

# Organization and Outcomes of Integrated Inpatient Medical and Psychiatric Care Units: A Systematic Review

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**Objective:** The goal of this review was to assess the relationships among aims, designs, and outcomes of integrated inpatient medical and psychiatric care units (IMPUs) and gather the evidence base on the effectiveness of these units.

**Methods:** Using online searches of Embase, Medline, Web of Science, PsycINFO, Scopus, CINAHL, Cochrane, and Google Scholar, the authors identified and reviewed literature describing the aims and outcomes of specific IMPU designs.

**Results:** The search yielded 55 studies, in which the authors identified 39 IMPUs that focused on patients with mood, psychotic, somatic symptom, substance use, organic, and personality disorders and a broad array of medical diagnoses. Most units were psychiatric-medical units and had

medium medical and psychiatric acuity capabilities. The studies reviewed provided little information on the cost-effectiveness of various IMPU designs. Although some comparative studies indicated reductions in hospital length of stay (LOS), these studies were generally of low quality and rarely reported other intended outcomes.

**Conclusions:** IMPUs may help shorten LOS. IMPUs should focus care on patients with complex conditions and high acuity to maximize health system value. Implementing compulsory admission facilities; qualified psychiatric, medical, and nursing staff involvement; and cross-disciplinary training may improve IMPUs' capacity to treat high-acuity patients. Future research should relate IMPU designs to intended outcomes.

*Psychiatric Services 2021; 00:1–13; doi: 10.1176/appi.ps.202000416*

Multimorbidity of medical conditions and mental disorders appears to be the rule rather than the exception (1, 2). Such multimorbidity is associated with excess mortality, loss of independent functioning, and reduced quality of life. The prevalence of psychiatric comorbid conditions among medical-surgical hospital inpatients ranges from 15% to 50% (3). Comorbid conditions are associated with increased hospital length of stay (LOS), medical costs, and rehospitalizations (3–6). To treat patients with the most complex conditions, some hospitals have established integrated inpatient medical and psychiatric care units (IMPUs) (7). Specific characteristics of IMPUs include the structural and technical capacity to care for patients presenting with acute psychiatric disorders and medical conditions requiring hospitalization, nursing staff with expertise in both of these domains, and the ability to carry out both medical and psychiatric interventions in an integrated and secure setting (8, 9). IMPU designs vary widely according to differences in their goals, operating contexts, and populations served (10). This variety has previously been categorized according to the psychiatric or medical origin of the unit (e.g., “psychiatric-medical” or “medical-psychiatric” units) or the level of their medical and psychiatric acuity capabilities (10–13).

A growing body of literature has begun to address IMPU designs and treatment outcomes. However, there is only limited understanding of the relationships among their aims, design characteristics, and outcomes (14). This literature gap hampers valid comparisons among IMPUs and may lead to incorrect generalizations of previous outcomes research (15, 16). We systematically reviewed the literature on the relationships among IMPU aims, designs, and outcomes and present our findings here.

## HIGHLIGHTS

- Integrated inpatient medical and psychiatric care units (IMPUs) may deliver the most significant value if they focus on providing high-level psychiatric, medical, and surgical care to patients with complex conditions.
- To add value, IMPUs could better serve patients with acute illness by introducing compulsory admission facilities; adding qualified psychiatric, medical, and nursing staff; and providing cross-disciplinary training.
- This review identified a need to document evidence about IMPUs' cost-effectiveness once high-acuity designs become more prevalent.

## METHODS

Because this study was a review of published and publicly available research data, institutional review board approval was not required.

### IMPU Definition

IMPUs are hospital wards that diagnose diseases and disorders and treat hospital inpatients who have concomitant medical and psychiatric disorders or behavioral problems (7).

### Search Strategy

We comprehensively searched Embase, Medline, Web of Science, PsycINFO, Scopus, CINAHL, Cochrane, and Google Scholar on May 24, 2019. The search strategy was based on use of related terms for IMPUs in the title and abstract fields, and the search syntax is included in an online supplement to this article. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (17).

### Eligibility Criteria

The review included English-language, descriptive, evaluative, and comparative studies presenting relevant empirical data on IMPUs and published in peer-reviewed journals. We excluded perspectives, expert opinions, letters to the editor, and meeting abstracts. We also excluded studies reporting on specialized units focusing on a single disease, for example, delirium or dementia; psychosomatic units that primarily focus on the clinical psychotherapeutic treatment for psychosomatic disorders (18); and interventions that mainly consist of embedded consultation (“liaison”) by a psychiatrist or another physician on a medical or psychiatric ward without other staff or ward modifications.

### Data Extraction

After removing duplicates, the first author (M.A.v.S.) screened all titles and abstracts of the studies identified. The full texts of the included studies were retrieved and checked for eligibility by two authors (M.A.v.S. and J.D.H.v.W.) independently. These authors sought consensus for final inclusion in the qualitative synthesis. The online supplement gives details on the study selection. All studies included were searched for aims, structural characteristics, process characteristics, and outcomes in accordance with Donabedian’s structure-process-outcome framework (14). The two authors independently extracted data from 20 randomly selected studies of the included articles to reach a consensus on the relevance of IMPU characteristics. The structural characteristics considered relevant were hospital type and size, unit size and embedding, ward features (any physical characteristics), medical staff (medical direction, attending and consulting physicians, residents), nursing staff (primary specialty, specialist nurses, and cross-training), and other staff. The procedural characteristics considered relevant were referral sources, age focus (children and adolescents, adults, or elderly persons), population descriptors, collaboration, medical and psychiatric treatment capabilities, LOS, and

aftercare. We considered funding to be an external, contextual factor rather than an internal, structural factor. The first author completed data extraction for the complete set of included studies (see the online supplement).

### Study Quality Assessment

The first two authors (M.A.v.S., J.D.H.v.W.) independently assessed and scored each study’s quality by using the GRADE system (19) and sought consensus in cases where scores differed between them.

### Data Synthesis

We followed an inductive approach relying on each empirical study’s data instead of deductively relying on existing IMPU categorizations. The first data analyses revealed that the existing concepts of unit type and acuity capabilities were beneficial to structure the analysis.

### Unit Type

We characterized IMPUs as follows. Units that treated general medical and psychiatric patients in a unified setting were labeled as “nonsegregated.” Units that originated from or were located on a psychiatric unit were labeled “psych-med units.” Conversely, units that arose from or were located on a medical unit were considered “med-psych units.” Units that had an equivalent contribution of medical and psychiatric staff, irrespective of unit origin, were defined as “combined.” Finally, we designated the colocation of two complementary specialist units as “adjacent units.”

### Acuity Capability

The first two authors independently scored each unit for medical and psychiatric acuity capabilities (1, low; 2, medium; and 3, high), following Kathol et al.’s definitions (13). A low level of medical acuity corresponded to chronic medical problems that were well controlled and required minor treatment adjustment. Patients with a medium level of medical acuity had an active, non-life-threatening condition requiring immediate medical intervention. Patients with high medical acuity required direct medical intervention, without which they may have died (9). A low level of psychiatric acuity corresponded to an easily managed behavioral problem or psychiatric illness (13). Patients with a medium level of psychiatric acuity had an active psychiatric condition that posed no acute danger to themselves or others. Patients with high psychiatric acuity required admission to a locked ward or an open ward with close supervision because of dangerous behavior (13). All units received a medical and psychiatric acuity capability score, even when acuity-defining data were incomplete. The authors used a Likert scale (ranging from 1, “not sure at all,” to 5, “completely sure”) to indicate their perceived level of precision in assigning the acuity capability score.

### Main Findings

The main findings focused on IMPU aims, structure and process characteristics, outcomes, and study quality. Findings

also focused on age group and unit type when considered appropriate. The heterogeneity of the included studies precluded a meta-analysis of outcomes.

