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Functional movement disorders in neurogeriatric inpatients

Underdiagnosed, often comorbid to neurodegenerative disorders and treatable

Introduction

Functional movement disorders (FMD) belong to the spectrum of functional neurologic disorders [1]. Previously referred to as psychogenic, this term assumed an etiology that may be relevant to some patients only [2]. As a result FMD has gained widespread acceptance, including in the current Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the 11th revision of the International Classification of Diseases (ICD-11, expected for 2019).

The prevalence of FMD is between 2% and 20% in movement disorders clinics [1, 3, 4]. Although young adults are more commonly affected, the age spectrum is wide. Approximately 20% of FMD patients may have the onset of FMD after the age of 60 years [5]. An FMD can manifest with different movements (may be seen as FMD subtypes), such as tremor, dystonia, myoclonus, parkinsonism, tics, paroxysmal dyskinesia, gait disorders and other movement phenotypes [3]. Disability and impairment in quality of life have been reported to be comparable to patients with neurodegenerative diseases, such as idiopathic Parkinson's disease [1]. The diagnosis of each FMD

requires the ascertainment of incongruence and inconsistency of the abnormal movements ([6, 7]; **Table 1**). Only neurologists with expertise in movement disorders can distinguish FMD from organic (often complex and bizarre) movement disorders [6]. Diagnosis can be even more challenging when FMD appears in the setting of organic disorders or after a physical injury, which occurs frequently in geriatric (i.e., multimorbid) patients [1, 8, 9].

To date there is no accepted standard protocol available for treating FMD. The treatment process generally starts with detailed diagnostic debriefing to facilitate the patient's acceptance of diagnosis [1]. Physiotherapy and psychodynamic psychotherapy may be effective in at least some patients [10–12]. A recent study measured the effects of a 1-week physiotherapy program based on the concept of motor reprogramming on FMD in 60 patients (17–79 years old) compared to a control group (age and sex-matched patients treated as usual) [13]. Improvement, substantial improvement or remission occurred in 74% of patients. Patient-rated outcomes after 2 years still showed 60% (compared to 22% in the control group) of patients reporting improvement, substantial improvement or remission. Interestingly, partial inpatient and

inpatient multidisciplinary treatment has been shown to be effective, especially in severely affected patients [14, 15].

The aim of this study was to evaluate the prevalence, demographic and clinical characteristics as well as the treatment response to a multidisciplinary rehabilitation program of FMD inpatients at a geriatric ward of a neurological department in a University Hospital in Germany.

Methods

The study included all participants who 1) were treated in the neurogeriatric ward at the University Hospital Schleswig-Holstein in Kiel between July 2017 and November 2018 and 2) took part in the ComOn Study (*COgnitive and Motor interactions in the Older population*), a prospective, cross-sectional, explorative observational multicenter study. The study included all multimorbid [16–18] patients treated on the ward who provided informed consent and were able to stand without personal aid for at least 10 s and to walk at least 3 m with or without walking aids. Exclusion criteria were age <60 years, deficits in consciousness (clinical diagnosis), >2 falls during the previous week (fall risk during the assessment too high), ≤5 points in the Montreal cog-

S. Mätzold and J. Geritz contributed equally.

Table 1 Building blocks for the diagnosis of functional movement disorders

	Incongruence	Inconsistency
What does it mean?	1. Movements do not present or progress according to the wide phenotypic range of known organic movement disorders 2. Movements change or are suppressed with complex tasks ^a	1. Movements vary over time 2. Movements change or are suppressed with complex tasks ^a 3. Disability is disproportionate to objective findings
What does it require?	Extensive experience on organic movement disorders	Careful examination of changes in movement to distracting tasks or non-physiologic interventions
What does it imply?	Diagnosis can only be made by a neurologist with expertise in movement disorders	Diagnosis may require a longer period of examination and observation than for most movement disorders

^aChanges over time and suppressibility with complex tasks are also a domain of organic tics but not of most other movement disorders. According to [6]

nitive assessment (MoCA) test (severe dementia precluding effective communication), history of or current drug abuse (except nicotine) and corrected visual acuity <60%. The study was approved by the ethics committee of the Faculty of Medicine, Christian-Albrechts-Universität zu Kiel (No D427/17). The Declaration of Helsinki was respected. A representative proportion of 84% of all patients admitted to the ward were included in the analysis.

