at the specialized hospital outpatient level (i.e., affective conditions and somatoform disorders presenting with almost equal prevalence). In that light, the presence of multiple physical symptoms is longitudinally associated with the recurrence of affective conditions at the community, primary care or mental health care level. The question then arises: What comes first – the chicken or the egg (i.e., complex (functional) somatic or affective complaints)^{42,404-406}? Following patients through various health care settings (e.g., via the Med-Psych-Net) by using the same patient-related mobile/e-health assessment tool across medical settings (e.g., ESM) might elucidate the sequence of complexity development and help answer the next question: What is (dys-) functional in complex functional somatic syndromes? From a systemic point of view, complex functional somatic conditions with comorbid affective disorders are probably best understood as a sensitized defence response to earlier threats resulting in perceived emotional and bodily distress (i.e., hyperarousal). Besides psychological stressors, physical threat contributes to an alarm falsification in the body–brain crosstalk, affecting mood, cognition and defensive behaviour -- the symptoms of affective and functional somatic disorders³⁸. In order to further investigate the relation between contextual threat and symptom formation, a feasible and reliable momentary assessment tool for diagnostic and therapeutic purposes (i.e., ESM) can be implemented. ESM has been shown to be a reliable transdiagnostic mROM tool, which also can be used to facilitate shared decision making and monitoring of personalized treatment in psychosomatic medicine^{chapter15}.

With regard to integrated complexity treatment, MPUs embedded in a transitional Med-Psych-Net might help to reassess the consistent evidence for the negative association between concomitant physical symptoms and affective conditions in order to turn the course of affective conditions at the highest level of complexity. Moreover, the Med-Psych-Net may add value in the light of the fragile consensus between patients with comorbid conditions and health care professionals on the preventability of costly readmissions^{20,37,407-409}. At moments of care transition, staff-guided case management

supported by ESM can take over the care, eventually leading to primary care-based collaborative care^{chapter7&15}. In the temporal relationship between stress and complex functional somatic conditions, the most care-relevant moment might be when complexity gets started. At that moment of initial complexity, the exclusive administration of web-based telemedicine or m-health management is a scenario that deserves further investigation, even with regard to multi-conditional complaints. The rationale is that patients with an initial but increasing somatic symptom burden rise instantly to the same level of health care utilization as patients with chronic physical symptoms⁴¹⁰⁻⁴¹². Alternatively, immediate involvement of an integrated Med-Psych-Net approach should be considered if patients and primary care givers need medical staff-guided CM to establish psychosomatic attributions.

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