## RESULTS

The database search yielded 5,294 records after deduplication. In total, 55 studies were included in the qualitative synthesis. Most of these studies (N=39) were descriptive (7, 8, 20–56), and 16 were comparative (9, 11, 57–70) (see the online supplement). Two studies were published in the 1970s (20, 21), 22 in the 1980s (11, 22–35, 55–61), 17 in the 1990s (36–48, 62–65), seven in the 2000s (8, 9, 49–52, 66), and seven in the 2010s (53, 67–70). Studies were grouped per IMPU; some IMPUs were described by more than one study. Table 1 gives an overview of the 39 unique IMPUs identified (7–9, 11, 20–70) and their main aims, designated unit type, structural characteristics, acuity scores, outcomes, and quality of the associated studies. The IMPU unit numbers in Table 1 (CA1, AE1, E1, etc.) will be used as reference numbers in the remainder of this article.

### Context

Most IMPUs were in the United States (N=23, 59%) or Europe (N=11, 28%). IMPUs were most commonly located in university and teaching hospitals (N=26, 67%). Nine units (23%) were independent, nine (23%) were a subunit, and two (5%) were an annex (“outgrowth”) of the psychiatric hospital into the general medical hospital. Some units reported on their location within the hospital: amid other primary care inpatient units (AE11), contiguous to medical wards (CA3, AE2, AE13), at the core of a center for the elderly (E6), within one block of the hospital (CA4), or half a mile from the hospital’s main center (AE3).

### Aims

The online supplement lists the aims of IMPUs. IMPUs generally aimed to treat patients with comorbid medical and psychiatric illnesses that were highly prevalent and increasingly common in the hospital environment. Because of their psychiatric illness or behavioral problems, these patients could not be treated satisfactorily on a general medical floor, or, vice versa, their medical needs could not be met on a psychiatric ward (58). Care for these patients was often fragmented, causing multiple ward moves or even refusal of care (5, 12). IMPUs aimed to remedy this fragmentation by providing integrated medical and psychiatric care in an adequate setting with both medical facilities and psychiatric safety features and trained nursing staff (8, 9). Patients with a psychiatric comorbid condition or behavioral disturbances were often regarded as “problem cases” and had unmet health care needs in the medical setting. IMPUs provided an excellent training location for residents and medical students in biopsychosocial diagnosis and treatment. Treatment in a medical setting could improve patient acceptance and reduce stigma. The top five specific aims of IMPUs (Table 1) included

integration, decompartmentalization, and continuity of care (N=14, 36%); quality and safety (N=13, 33%); improved patient-related and economic outcomes (N=11, 28%); training professionals (N=10, 26%); and managing disruptive behavior or high health care utilization (N=9, 23%).

### Unit Type

Most IMPUs (N=23, 59%) were categorized as psych-med units, eight (21%) were a med-psych unit, three were a nonsegregated unit, one was a combined unit, and one was an adjacent unit (E7). Three units could not be classified.

*Age group focus.* Five units served children and adolescents (CA units), 24 served adult and elderly patients (AE units), and 10 served only elderly patients (E units). Both AE (N=16, 67%) and CA units (N=4, 80%) were mostly psych-med units, and 40% (N=4) of E units were a med-psych unit.

*Patient population.* Age largely determined the psychiatric population focus of IMPUs. Medical disease categories were broad and variable. In CA units, psychosomatic disorders and eating disorders were the most frequently managed conditions. Three CA units (60%) admitted a sizable proportion of patients without medical disorders.

AE units tended to handle a broad spectrum of psychiatric disorders, with mood (affective) disorders being the most prevalent. Patients with psychotic disorders, somatic symptom disorders, substance abuse, organic disorders, and personality disorders were significantly large groups (representing >10% of the admissions and discharges) in 13 (54%) units (see the online supplement). In seven AE units (29%), only some of the patients had a medical condition. Six AE units (25%) cared for patients with acute medical illnesses, and six reported caring for stable, nonacute medical illnesses.

E units frequently (N=5, 50%) cared for acute geriatric patients. Two E units (20%) cared for patients with nonacute medical conditions. Psychiatric diagnoses were mainly delirium, dementia, and mood disorders.

Some units had a particular population focus: a treatment program for psychotic pregnant patients (AE5), deliberate self-harm (AE13), the Hassidic Jewish community (AE15), unexplained somatic complaints (AE20), unintentional or self-inflicted trauma (AE23), chronic and refractory major affective disorders of the elderly population (E4), confused elderly patients (E10), and delirium or dementia (E11).

### Structural Characteristics

*Unit size.* The IMPUs included had a median number of 15 beds (range 3–102, interquartile range [IQR]=14). CA units were often smaller (median=9 beds), and E units tended to be larger (median=23 beds).

*Ward features.* The studies scarcely reported on facility design. Units with a locked or lockable door (N=10, 25%) were usually psych-med units. Twelve units (31%) had an unlocked door.

TABLE 1. Integrated inpatient medical and psychiatric care units (IPUs) included in this review

| IPU no. and reference <sup>a</sup> | Country <sup>b</sup> | Year | Hospital type <sup>c</sup> | Unit type <sup>d</sup> | Aims <sup>e</sup> | Size <sup>f</sup>        | Patient age in years | Physicians <sup>g</sup>       | Residents                    | Nurses                           | Length of stay (LOS) in days | Acuity <sup>h</sup> |   | Study design, outcome, GRADE <sup>i</sup>   |
|------------------------------------|----------------------|------|----------------------------|------------------------|-------------------|--------------------------|----------------------|-------------------------------|------------------------------|----------------------------------|------------------------------|---------------------|---|---|
|                                    |                      |      |                            |                        |                   |                          |                      |                               |                              |                                  |                              | M                   | P |   |
| CA1 (21)                           | US                   | 1976 | G/C                        | NSU                    | —                 | M: 19 (L, S)             | Adolescence          | Ped (A), psych (NR)           | Not defined                  | Ped, cross-training              | NR                           | 3                   | 2 | NR  |
| CA2 (37, 38)                       | US                   | 1991 | U/T                        | PMU                    | 3, 5              | P: 8 (O)                 | range 4–18           | Psych (A, MD), ped (A)        | Psych and ped                | Psych, cross-training            | M=27                         | 2                   | 2 | NR  |
| CA3 (41)                           | US                   | 1994 | U/T                        | PMU                    | 1                 | P: 16 (L)                | range 15–22          | Psych (A, MD), ped (A, MD)    | NR                           | Psych, med, cross-training       | NR                           | 2                   | 2 | NR  |
| CA4 (42)                           | US                   | 1995 | U/T                        | PMU                    | —                 | P: 9 (L, S)              | range 5–18           | Psych (A, MD), ped (C)        | Specialty residents          | Psych, cross-training            | NR                           | 1                   | 3 | NR  |
| CA5 (46, 47, 50)                   | ISR                  | 1999 | U/T                        | PMU                    | 3                 | P: 9                     | range 8–18           | Psych (A), ped (C)            | NR                           | Psych                            | NR                           | 1                   | 2 | NR  |
| AE1 (24, 26, 57)                   | US                   | 1980 | U/T                        | NSU                    | 4                 | M: 32                    | M=44, range 16–63    | Psych (A, MD), med (A)        | Med, psych, and double board | Med cross-training               | M=9                          | 1                   | 2 | For reference 57, cohorts pre-post unit conversion; GRADE C. No significant differences for recidivism and return to responsible activity.  |
| AE2 (23)                           | US                   | 1981 | G/C                        | NSU                    | 1                 | P: 10 (O, S) and M: 25   | NR                   | Psych (A) med (NR)            | Med                          | Med cross-training               | M=7                          | 2                   | 2 | NR  |
| AE3 (25)                           | US                   | 1982 | U/T                        | PMU                    | 4                 | M: 13 (O)                | ≥16                  | Psych (A, MD) med (A)         | NR                           | Med cross-training               | NR                           | 2                   | 2 | NR  |
| AE4 (11, 27, 32, 55)               | US                   | 1983 | U/T                        | MPU                    | 1, 5              | M: 15 (O) M±SD=46.2±14.2 | ≥16,                 | Med (A, MD) psych (C, MD)     | Med and psych                | Med                              | M=14                         | 2                   | 2 | NR  |
| AE5 (28)                           | US                   | 1984 | U/T                        | PMU                    | 1, 2, 4, 5        | M: 14 (O) and P: 24      | ≥60% were >60        | Psych (A, MD) med (A)         | Psych                        | Med                              | Median=4                     | 3                   | 2 | NR  |
| AE6 (30, 58, 60)                   | US                   | 1985 | U/T                        | PMU                    | 4, 5              | P: 20 (L) and P: 80      | M±SD=40.4±17.1       | Psych (A), med (A)            | Psych                        | NR                               | M=13                         | 2                   | 3 | For references 58, 60, cross-sectional design of IMPU vs. C-L service and psychiatric inpatient unit; GRADE C. C-L service had longer LOS (22.1±40.8 days) than IMPU (13.2±12.3 days) and psychiatric inpatient unit (13.5±9.9 days). |
| AE7 (29)                           | US                   | 1985 | U/T                        | PMU                    | 4                 | P: 23 (O)                | >13                  | Psych (A, MD), med (A)        | Psych                        | Psych and med                    | M=25                         | 2                   | 2 | NR  |
| AE8 (11, 59)                       | US                   | 1985 | U/T                        | PMU                    | 1, 5              | P: 19 (O)                | M±SD=54.1±18.3       | Psychiatrist (A, MD), med (C) | Med for emergency            | Psych, med experience each shift | M=23.1                       | 2                   | 2 | For reference 59, cohorts pre-post unit conversion; GRADE C. LOS increased from 13.9 to 23.1 days; cost of treatment on IMPU increased at a greater rate than the hospital's average.   |