All participants were assessed within 2 days after admission (T1) and within 2 days prior to discharge (T2). During the hospital stay all participants received multidisciplinary care from a geriatric team with an individually adapted set of therapeutic goals depending on the needs. For the diagnosis of FMD patients the abovementioned criteria were used [6, 7] and the diagnosis was made by a neurologist experienced in movement disorders (WM). For the inpatient treatment of FMD patients the criteria recently published [19] were used with minor adaptations. Incongruence was defined as in **Table 1** and also when functional movements were (i) distractible and (ii) (in case of gait and balance involvement) accompanied by compensation strategies indicative of physiological or even improved gait and balance performance [14]. This treatment covered the following components, which were provided by all team members and discussed during the weekly team meetings: giving the symptoms a name (e.g. functional movement disorder), explain

the diagnosis to the patient (e.g. “it is a software problem, a learned movement pattern”), provide information about the characteristics of the disorder (e.g. “it is real, not imagined, it is common and can be treated”), encourage self-observation, discuss the possibility of self-healing and treatment and support a relationship with experienced therapists.

Most of the patients underwent treatment in the frame of the early rehabilitative complex treatment (*frührehabilitative Komplexbehandlung*, a specific instrument provided by the German health insurance system to enable early and extensive rehabilitative combination therapy of 14–20 days for geriatric inpatients). This article reports the demographic parameters (age, gender) and for FMD patients the presence and severity of depressive symptoms using the screening tool depression in old age (*Depression im Alter*, DIA-S [20]), a self-reporting questionnaire with 10 items and a cut-off value of 4 points. For our main analyses we focused on the following parameters, Short Physical Performance Battery (SPPB) and the instrumented activity of daily life (iADL) Barthel Index. The SPPB measures physical performance and mobility aspects, e.g. balance (tandem, semi-tandem, and side-by-side standing), gait speed (walking 4 m twice at a comfortable speed) and chair rise performance (five chair-rise tests, as fast as possible) on a scale from 0–4 each. The total score ranks from 0 to 12 and higher levels display better physical function and mobility [21]. The test has been shown

to be valid and reliable in older adults (interclass correlation, ICC = 0.83–0.89) [22]. The Barthel index measures severity of impairment of tasks, such as toilet use, eating, dressing and climbing stairs. The German version used has been shown to have a high interrater reliability (kappa = 0.93) [23, 24]. The maximum score is 100 with higher scores indicating better performance and a higher degree of independence in iADL.

The data from T1 were used to evaluate cross-sectional aspects of FMD and non-FMD patients at admission. It was also evaluated whether symptoms of FMD were already mentioned by the referring doctor, whether patients were informed about the diagnosis and whether these symptoms contributed (at least indirectly) to the primary or additional diagnosis for admission.

Response to treatment was evaluated by calculating the change between admission and discharge according to the formula, T2 (discharge)—T1 (delta, Δ) of the SPPB and the Barthel index. Data are presented as mean \pm standard deviation and frequency. Student’s t-test and the χ^2 -test were used for statistical group comparisons of FMD versus non-FMD and the Mann-Whitney U-test for subgroup analyses (small N). A non-corrected *p*-value <0.05 was considered significant in this hypothesis generating study.

Results

Comparisons of demographic and clinical parameters between the FMD group and the non-FMD group are summarized in **Table 2**. The proportion of FMD patients in the total cohort was 11%. The mean age of FMD (14 patients older than 70 years) and non-FMD patients was comparable. Females were more common in the FMD group than in the non-FMD group. At admission, neither the Barthel (iADL) index nor the SPPB differed significantly between FMD and non-FMD patients. The time between T1 and T2 as well as Δ Barthel index and Δ SPPB were comparable between groups.

The three items “help needed with transfers” (improved in 12), “help needed with bathing” (improved in 9) and “help

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Functional movement disorders in neurogeriatric inpatients. Underdiagnosed, often comorbid to neurodegenerative disorders and treatable**Abstract**

Background. The proportion of patients with functional movement disorders (FMD) is particularly high in neurology clinics. Treatment options have not been consistently developed, not well evaluated and not validated. This article presents the preliminary data on the prevalence and treatment response of patients with FMD who were treated within the framework of an early rehabilitative geriatric complex treatment at a university hospital for neurology.

Methods. From July 2017 to November 2018 the prevalence, demographic and clinical parameters, and response to treatment of FMD patients were documented and compared to non-FMD patients treated at the neurogeriatric ward of the University Hospital Schleswig-Holstein, in Kiel. Clinical endpoints

were the Short Physical Performance Battery (SPPB) for mobility and the Barthel index for instrumented activity of daily life (iADL).

Results. The prevalence of FMD was 11% (19/175) and predominantly observed in women (74%). Of the FMD patients nine also had a diagnosis of either idiopathic Parkinson's disease ($N=7$), dementia with Lewy bodies ($N=1$) or progressive supranuclear palsy ($N=1$). At admission, neither the SPPB nor the iADL differed significantly between FMD and non-FMD patients. The treatment response was comparable between the groups: SPPB change was $+0.3 \pm 1.8$ (mean, standard deviation) in FMD and $+0.4 \pm 1.9$ in non-FMD patients ($p=0.83$). The iADL change was $+19 \pm 15$ in FMD and $+18 \pm 17$ in non-FMD ($p=0.83$).

Conclusion. The prevalence of FMD was unexpectedly high in the neurogeriatric ward of a German university hospital. There were comparable impairments and responses to multidisciplinary treatment in mobility and iADL between FMD and non-FMD geriatric patients, suggesting that specific and informed treatment provided by a multidisciplinary geriatric team is effective in geriatric FMD patients. Further studies of this underdiagnosed disorder in older age are warranted.

Keywords

Parkinson's disease · Movement disorder · Activities of daily living · Mobility · Dementia

Funktionelle Bewegungsstörungen in der Geriatrie. Unterdiagnostiziert, oft mit neurodegenerativen Erkrankungen assoziiert und behandelbar**Zusammenfassung**

Hintergrund. Der Anteil von Patienten mit funktionellen Bewegungsstörungen (FBS) ist vor allem im neurologischen Fachgebiet relativ hoch. Therapeutische Optionen sind nicht konsequent entwickelt, nicht gut evaluiert und nicht validiert. Die hier vorgestellte Analyse präsentiert erste Daten zu Prävalenz und Therapieansprechen von Patienten mit FBS, die im Rahmen der frührehabilitativen geriatrischen Komplexbehandlung an einer neurologischen Universitätsklinik behandelt wurden.

Methoden. Auf der neurogeriatrischen Station des Universitätsklinikums Schleswig-Holstein Campus Kiel wurde über den Zeitraum von Juli 2017 bis November 2018 der prozentuale Anteil von Patienten mit FBS bestimmt. Danach wurde in diesen FBS-Patienten die Mobilität („short physical performance battery“, SPPB)

sowie die Schwere der Beeinträchtigung der instrumentellen Aktivität des täglichen Lebens (Barthel-Index) bestimmt und mit den Daten der Nicht-FBS-Patienten verglichen.

Ergebnisse. Der Anteil von Patienten mit FBS ($N=19$) am Gesamtkollektiv ($N=175$) lag bei 11%. Der Anteil von Frauen lag bei 74%. Neun der FBS-Patienten hatten zusätzlich die Diagnose einer neurodegenerativen Bewegungsstörung (7 idiopathisches Parkinson-Syndrom, 1 Demenz mit Lewy-Körpern, 1 progressive supranukleäre Blickparese). Bei Aufnahme zeigten sich keine signifikanten Unterschiede in der SPPB oder im Barthel-Index zwischen FBS- und Nicht-FBS-Patienten. Mit Delta SPPB von $+0,3$ (1,8) versus $+0,4$ (1,9; M [SD]; $p=0,83$) und Delta Barthel-Index von $+19$ (15) vs. $+18$ (17) Punkten ($p=0,83$) zeigten sich keine relevanten Unterschiede

hinsichtlich Therapieerfolg zwischen FBS und Nicht-FBS.

Schlussfolgerung. Der Anteil von Patienten mit FBS auf einer neurogeriatrischen Station an einer deutschen Universitätsklinik zeigt sich überraschend hoch. Erste Analysen deuten darauf hin, dass FBS-Patienten bei Zuweisung ähnlich schwer betroffen sind wie Nicht-FBS-Patienten und sie von der angebotenen Struktur und Behandlung durch das multidisziplinäre geriatrische Team auch ähnlich effektiv profitieren. Dies ist aufgrund der bestehenden Literatur nicht selbsterklärend und bedarf weiterer wissenschaftlicher Aufarbeitung.

Schlüsselwörter

Morbus Parkinson · Bewegungsstörung · Alltagsaktivitäten · Mobilität · Demenz

needed with dressing” (improved in 9) were the main drivers of the Δ Barthel index seen in FMD patients.