continued

TABLE 1, continued

| IMPU no. and reference <sup>a</sup> | Country <sup>b</sup> | Year | Hospital type <sup>c</sup> | Unit type <sup>d</sup> | Aims <sup>e</sup> | Size <sup>f</sup>             | Patient age in years        | Physicians <sup>g</sup>              | Residents               | Nurses                         | Length of stay (LOS) in days | Acuity <sup>h</sup> |   | Study design, outcome, GRADE <sup>i</sup> |   |
|-------------------------------------|----------------------|------|----------------------------|------------------------|-------------------|-------------------------------|-----------------------------|--------------------------------------|-------------------------|--------------------------------|------------------------------|---------------------|---|---|---|
|                                     |                      |      |                            |                        |                   |                               |                             |                                      |                         |                                |                              | M                   | P |   |   |
| AE9 (56)                            | US                   | 1986 | G/C                        | ND                     | —                 | 1–12 of unknown type<br>P: 8  | M=39.7, range 11–96<br>NR   | Med (A)                              | NR                      | NR                             | M=37                         | 1                   | 2 | NR  | consecutive cohorts of IMPU patients; GRADE C. LOS decreased from a mean of 20.5 days in 1984/85 to a mean of 16.8 days in 1986.<br>For reference 65, interrupted time series: IMPU vs. internal medicine wards (IMWs); GRADE C. Functioning: IMPU GAF +19.5±20.9 (p<.05), Karnofsky Performance Scale (KPS) score +24.3±19.5 (not statistically significant), IMW GAF 11.2±16.3 (p<.05), IMW KPS 22.4±21.4 (not statistically significant).<br>Total hospital LOS: IMPU 18±13 vs. IMW 13±8 days (p=.01).<br>For reference 62, cross-sectional design of IMPU vs. general adult inpatient service (GAIS) and geriatric psychiatry service (GPS) patients; GRADE C. LOS IMPU 19.3±21.2 days, GPS 38.6±49.4 days (significantly different from IMPU and GAIS), GAIS 18.6±18.9 days. |
| AE10 (31, 33, 61)                   | US                   | 1986 | ND                         | PMU                    | 1, 4              |                               |                             | Psych (A, MD), med (C)               | Med with cross-training | Med with cross-training        | M=17                         | 2                   | 2 |   |   |
| AE11 (7, 34, 65)                    | US                   | 1989 | U/T                        | CU                     | 2, 3, 4           | M: 15 (L, S)                  | M±SD=47±17                  | Dually trained or med (A), psych (A) | Med, psych              | Dually trained, cross-training | M=17.5, median=13            | 3                   | 3 |   |   |
| AE12 (62)                           | CAN                  | 1992 | G/C                        | PMU                    | 1, 4              | P: 6 and P: 49 on larger unit | M±SD=39.5±14.7              | Psych (A, MD), med (C), neu (C)      | Psych                   | Psych                          | M=19                         | 2                   | 2 |   |   |
| AE13 (40, 45)                       | IRL                  | 1994 | G/C                        | PMU                    | —                 | P: 3 and P: 22 on larger unit | M=33, range 14–72           | Psych (A), med/surg (A)              | NR                      | Psych                          | Median=2                     | 2                   | 2 | NR  |   |
| AE14 (63)                           | AUS                  | 1995 | U/T                        | PMU                    | 3, 4              | P: 4 and P: 30 on larger unit | M±SD=43.7±17.7, range 17–87 | Psych (A, MD), med (C)               | Psych                   | Med and Psych, cross-training  | M=22                         | 2                   | 2 |   | For reference 63, cross-sectional: IMPU vs. general psychiatry unit (GPU) patients; GRADE D. IMPU LOS 22±23 days vs. GPU LOS 25±22 days.  |

continued

TABLE 1, continued

| IMPU no. and reference <sup>a</sup> | Country <sup>b</sup> | Year | Hospital type <sup>c</sup> | Unit type <sup>d</sup> | Aims <sup>e</sup> | Size <sup>f</sup> | Patient age in years   | Physicians <sup>g</sup>      | Residents | Nurses  | Length of stay (LOS) in days | Acuity <sup>h</sup> |   | Study design, outcome, GRADE <sup>i</sup>  |   |
|-------------------------------------|----------------------|------|----------------------------|------------------------|-------------------|-------------------|------------------------|------------------------------|-----------|---|------------------------------|---------------------|---|--|---|
|                                     |                      |      |                            |                        |                   |                   |                        |                              |           |   |                              | M                   | P |  |   |
| AE15 (44)                           | US                   | 1995 | G/C                        | PMU                    | —                 | P: 20 (O)         | NR                     | Psych (A)                    | Psych     | NR  | M=21                         | 1                   | 2 | NR   | For reference 64, cohorts: first vs. latter 2 years; GRADE D. Mean LOS shortened (from 158 to 122 days, not statistically significant), 73% of general medical illnesses cured or improved; 65% of psychiatric disorders unchanged. |
| AE16 (64)                           | JAP                  | 1996 | G/C                        | PMU                    | 4, 5              | P: 63 (O, S)      | M±SD=54±16             | Psych (A), med (C)           | Psych     | Psych with med or surg experience, cross-training | M=122                        | 2                   | 2 | NR   |   |
| AE17 (48)                           | UK                   | 1999 | U/T                        | PMU                    | 2                 | I: 12             | Median=49, range 19–78 | Psychiatrist (A), med (C)    | NR        | Doubly qualified                                  | Median=18                    | 2                   | 2 | NR   |   |
| AE18 (49)                           | TWN                  | 2001 | U/T                        | PMU                    | —                 | P: NR             | M=46.3, range 18–77    | Psych (A), med (C), surg (C) | NR        | NR  | M=20                         | 1                   | 1 | NR   |   |
| AE19 (8, 9)                         | CHE                  | 2004 | U/T                        | PMU                    | 1, 2, 3           | P: 18 (L, S)      | Range 16–65            | Psych (A), med (A)           | Psych     | Mixed   | M=26, median=21              | 3                   | 3 | For reference 9, consecutive cohorts; GRADE D. Mean LOS increased from 14 days in 1999–2000 to 21 days in 2003–2004 (p<.001).  |   |
| AE20 (67)                           | NL                   | 2010 | U/T                        | MPU                    | 1                 | M: NR             | M±SD=52.8±15.1         | Psych (A), med (A)           | NR        | Mixed   | M=24                         | 2                   | 2 | For reference 67, GRADE C. Controlled before and after medical costs of IMPU vs. medical wards were lower (€104, 95% CI=€35–€174, p<.01). Total costs after IMPU admission were higher than for medical ward admission (€263, 95% CI=€68–€458, p<.01). |   |
| AE21 (7)                            | US                   | 2018 | U/T                        | MPU                    | 1, 2, 3           | M (O): NR         | NR                     | Med (A), psych (C)           | NR        | Med   | NR                           | 3                   | 1 | NR   |   |
| AE22 (7)                            | US                   | 2018 | G/C                        | PMU                    | 1, 2, 3           | P: 102 (L, S)     | NR                     | Psych (A), med (C)           | NR        | Psych, cross-training                             | NR                           | 2                   | 3 | NR   |   |
| AE23 (7)                            | US                   | 2018 | U/T                        | PMU                    | 1, 2, 3           | P: 24 (L, S)      | NR                     | Psych (A, MD), med (C)       | NR        | Psych, cross-training                             | NR                           | 2                   | 3 | NR   |   |
| AE24 (54)                           | NL                   | 2019 | U/T                        | MPU                    | 1, 3, 5           | NR (L)            | Median=46, range 18–94 | Trauma surg (A), psych (C)   | NR        | Dually trained                                    | Median=10                    | 3                   | 3 | NR   |   |

continued

TABLE 1, continued

| IMPU no. and reference <sup>a</sup> | Country <sup>b</sup> | Year | Hospital type <sup>c</sup> | Unit type <sup>d</sup> | Aims <sup>e</sup> | Size <sup>f</sup>  | Patient age in years    | Physicians <sup>g</sup>       | Residents     | Nurses                             | Length of stay (LOS) in days                       | Acuity <sup>h</sup> |   | Study design, outcome, GRADE <sup>i</sup>  |  |
|-------------------------------------|----------------------|------|----------------------------|------------------------|-------------------|--|-------------------------|-------------------------------|---------------|------------------------------------|--|---------------------|---|--|--|
|                                     |                      |      |                            |                        |                   |  |                         |                               |               |                                    |  | M                   | P |  |  |
| E1 (20)                             | UK                   | 1973 | C/G                        | MPU                    | —                 | G: 4 and G: 17 on larger unit<br>G: 16 and P: 8 and G: 25 on larger unit | Elderly population      | Ger (A), psych (C)            | NR            | Ger                                | M=20   | 2                   | 1 | NR   |  |
| E2 (22)                             | UK                   | 1980 | U/T                        | PMU                    | —                 | "Pensionable age"  |                         | Ger (A), psych (A)            | NR            | NR                                 | 98% for ≤ 1 month                                  | 3                   | 2 | NR   |  |
| E3 (35, 39)                         | US                   | 1989 | U/T                        | PMU                    | 5                 | I: 14  | M=68, range 18–92       | Psych (A, MD)                 | NR            | NR                                 | M=22   | 2                   | 2 | NR   |  |
| E4 (36)                             | US                   | 1990 | C/G                        | MPU                    | 4                 | P: NR  | NR                      | Psych (A), med (C)            | NR            | Mixed, cross-training              | M=24   | 2                   | 2 | NR   |  |
| E5 (43)                             | US                   | 1995 | C/G                        | PMU                    | —                 | P: 20 (L, S)   | M±SD=76±10, range 39–96 | Psych (A), med (A)            | NR            | Med with variable psych experience | M=15   | 3                   | 3 | NR   |  |
| E6 (66)                             | DEU                  | 2007 | C/G                        | AU                     | 2, 3, 5           | G and PG: 64   | >60                     | Ger (A), psych (A), neuro (C) | NR            | Mixed, cross-training              | Median=18 (geriatric), median=26 (psychogeriatric) | 3                   | 3 | For reference 66, mixed methods before and after; GRADE C. Majority of employees: treatment quality and allocation of patients were improved after opening. No of transfers decreased significantly. Median LOS decreased from 22 days in 2000 to 18 days in 2001 (p<.001).  |  |
| E7 (51)                             | UK                   | 2008 | ND                         | ND                     | —                 | NR: 26 (O)   | "Old age"               | Psych (A), ger (A)            | NR            | Mixed                              | NR   | 2                   | 2 | NR   |  |
| E8 (52)                             | UK                   | 2008 | C/G                        | ND                     | 1                 | 21   | >65                     | Psych (NR), ger (NR)          | Med and psych | Mixed                              | M=44   | 2                   | 2 | NR   |  |
| E9 (53, 68–70)                      | UK                   | 2011 | U/T                        | MPU                    | 2, 4              | G: 28  | Median=85, IQR=80–88    | Ger (A), psych (C)            | NR            | Ger and 3 extra psych              | Median=11  | 3                   | 2 | For reference 68, randomized controlled trial; GRADE B. No significant difference in days spent at home between IMPU and standard care (69). Qualitative interviews with caregivers from the IMPU who appreciated IMPU improvements. Communication and engagement of family caregivers were still perceived as insufficient. Reference 70 included cost-effectiveness analysis; GRADE B. The IMPU was very cost- |  |

continued

TABLE 1, continued

| IMPU no. and reference <sup>a</sup> | Country <sup>b</sup> | Year | Hospital type <sup>c</sup> | Unit type <sup>d</sup> | Aims <sup>e</sup> | Size <sup>f</sup> | Patient age in years | Physicians <sup>g</sup> | Residents | Nurses              | Length of stay (LOS) in days | Acuity <sup>h</sup> |   | Study design, outcome, GRADE <sup>i</sup> |
|-------------------------------------|----------------------|------|----------------------------|------------------------|-------------------|-------------------|----------------------|-------------------------|-----------|---------------------|------------------------------|---------------------|---|---|
|                                     |                      |      |                            |                        |                   |                   |                      |                         |           |                     |                              | M                   | P |   |
| E10 (7)                             | US                   | 2018 | U/T                        | MPU                    | 1, 2, 3           | G: 25 (O)         | Elderly population   | Med (A), psych (C)      | NR        | Med, cross-training | NR                           | 3                   | 2 | NR  |

<sup>a</sup> IMPU type, by patients served. Numbers following IMPU type are used as identifiers in the text (for example, CA3, AE1, and E4). AE, adults and elderly; CA, children and adolescents; E, elderly; NR, not reported.  
<sup>b</sup> AUS, Australia; CAN, Canada; CHE, Switzerland; DE, Germany; ISR, Israel; JAP, Japan; NL, Netherlands; TWN, Taiwan; UK, United Kingdom; US, United States.  
<sup>c</sup> G/C, general/community; ND, not determined; U/T, university/teaching.  
<sup>d</sup> AU, adjacent; CU, combined; MPU, medical-psychiatric; ND, not determined; NSU, nonsegregated; PMU, psychiatric-medical.  
<sup>e</sup> 1, integration, decompartmentalization, continuity; 2, quality and safety; 3, improve outcomes; 4, training; 5, manage disruptive behavior and overutilization. Dashes indicate "not reported."  
<sup>f</sup> Number of medical (M), psychiatric (P), or independent (I) beds. L, locked or lockable; O, open; S, seclusion.  
<sup>g</sup> A, attending; C, consulting; ger, geriatrics; MD, medical director; med, medicine; neuro, neurology; ped, pediatrics; psych, psychiatry; surg, surgical.  
<sup>h</sup> 1, low; 2, medium; 3, high. M, medical acuity capabilities; P, psychiatric acuity capabilities as scored by the authors.  
<sup>i</sup> GRADE scores range from A to D, with A denoting "high-quality level" and D "very-low-quality level"; ratings were used as outlined in Balshem et al. (19).  
 effective when usual criteria were applied.

*Medical staff.* Psychiatrists (97%, N=38) and internists (43%, N=17) were frequently involved in care, as were pediatricians on all CA units and geriatricians or old-age specialists on most E units. Seventeen units (44%) had a medical director, mostly a psychiatrist (82%, N=14) on a psych-med unit, frequently in the setting of a university hospital (53%, N=9). Nineteen units (49%) employed residents. These units were mostly located in university or teaching hospitals.