Figure 1 provides an overview of the two parameters evaluated between T1 and T2 for the FMD versus non-FMD patients.

None of the patients were diagnosed with FMD prior to the inpatient stay.

Approximately half of the patients were referred due to symptoms that indirectly suggested the possibility of FMD but the diagnosis was not confirmed on examination until hospital admission. Of the patients nine suffered from additional neurodegenerative movement disorders, idiopathic Parkinson's disease (IPS) [25] $N=7$, dementia with Lewy bodies (DLB)

[26] $N=1$ and progressive supranuclear palsy (PSP) [27] $N=1$. The DIA-S values were relatively low (1.8 ± 2.7) suggesting that, as a mean, depressive symptoms did not relevantly contribute to the FMD symptoms. At admission four FMD patients had anti-depressive co-medication with a selective serotonin reuptake inhibitor (SSRI) each and two patients

Table 2 Demographic and clinical parameters: group comparisons between FMD and non-FMD patients

Parameter	FMD	Non-FMD	p-value
N	19	175	–
Age (M ± SD, CI, years)	75 ± 8 (70–79)	78 ± 7 (77–79)	0.14
Female (%)	14 (74%)	71 (45%)	0.02
Barthel index (0–100) at T1 (M ± SD/CI)	58 ± 14 (51–64)	53 ± 14 (51–55)	0.85
SPPB score (0–12) at T1 (M ± SD/CI)	5.3 ± 1.9 (4.4–6.2)	5.2 ± 2.3 (4.9–5.5)	0.83
Time between T1 and T2 (days)	10.4 ± 1.8 (9.6–11.2)	11.4 ± 2.2 (11.1–11.7)	0.07
ΔBarthel index (M ± SD/CI)	19 ± 15 (12–26)	18 ± 17 (15–20)	0.83
ΔSPPB (M ± SD/CI)	0.3 ± 1.8 (–0.5–1.1)	0.4 ± 1.9 (0.1–0.7)	0.83

CI 95% confidence interval, Δ (delta) difference between T1 (first assessment) and T2 (second assessment), FMD functional movement disorder, M mean, N sample size, SD standard deviation, SPPB short physical performance battery, FMD functional movement disorders

continued to take the medication during and beyond the entire treatment phase.

FMD patients with IPS (mean Levodopa-equivalence daily dose (LEDD) at T1, 614 mg; ΔLEDD, 56 mg) presented with tightrope walking ($N=1$), dragging ($N=1$), backward and sideward leaning of the trunk ($N=1$), trembling ($N=1$), gradual fatiguing of gait with presyncope ($N=1$) and robotic gait ($N=2$). The DLB patient presented with walking on ice and waddling gait and the PSP patient with stiff-legged gait on the left side and severe gradual fatigue. The 10 patients without neurodegenerative disease presented with ataxic/uncoordinated gait ($N=2$, 1 only with the left side), giving way of the knees ($N=3$, 1 with truncal myoclonic movements), hyperkinetic movement of the left arm ($N=1$), scissoring gait ($N=1$), tremor of the upper extremities and inability to move legs ($N=1$), walking on ice gait ($N=1$) and marked slowness on manual tasks and variable resistance against passive movements without cogwheel rigidity ($N=1$).

Of the patients 12 were informed about their FMD diagnosis during the inpatient stay. The remaining seven patients were not informed because the multidisciplinary team felt that this information may not have been helpful for treatment at the current stage (e.g., due to complex treatment situation and risk of noncompliance). These pa-

tients were trained in coping with FMD symptoms. There was no significantly different therapy response between the informed and noninformed FMD patients (Δ SPPB, $p=0.39$; Δ Barthel index, $p=0.12$). At discharge 8 patients had a primary diagnosis of FMD, 11 patients had a different primary diagnosis and FMD was listed as an additional diagnosis. There was no significantly different therapy response between patients with primary/additional FMD diagnosis (Δ SPPB, $p=0.23$; Δ Barthel index, $p=0.72$).

Discussion

The prevalence of FMD was surprisingly high in an inpatient neurogeriatric setting, an observation not previously reported. Remarkably, half of the FMD diagnoses were uncovered in patients with established neurodegenerative disorders, a level of co-occurrence in the high end of the previously reported range [28]. While this finding will need to be re-examined in independent cohorts, it supports the hypothesis that FMD is common in old people, occurring in isolation [5] or complicating other neurodegenerative disorders [9]. Physicians treating geriatric patients with movement disorders need to be alert as to the possibility that FMD may be the predominant source of disability.