Sixteen units (41%) employed both a medical and a psychiatric attending physician. In 11 units (28%), a psychiatrist was the attending physician, and another specialty doctor was the consulting physician. In three units (8%), a medical specialist was the attending physician, and the psychiatrist was a consulting physician. One unit employed a dually trained physician, when available. The consulting physician was involved in care in varying intensities: "embedded," "involved in each case," "designated," "named," "became part of the team," "performed patient rounds," "saw a subset," "was a backup," or "was frequently unavailable."

*Nursing staff.* The unit type largely determined the nursing staff's constitution: 48% (N=11) of psych-med units had psychiatric nursing staff, whereas all med-psych units (100%, N=8) had medical, mixed, or dually trained nursing staff.

*Other disciplines.* The most frequently reported other disciplines were social workers (in 91% [N=35] of IMPUs), psychologists (56%, N=22), occupational therapists (41%, N=16), and physical therapists (28%, N=11).

**Process Characteristics**

*Referral and admission.* Common referral routes were in-house transfers, direct or via the psychiatric consultation-liaison service (39%, N=15), through the emergency department (23%, N=9), outpatient clinics (13%, N=5), and the community that also included nursing homes (10%, N=4). Most of the CA units (80%, N=4) excluded patients with acute medical illness but did not report psychiatric exclusion reasons. For AE units, the leading medical exclusion reasons were acute medical care needs (29%, N=7), patient being bedridden (13%, N=3), and critical care needs (13%, N=3). The leading psychiatric exclusion reasons were compulsory admission (29%, N=7) and danger to self or others (21%, N=5).

*Collaboration.* Multidisciplinary collaboration centered around formal and informal multidisciplinary meetings in 15 units (39%). An equal number of units reported individual or joint ward rounds. Round frequency varied from daily to twice weekly to "on request."

*Training.* The importance of cross-training was frequently stressed as essential to maintaining nursing skills (N=16, 41%). Cross-training involved training by the medical director, the clinical nursing coordinator, or a clinical nurse specialist;



through a rotation system; through staff meetings; and through the nursing leaders' appointment.

**Treatment.** Comprehensive diagnosis and treatment formed a standard approach (N=17, 44%). The description of psychiatric treatment was process oriented (e.g., therapy), whereas medical treatment was often described transactionally (e.g., administering intravenous fluids, performing cardiac monitoring, or doing a CT scan). Medical treatment descriptions were generally limited. Because of the heterogeneity of these descriptions, no categories could be reported, except for physical therapy (N=12) and dietary advice (N=10). Psychiatric treatment was reported in detail, especially by psych-med units; the treatments included occupational, expressive, and activities therapy (N=19); group, individual, or milieu psychotherapy (N=18); family involvement (N=14); pharmacology (N=13); behavioral interventions (N=9); and electroconvulsive therapy (N=5).

LOS data were reported by 26 units (67%); 22 units reported a mean LOS (median of means=21.5 days, IQR=16.5–25.2), and seven units reported a median LOS (median=11 days, IQR=4–17.5). Three units were considered outliers, with a mean LOS of 37 (AE9), 44 (E8), and 122 days (AE16).

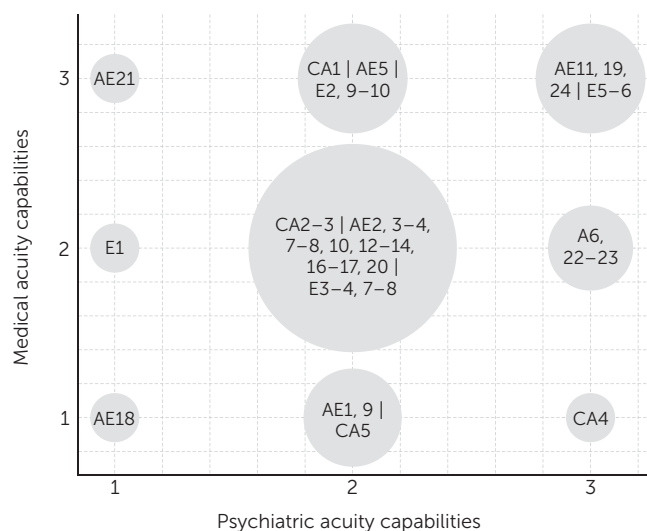
**Acuity capabilities.** Both independent raters reached fair agreement for medical acuity scores (Cohen's  $\kappa=0.36$ ,  $p=0.03$ ) and almost perfect agreement for psychiatric acuity scores (Cohen's  $\kappa=0.826$ ,  $p=0.001$ ) and most often rated impreciseness as "neutral." The main factors that influenced psychiatric capabilities were staff, psychiatric exclusion reasons, and population focus. For example, the treatment of patients with an organic illness or with psychosis and disruptive behavior required higher psychiatric acuity capabilities than did treatment of patients with psychosomatic illness. Likewise, patients who could benefit from a psychiatric therapy program generally needed lower psychiatric acuity capabilities than patients with impaired reality testing and compulsory admission. The main factors that influenced medical capabilities were the availability and involvement of medical staff, medical exclusion reasons, and a predominant focus on either acute or elective medical care.

Most units (Figure 1) had medium medical and psychiatric acuity capabilities (median scores of 2 and 2, respectively). Five units (AE11, AE19, AE24, E5, and E6) had high medical and psychiatric acuity capabilities. Seven units had either low medical or low psychiatric acuity capabilities (CA4, CA5, AE1, AE9, AE18, AE21, and E1), and one had both (AE18).

### Outcomes

Of the 16 comparative studies, 14 reported quantitative measures (9, 57–68, 70). Table 1 shows that according to the GRADE system (19), the quality of the included studies was mostly low (57–62, 65–67), often because of indirect comparisons. Table 1 also shows that most studies focused on LOS as the intended outcome, congruent with the aim to

**FIGURE 1. Medical and psychiatric acuity capabilities score per unit<sup>a</sup>**



<sup>a</sup> 1, 2, and 3 denote psychiatric acuity capabilities on the x-axis and medical acuity capabilities on the y-axis. Unit type by age group served: AE, units for adult and elderly patients; CA, units for children and adolescent patients; E, units for elderly patients. The numbers refer to the inpatient medical and psychiatric care unit numbers given in Table 1.

improve economic outcomes (see the online supplement). The achievement of the other aims received limited attention.

**Economic outcomes.** Of the two studies that used a pre-post design, one reported LOS reduction (66) and the other a LOS increase (9). A study with consecutive patient cohorts during unit maturation found a LOS reduction (61). Authors who compared LOS of IMPU and psychiatric ward patients found similar LOS for both groups (58, 60). Kishi and Kathol (65) showed that concerning time spent on other wards before IMPU admission, LOS on internal medicine wards was comparable to that of IMPU patients. Goldberg et al. (68) used the LOS-related measure "days spent at home in a 90-day time frame" and found no significant difference in days spent at home between the IMPU and standard care groups. Tanajewski and colleagues (70) observed that their IMPU was cost-effective (at a £20,000/quality-adjusted life year [QALY] threshold, the probability of cost-effectiveness was 94%, falling to 59% when cost-saving QALY loss cases were excluded). Still, no difference in QALYs gained was detected between the IMPU and care as usual. Other measures were readmissions (unchanged in [57] and increased in [61]) and return to responsible activities (unchanged in [57]). Leue et al. (67) found that LOS costs were higher after admission for IMPU patients than for patients admitted to an internal medicine ward.

**Quality.** Two studies evaluated the quality of care. Maier et al. (66) found improved caregivers' and professionals' perception of care quality after establishing their IMPU. Using a

randomized controlled trial design, Spencer and colleagues (69) found enhanced caregivers' perception of quality in the IMPU arm when compared with care as usual.

## DISCUSSION

In this review, we found that most of the IMPUs were psych-med units in a university or teaching hospital. Most of these units had medium medical and psychiatric acuity capabilities. Patients with acute medical care needs and patients who pose a danger to themselves or others were often excluded from these units.

IMPUs in hospitals serve patients who cannot be treated satisfactorily on a general medical floor and often have extensive hospital LOS. IMPUs also aim to improve patient-related and economic outcomes by better addressing medical and psychiatric patient needs. From an educational perspective, IMPUs provide an excellent training environment for medical students and medical and psychiatric resident physicians. Finally, treatment in a medical setting has the potential to improve patient acceptance and reduce stigma.

Age significantly determined the population focus of the IMPUs, but the broad range of medical conditions for which patients are treated did not. The considerable variation in LOS we found here likely indicates differences in the patient populations served and in the treatments delivered, reflecting this widely disparate group of studies. For instance, psychiatric treatment approaches reported in the studies included "short stay crisis intervention," "focus on process-oriented psychotherapeutic and milieu treatment," "treatment as long as there is high acuity combined illness," and "long stay." As reporting on processes is scarce, the actual operation of IMPUs largely remains a black box (71).

The relationships among aims, structural and process characteristics, and outcomes of IMPU stays remained undefined in many of the included articles. Thus, these reports provided a low quality of evidence, mainly focused on patients' LOS, and were far from conclusive in regard to the cost-effectiveness of IMPU designs. Although LOS is often used as a proxy measure for cost-effectiveness, it should mainly be seen as a process measure that is influenced by the structural and process characteristics of hospital systems. Other intended outcomes were infrequently reported. Notably, the only moderate-quality study (53) we identified in our search evaluating an acute geriatric ward with added mental health personnel and training in person-centered dementia care reported no difference in the number of days spent at home between an IMPU stay and standard care. However, the accompanying economic evaluation (70) found that care on their studied IMPU was cost-effective relative to standard care. We conclude that, in line with the findings of a previous review by Hussain and Seitz (15), further studies are needed to evaluate the effect of IMPUs on patient outcomes and costs of care.

### IMPU Types

The findings of this review reveal that a classification based on IMPU types provides information on the units' origin and

embedding. Although they were not strictly IMPUs, we chose to include nonsegregated units because one could think of "nursing in a shared environment" as one end of the integration spectrum and combined units as the other end (i.e., full integration). Mixed or dually trained nursing staff, cross-training, and the active involvement of both medical and psychiatric physicians are typically in place for reaching medium-to-high medical and psychiatric acuity capabilities, in line with findings by Kathol et al. (12). In addition to staffing, medical and psychiatric exclusion reasons and population focus were important determinants of medical and psychiatric acuity capabilities.

Because we followed an inductive approach relying on each study's empirical data, we did not apply Kathol et al.'s (13) categorization of medical-psychiatry units in the data synthesis. On the basis of median medical and psychiatric acuity capabilities, however, the findings of this review suggest that type III units (13, 65), which provide care for patients with low to high psychiatric acuity as well as medium medical acuity, are the most prevalent type among IMPUs. Kathol et al.'s (13) definition of type III units, however, precludes unit embedding outside general medical hospitals because emergency physician coverage and staff training are then much more difficult to provide. We nevertheless found IMPUs with medium medical acuity capabilities located outside the main center of general medical hospitals. Furthermore, seven units had no acute medical capabilities, psychiatric capabilities, or both. One may conclude that in the current health care environment, nongeneral medical hospital units or those without acute discipline-specific capabilities would no longer be included among those calling themselves IMPUs.

Some authors rightly point to the tension between acute medical care and maintaining process-oriented (psychiatric) treatment conditions, such as the therapeutic milieu and delivery of psychotherapeutic interventions. The discussion about the interactions between acute medical care and process-oriented treatment continues. An IMPU, for instance, might exclude or transfer patients whose medical or psychiatric conditions become too acute. However, it might be undesirable to exclude from IMPUs patients with severe mental illness because of general medical causes, because these patients might benefit most from integrated care (5, 16). Solutions to these challenges are the flexible use of extra staff and allowing IMPUs to welcome a differentiated population and focus on acuity.

Location and financing also determine medical acuity capabilities. Some psych-med units were not located closely to other medical or surgical units and to those having medical testing, intervention, and consultation capabilities. This physical distance complicates collaboration among medical specialists. Further, psychiatric payor-financed IMPUs might not be financially profitable because of underpayment of acute medical care, unless patients are transferred to medical units for general medical needs. Of course, this transfer defeats the interdisciplinary purpose of psych-med units. As a result,

psych-med units having a segregated psychiatric payment system will need to be rededicated as med-psych units so that medical payors cover the total cost for treating patients with complex conditions (12).

### Maximizing Value

This review found few data on the cost-effectiveness of IMPU designs. Nevertheless, some proposals for cost-effectiveness can be formulated. Kathol et al. argued that medical-psychiatric units should primarily serve patients with complex conditions to maximize health system value and that these patients often have severe and acute (i.e., high-acuity) medical and psychiatric illnesses (12). For these patients, proactive psychiatric consultation-liaison teams in standard general medical health settings are insufficient (12). Relatively simple ways to improve the acuity capabilities of many low-to-medium acuity IMPUs to serve patients with complex conditions better would be active involvement of both psychiatric and medical staff on a single medical unit for patients with comorbid psychiatric and general medical conditions, cross-training of nursing staff, and a focus on acute general medical and psychiatric care capabilities.

However, the studies included here did not contain much information on facility design. Kathol et al. advised on the implementation of facility design (12, 13, 72). Most IMPUs focus primarily on patients with mood disorders. In the future, IMPUs should put greater emphasis on other psychiatric patient groups with significantly increased mortality rates due to illnesses such as delirium, schizophrenia spectrum disorders, substance use disorders, and severe somatic symptom disorders. To further improve value, consideration should be given to what medical and psychiatric care could be replaced by integrated outpatient care (16, 73). At the upper end of the acuity spectrum, clinical experience suggests that IMPUs for high-acuity patients might prevent critical care unit admission, for instance, of severely agitated patients.

From the patient's perspective, their functioning, quality of life, and care continuity are essential goals (74). These aims can often be pursued in a unit with both general medical and psychiatric capabilities, including process-oriented treatment and resocialization. From the perspective of hospitals and insurers, an IMPU should treat patients who have disruptive behavior, thereby better facilitating medical treatment, relieving the referring wards, and potentially shortening LOS and reducing readmissions (16). A short-stay medical-psychiatric unit can achieve these outcomes. Such units admit patients with the most severely disruptive behavior while sending patients with less severe disruptive behavior back to their referring wards. Although specialization of IMPUs might be feasible in some densely populated regions, other regions will need design compromises that would reflect regional needs and alternative facilities available in the local health care network (75). Because patient acuity levels tend to fluctuate (13), some IMPUs may be designed such that they promote care continuity to avoid back-and-forth patient referrals.

### Lessons From Integrated Care

The current conceptualization of IMPUs mainly focuses on clinical and horizontal integration of psychiatric and medical services within hospitals. To improve long-term outcomes, integration across primary, community, hospital, and tertiary care services (i.e., vertical integration) might also be promising (76). Such a development would involve other critical elements of integrated care, such as a single point of entry, continuity of care, health promotion and (proactive) prevention, a participatory approach (including shared decision making), case management, training of professionals, risk stratification, and information sharing (74, 77, 78).

### Limitations

Many of the studies included were published >10 years ago, limiting the validity of their findings for present-day IMPUs. The included papers contained limited information on the context of IMPUs, including funding. Therefore, we could not make firm evidence-based statements on the influence of any contextual factors. Furthermore, this review's external validity might have been limited by the overrepresentation of studies done in the United States, university and teaching hospital settings, and psych-med units, as opposed to med-psych or combined units. The extent to which the units included reported structural and procedural characteristics varied widely, which might have introduced a negative bias for units with sparse reporting of acuity capabilities. Besides, the classification scale used to estimate acuity capabilities is coarse and has not been validated. Several of the included studies did not contain enough information to enable statements about the actual acuity of the patients treated in each unit. Although we could classify most included studies, many described medical and psychiatric acuity capabilities in insufficient detail. Many of the included papers offered advice on setting up or running an IMPU, but summarizing these suggestions and guidelines was beyond the scope of this review.