Interestingly, FMD patients did not significantly differ from the geriatric non-FMD patients at admission regarding age, physical function and mobility (SPPB) and iADL (Barthel index, Fig. 1). As consistently reported [29], the majority of our geriatric FMD participants were females. It must be considered that FMD diagnosis is more challenging in geriatric than in non-geriatric patients, given the comorbidities, including additional neurodegenerative movement disorders, as in half of our cohort. This finding underscores the relevance of the criterion “reliable diagnosis can only be made by a neurologist with expertise in movement disorders” [6]. Geriatricians and neurologists are encouraged to work closely together to design and implement an efficient diagnostic approach. Fortunately, the new diagnostic criteria for FMD [6, 30] enable a positive diagnosis and should replace a diagnosis based on exclusion of organic diseases that is, at least in our experience, often not helpful and does not assist the treatment goals and strategy.

The analyses show that FMD patients benefited from the geriatric multidisciplinary team approach provided at the neurogeriatric ward comparatively well to non-FMD patients, suggesting that this approach is an effective treatment option using published recommendations [14, 19]. In more detail, changes of the Barthel index and the SPPB values were similar in both groups. In this cohort this held true for patients 1) with and without additional movement disorders, 2) with and without primary FMD diagnosis at discharge and 3) with and without being informed about the FMD diagnosis. The last aspect is surprising as according to current recommendations, providing information about FMD to the patient is a central part of effective treatment. It can only be speculated that in geriatric, multimorbid patients, a specific and goal-oriented multidisciplinary geriatric team treatment approach can still lead to a relevant improvement in the outcome parameters due to, e.g., significant improvement of symptoms in the non-FMD diagnoses. Another reason could be that the outcome parameters used in this study were nonspecific and/or that the FMD subgroups were too small to

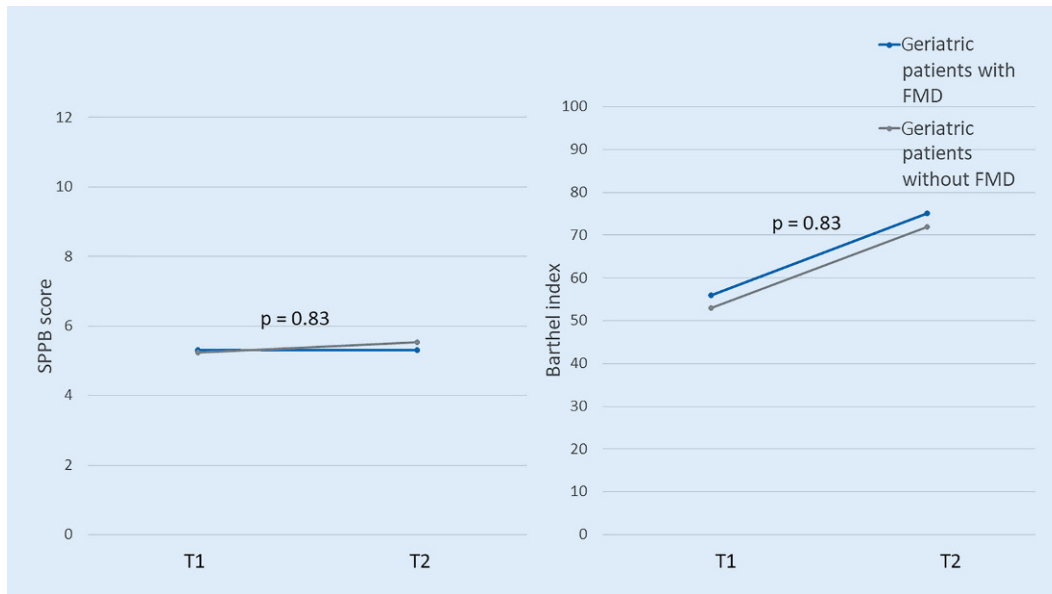


Fig. 1 ◀ Treatment response of geriatric patients with and without functional movement disorders (FMD). SPPB short physical performance battery, reflecting mobility. The Barthel index reflects instrumented activities of daily living (iADL) performance. T1/T2 measurement at the admission/discharge of the inpatient stay dot

reach significance; still, we feel that our pilot results are promising for a disorder that is short on evidence-based treatments to date [1, 10–13] and is associated with a poor prognosis in a high proportion of those affected [3, 15]. Based on the observations coming from this pilot study, future studies could use a (more) standardized assessment and treatment regimen and collect data over longer time periods. These studies may also include outcome parameters beyond the Barthel index and SPPB, such as health-related quality of life and (real life) activity and mobility parameters, to allow the generalizability of treatment effects.