### Future Directions

We encourage future studies to explicitly describe the aims, population focus, staffing model, medical and psychiatric exclusion criteria, and population focus of IMPUs (75). Outcome measures related to the top 5 aims of IMPUs deserve much more attention. Reporting of patient-related outcomes and values for the hospital and the health system over more extended periods is needed (16). Research into the costs of various IMPU models in relation to their patient populations' morbidity can advance the necessary understanding of these models' cost-effectiveness. Furthermore, research into staff development, such as dual training of physicians, deployment of advanced practice providers, and cross-training methods, is also needed. Eventually, the contextual factor of funding should promote evidence-based IMPU designs and operation. Policy makers could contribute by designing and promoting integrated financial arrangements that promote enhanced medical acuity capabilities. In the United States, especially psych-med units might benefit from such arrangements.

## CONCLUSIONS

Most of the IMPUs reported in the studies included in this review were organized under psychiatric licensure (psych-med units) and some under medical auspices (med-psych units). Their staffing models corresponded to their psychiatric or medical origins and significantly influenced their acuity capabilities. Most had medium psychiatric and medical acuity capabilities. These units can improve their acuity capabilities by introducing compulsory admission capabilities and qualified psychiatric, medical, and nursing staff involvements. IMPUs have the potential to improve patient health and economic outcomes; however, the studies identified in our review provided little information about the cost-effectiveness of the IMPUs studied. Additional well-designed research in this area is needed to clarify the relationship between IMPU designs and clinical and economic outcomes.

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The authors thank Dr. Richard G. Brooks for manuscript editing.

The authors report no financial relationships with commercial interests. Received June 5, 2020; revisions received November 27, 2020, and February 5, 2021; accepted March 6, 2021; published online August 19, 2021.

## REFERENCES

- Šprah L, Dernovšek MZ, Wahlbeck K, et al: Psychiatric readmissions and their association with physical comorbidity: a systematic literature review. *BMC Psychiatry* 2017; 17:2
- Goodell S, Druss BG, Walker ER, et al: *Mental Disorders and Medical Comorbidity*. Princeton, New Jersey, Robert Wood Johnson Foundation, 2011
- Weichert I: The prevalence and impact of psychiatric comorbidity in inpatients admitted to a district general hospital in England: a 1-week cross-sectional study. *J R Coll Physicians Edinb* 2019; 49:237–244
- Kathol R, Saravay SM, Lobo A, et al: Epidemiologic trends and costs of fragmentation. *Med Clin North Am* 2006; 90:549–572
- Firth J, Siddiqi N, Koyanagi A, et al: The Lancet Psychiatry Commission: a blueprint for protecting physical health in people with mental illness. *Lancet Psychiatry* 2019; 6:675–712
- Jansen L, van Schijndel M, van Waarde J, et al: Health-economic outcomes in hospital patients with medical-psychiatric comorbidity: a systematic review and meta-analysis. *PLoS One* 2018; 13:e0194029
- Chan AC, Burke CA, Coffey EM, et al: Integrated inpatient medical and psychiatric care: experiences of 5 institutions. *Ann Intern Med* 2018; 168:815–817
- Eytan A, Bovet L, Gex-Fabry M, et al: Patients' satisfaction with hospitalization in a mixed psychiatric and somatic care unit. *Eur Psychiatry* 2004; 19:499–501
- Alberque C, Gex-Fabry M, Whitaker-Clinch B, et al: The five-year evolution of a mixed psychiatric and somatic care unit: a European experience. *Psychosomatics* 2009; 50:354–361
- van Schijndel MA, Jansen LAW, van de Klundert JJ: Empirical types of medical psychiatry units. *Psychother Psychosom* 2019; 88:127–128
- Fogel BS, Stoudemire A, Houpt JL: Contrasting models for combined medical and psychiatric inpatient treatment. *Am J Psychiatry* 1985; 142:1085–1089
- Kathol RG, Kunkel EJ, Weiner JS, et al: Psychiatrists for medically complex patients: bringing value at the physical health and mental health/substance-use disorder interface. *Psychosomatics* 2009; 50:93–107
- Kathol RG, Harsch HH, Hall RC, et al: Categorization of types of medical/psychiatry units based on level of acuity. *Psychosomatics* 1992; 33:376–386
- Donabedian A: The quality of care: how can it be assessed? *JAMA* 1988; 260:1743–1748
- Hussain M, Seitz D: Integrated models of care for medical inpatients with psychiatric disorders: a systematic review. *Psychosomatics* 2014; 55:315–325
- Kathol RG: Cost outcomes on a medical psychiatry unit. *J Psychosom Res* 2010; 68:293–294
- Moher D, Liberati A, Tetzlaff J, et al: Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Ann Intern Med* 2009; 151:264–269, W64
- von Rad M, Sellschopp A: The integrated psychosomatic inpatient unit: a new approach to hospital medical care. *Psychother Psychosom* 1987; 48:101–109
- Balslem H, Helfand M, Schünemann HJ, et al: GRADE guidelines: 3. rating the quality of evidence. *J Clin Epidemiol* 2011; 64:401–406
- Arie T, Dunn T: A “do-it-yourself” psychiatric-geriatric joint patient unit. *Lancet* 1973; 2:1313–1316
- Freeberg S, Kiner D, Walker B: Nursing care in a combined adolescent medical-psychiatric unit. *J Psychiatr Nurs Ment Health Serv* 1976; 14:13–15
- Pitt B, Silver CP: The combined approach to geriatrics and psychiatry: evaluation of a joint unit in a teaching hospital district. *Age Ageing* 1980; 9:33–37
- Markoff RA, Yano BS, Hsu J, et al: The mixed medical-psychiatric unit: an alternative approach to inpatient psychiatric care. *Hosp Community Psychiatry* 1981; 32:561–564
- Morgan DM, Withersty DJ: Patient acceptance of an integrated psychiatric/medical unit. *W V Med J* 1981; 77:114–115
- Koran LM, Barnes LEA: The Stanford comprehensive medicine unit: integrating psychiatric and medical care. *New Dir Ment Health Serv* 1982; 1982:61–73
- Shemo JP, Ballenger JC, Yazel JJ, et al: A conjoint psychiatry-internal medicine program: development of a teaching and clinical model. *Am J Psychiatry* 1982; 139:1437–1442
- Stoudemire A, Brown JT, McLeod M, et al: The combined medical specialties unit: an innovative approach to patient care. *N C Med J* 1983; 44:365–367
- Hoffman RS: Operation of a medical-psychiatric unit in a general hospital setting. *Gen Hosp Psychiatry* 1984; 6:93–99
- Goodman B: Combined psychiatric-medical inpatient units: the Mount Sinai model. *Psychosomatics* 1985; 26:179–182
- Muqtadir S, Hamann MW, Molnar G: Management of psychotic pregnant patients in a medical-psychiatric unit. *Psychosomatics* 1986; 27:31–33
- Young LD, Harsch HH: Inpatient unit for combined physical and psychiatric disorders. *Psychosomatics* 1986; 27:53–60
- White EM: The use of a medical support group on a medical/psychiatric unit. *Issues Ment Health Nurs* 1988; 9:353–362
- Harsch HH, LeCann AF, Ciaccio S: Treatment in combined medical psychiatry units: an integrative model. *Psychosomatics* 1989; 30:312–317
- Kathol RG, Krummel S, Shakespeare A: Psychiatry and internal medicine resident education in an acute care medical-psychiatry unit. *Gen Hosp Psychiatry* 1989; 11:23–30
- Kiernan K, Stoudemire A: Occupational therapy program development for medical-psychiatry units: a cognitive model. *Gen Hosp Psychiatry* 1989; 11:109–118