In conclusion, diagnosis of FMD was common in the neurogeriatric ward at this university neurology department and should be considered in geriatric patients presenting with movement disorders with or without associated neurodegenerative disorders. Preliminary analyses suggest that the geriatric multidisciplinary team approach with consequent implementation of published recommendations is an effective treatment option. Further studies are necessary to improve the understanding of the epidemiology and diagnostic aspects of FMD in geriatric patients, and to develop standardized and validated forms of treatment.

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Compliance with ethical guidelines

Conflict of interest S. Mätzold, J. Geritz, K.E. Zeuner, D. Berg, S. Paschen, J. Hieke, S. Sablowsky, C. Ortlieb, P. Bergmann, W. Hofmann, A.J. Espay and W. Maetzler declare that they have no competing interests.

All procedures performed in studies involving human participants or on human tissue were in accordance with the ethical standards of the institutional and/or national research committee (ethics committee of the Faculty of Medicine, Christian-Albrechts-Universität zu Kiel [No D427/17]) and with the 1975 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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Praxishandbuch Tageskliniken

Teilstationäre Behandlung in Psychiatrie und Psychosomatik

München: Urban & Fischer in Elsevier 2018, XII, 218 S., 23 Abb., (ISBN: 978-3-437-23391-3), Softcover 39,00 EUR

Teilstationäre Behandlungen in Tageskliniken haben in der Psychiatrie und Psychosomatik seit den 1980er Jahren stark an Bedeutung gewonnen. Aus über 20-jähriger Arbeit in Tageskliniken wurden die aktuell verfügbaren Kenntnisse und Erfahrungen erstmalig in einem Buch zusammengetragen. Der Autor gilt als ein ausgewiesener Experte auf diesem Gebiet. Dr. Herald Hopf ist Vorsitzender der Deutschen Arbeitsgemeinschaft Tageskliniken Psychiatrie, Psychotherapie und Psychosomatik (DATPPP).



Das Praxishandbuch richtet sich an Mitarbeiter von Tageskliniken, Kollegen stationärer und ambulanter Behandlung, Studierende oder Auszubildende im psychiatrischen Bereich und Patienten und Angehörige. Für den Laien erleichtert es den Einstieg und hilft, einen Überblick zu bekommen und ein Verständnis für das Geschehen in einer Tagesklinik zu entwickeln. Für den erfahrenen Therapeuten ergeben sich im Wesentlichen keine neuen Informationen. Die umfassende und fundierte Darstellung teilstationärer Spezifika erweist sich aber als praxisnah, hilfreich und in ihrer komprimierten Form sehr informativ und gut lesbar.

Zwanzig Kapitel geben einen guten Überblick über die Ideen und Vorgehensweisen der Tagesklinik. Der Autor benennt hier alle relevanten Stationen vom Vorgespräch über Aufnahme, Diagnostik, Therapieverlauf bis zur Entlassplanung. Er weist auf Probleme der tagesklinischen Behandlung hin, gibt berufsgruppenspezifische Hinweise für die einzelnen Krankheitsbilder und zeigt immer wieder die Unterschiede zur stationären Behandlung auf. Fachliche Standards werden zur Psychotherapie, somatischen Therapie, kreativen Therapien und sozialen Therapien mit besonderem Blick auf die Vernetzung mit dem ambulanten Setting aufgezeigt. Neben häufigen Diagnosen werden die teilstationäre Behandlung spezieller Gruppen u.a. Mutter-Kind-Gruppen, gerontopsychiatrische Patienten, Adoleszente, Migranten und der Umgang mit Extremsituationen, z.B. Suizid, Gewalt besprochen. Auch auf historische Aspekte, den aktuellen Stand, wirtschaftliche Aspekte sowie mögliche Zukunftsszenarien wird eingegangen.

Es ist jederzeit möglich, einzelne Kapitel oder Kategorien thematisch separat auszuwählen und gesondert zu lesen. Die Kapitelgrößen sind übersichtlich, wichtige Elemente werden fett hervorgehoben. In separaten Boxen findet man Praxisbeispiele, Zusammenfas-

sungen wichtiger Inhalte und Kernaussagen.

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S. Hoffmann (Aachen)