36. Bruns W, Stoudemire A: Development of a medical-psychiatric program within the private sector: potential problems and strategies for their resolution. *Gen Hosp Psychiatry* 1990; 12:137-147
37. Kahan BB, Sexson SB: Organization and development of pediatric medical-psychiatric units. Part II: clinical management issues. *Gen Hosp Psychiatry* 1991; 13:391-398
38. Sexson SB, Kahan BB: Organization and development of pediatric medical-psychiatric units. Part I: administrative, financial, and political issues. *Gen Hosp Psychiatry* 1991; 13:296-304
39. Stoudemire A, Hill CD, Morris R, et al: The medical-psychiatric unit as a site for outcome research in dementia/depression syndromes. *Psychiatr Med* 1991; 9:535-544
40. Buckley P, Freyne A, Walshe N: The medical-psychiatry unit: a pilot study of conjoint care within an Irish general hospital. *Psychosomatics* 1994; 35:515-519
41. Raney D, Siegel CH: An adolescent psychiatric unit for difficult medical patients. *Child Psychiatry Hum Dev* 1994; 25:109-124
42. Campo JV, Raney D: The pediatric medical-psychiatric unit in a psychiatric hospital. *Psychosomatics* 1995; 36:438-444
43. Porello PT, Madsen L, Futterman A, et al: Description of a geriatric medical/psychiatry unit in a small community general hospital. *J Ment Health Adm* 1995; 22:38-48
44. Trappler B, Greenberg S, Friedman S: Treatment of Hassidic Jewish patients in a general hospital medical-psychiatric unit. *Psychiatr Serv* 1995; 46:833-835
45. Farragher B, Walsh N: Joint care admissions to a psychiatric unit: a prospective analysis. *Gen Hosp Psychiatry* 1998; 20:73-77
46. Fennig S, Fennig S: Management of encopresis in early adolescence in a medical-psychiatric unit. *Gen Hosp Psychiatry* 1999; 21:360-367
47. Fennig S, Fennig S: Diagnostic delays and dilemmas. Management of affected patients in the psychiatric inpatient unit of a general children's hospital. *Gen Hosp Psychiatry* 1999; 21:122-127
48. Protheroe D, House A: In-patient liaison psychiatry in the UK: a neglected option for improving the psychiatric care of medical patients. *Psychiatr Bull* 1999; 23:525-527
49. Chang CM, Lee Y, Lee Y, et al: Predictors of readmission to a medical-psychiatric unit among patients with minor mental disorders. *Chang Gung Med J* 2001; 24:34-43
50. Fennig S, Fennig S, Roe D: Physical recovery in anorexia nervosa: is this the sole purpose of a child and adolescent medical-psychiatric unit? *Gen Hosp Psychiatry* 2002; 24:87-92
51. Astell AJ, Clark SA, Hartley NT: Predictors of discharge destination for 234 patients admitted to a combined geriatric medicine/old age psychiatry unit. *Int J Geriatr Psychiatry* 2008; 23:903-908
52. Hanna SJ, Woolley R, Brown L, et al: The coming of age of a joint elderly medicine-psychiatric ward: 18 years' experience. *Int J Clin Pract* 2008; 62:148-151
53. Harwood RH, Goldberg SE, Whittamore KH, et al: Evaluation of a Medical and Mental Health Unit compared with standard care for older people whose emergency admission to an acute general hospital is complicated by concurrent 'confusion': a controlled clinical trial. Acronym: TEAM: Trial of an Elderly Acute care Medical and mental health unit. *Trials* 2011; 12:123
54. Dekker L, Heller HM, van der Meij JE, et al: A mixed psychiatric and somatic care unit for trauma patients: 10 years of experience in an urban level I trauma center in the Netherlands. *Eur J Trauma Emerg Surg* 2020; 46:1159-1165
55. Stoudemire A, Kahn M, Brown JT, et al: Masked depression in a combined medical-psychiatric unit. *Psychosomatics* 1985; 26:221-224, 7-8
56. Moss GR, James CR: Pilot study of a behavioral medicine program in a community hospital setting. *J Behav Ther Exp Psychiatry* 1986; 17:3-9
57. Withersty DJ, Shemo JP, Waldman RH, et al: Evaluating a conjoint psychiatric-medical inpatient unit—a one year follow-up study of depressed patients. *J Clin Psychiatry* 1980; 41:156-158
58. Fava GA, Wise TN, Molnar G, et al: The medical-psychiatric unit: a novel psychosomatic approach. *Psychother Psychosom* 1985; 43:194-201
59. Fogel BS: A psychiatric unit becomes a psychiatric-medical unit: administrative and clinical implications. *Gen Hosp Psychiatry* 1985; 7:26-35
60. Molnar G, Fava GA, Zielezny MA: Medical-psychiatric unit patients compared with patients in two other services. *Psychosomatics* 1985; 26:193-195
61. Young LD, Harsch HH: Length of stay on a psychiatry-medicine unit. *Gen Hosp Psychiatry* 1989; 11:31-35
62. Swenson JR, Mai FM: A Canadian medical-psychiatric inpatient service. *Can J Psychiatry* 1992; 37:326-334
63. Gertler R, Kopec-Schrader EM, Blackwell CJ: Evolution and evaluation of a medical psychiatric unit. *Gen Hosp Psychiatry* 1995; 17:26-31
64. Nomura S, Shigemura J, Nakamura M, et al: Evaluation of the first medical psychiatry unit in Japan. *Psychiatry Clin Neurosci* 1996; 50:305-308
65. Kishi Y, Kathol RG: Integrating medical and psychiatric treatment in an inpatient medical setting. The type IV program. *Psychosomatics* 1999; 40:345-355
66. Maier AB, Wächtler C, Hofmann W: Combined medical-psychiatric inpatient units: evaluation of the Centre for the Elderly. *Z Gerontol Geriatr* 2007; 40:268-274
67. Leue C, Driessen G, Strik JJ, et al: Managing complex patients on a medical psychiatric unit: an observational study of university hospital costs associated with medical service use, length of stay, and psychiatric intervention. *J Psychosom Res* 2010; 68:295-302
68. Goldberg SE, Bradshaw LE, Kearney FC, et al: Care in specialist medical and mental health unit compared with standard care for older people with cognitive impairment admitted to general hospital: randomised controlled trial (NIHR TEAM trial). *BMJ* 2013; 347:f4132
69. Spencer K, Foster P, Whittamore KH, et al: Delivering dementia care differently—evaluating the differences and similarities between a specialist medical and mental health unit and standard acute care wards: a qualitative study of family carers' perceptions of quality of care. *BMJ Open* 2013; 3:e004198
70. Tanajewski L, Franklin M, Gkountouras G, et al: Economic evaluation of a general hospital unit for older people with delirium and dementia (TEAM randomised controlled trial). *PLoS One* 2015; 10:e0140662
71. Guthrie E, McMeekin A, Thomasson R, et al: Opening the 'black box': liaison psychiatry services and what they actually do. *BJPsych Bull* 2016; 40:175-180
72. Hall RC, Kathol RG: Developing a level III/IV medical/psychiatry unit. Establishing a basis, design of the unit, and physician responsibility. *Psychosomatics* 1992; 33:368-375
73. Bell C, Fredberg U, Schlünsen ADM, et al: Converting acute inpatient take to outpatient take with fast-track assessment in internal medicine wards—a before-after study. *BMC Health Serv Res* 2019; 19:346
74. van Schijndel MA, Caarls PJ, van Wijngaarden JDH, et al: Identifying value-based quality indicators for general hospital psychiatry. *Gen Hosp Psychiatry* 2018; 55:27-37
75. Caarls PJ, van Schijndel MA, Berk GVD, et al: Factors influencing the admission decision for medical psychiatry units: a concept mapping approach. *PLoS One* 2019; 14:e0221807
76. Goodwin N: Understanding integrated care. *Int J Integr Care* 2016; 16:6
77. Struckmann V, Leijten FRM, van Ginneken E, et al: Relevant models and elements of integrated care for multi-morbidity: results of a scoping review. *Health Policy* 2018; 122:23-35
78. Leue C, van Schijndel M, Keszthelyi D, et al: The multi-disciplinary arena of psychosomatic medicine—time for a transitional network approach. *Eur J Psychiatry* 2020; 34:63-73