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Abstract

Adolescent mental health research is a developing area. Inpatient units are the most widely used acute element of adolescent mental health services internationally. Little is known about inpatient units, particularly when it comes to measuring improvement for adolescents. Clinical outcome measurement in the broad context has gathered momentum in recent years, driven by the need to assess services. The measurement of outcomes for adolescents who access inpatient care is critical, as they are particularly vulnerable and are often considered the most difficult to treat. The aim of this review was to assess if adolescent inpatient units are effective and understand how outcomes are measured. CINAHL, MEDLINE with Full Text, ERIC, PsychINFO and Cochrane databases were systematically searched. Studies were included if the inpatient units were generic and adolescents were between the mean age of 12-25 years. Furthermore, studies published in English within the last ten years were included. Exclusions were outpatient and disorder specific inpatient settings. A total of 16 studies were identified. Each study demonstrated effectiveness on at least one outcome measure in terms of symptom stabilisation. However, several outcome measures were used and therefore inpatient units lack consistency in how they measure improvement. Inpatient units are effective for the majority of young people as they result in symptom stabilisation. Whilst symptom stabilisation can be achieved, future research examining the mechanism of change is needed.

Introduction

Globally, mental illness among adolescents is a critical health concern. The majority of mental health problems have their peak period of incidence during adolescence (Merikangas et al., 2009; Rickwood et al., 2015). Approximately one in five adolescents experience serious mental health problems, accounting for an estimated 13% of the total

burden of disease (World Health Organization, 2013). Suicide is the second leading cause of mortality among young people between the ages of fifteen to twenty-nine (World Health Organization, 2014). Furthermore, adolescents experiencing mental health problems are more likely to have suicidal thoughts or engage in suicidal ideation (Allen and McKenzie, 2015; Vander Stoep et al., 2009). Given the vulnerability of this population, it is no surprise that admissions to Inpatient Units (IPUs) are often required.

IPUs are used for symptom stabilisation in the event of psychiatric crisis (Goldman et al., 1998; Tharayil et al., 2012). IPU admissions often occur when adolescents and their caregivers are unable to manage the young person's mental health symptoms at home. Consequently, more intense professional support is required (Sadock et al., 2007; Smith et al., 2015). According to Kronstrom et al. (2016), adolescents being treated in IPUs are considered to be the most distressed in society. As well as having severe mental health disorders, they often have psychosocial risk factors and a history of traumatic life events (Case et al., 2007). Adolescent IPUs introduce intensive interventions for complex disorders over a defined period (Green and Worrall-Davies, 2009). These IPU interventions are often associated with high costs, particularly when clients are admitted for several weeks or months. Consequently, it is important to establish the effectiveness of adolescent IPUs, not only in terms of cost effectiveness, but more importantly, to establish the outcomes for young people and their families.

As mental health demands increase, many inpatient services have been encouraged to reduce costs with a parallel pressure to measure outcomes and effectiveness (Hall et al., 2014). In terms of this review, positive outcomes are related to sustained health improvement of young people. The demand for evidence-based practice (EBP) underpins the need to examine valid and reliable outcome measures, which capture changes in symptoms, functioning and determine effectiveness within the context of short-term interventions (Tharayil et al., 2012; Koch et al., 1998). Measuring this change and assessing outcomes provides an evaluation of the service as a whole, as well as highlighting areas for improvement (Yuan, 2015). Whilst this is undoubtedly important, it's perceived difficult to implement and measure outcomes. It is difficult to measure outcomes in IPU settings, particularly when admitting different types of

adolescents with various clinical problems and at various time-points. In addition, every IPU is different in terms of typical length of stay (LOS), admission policies, organisational cultures and types of interventions offered. There is a significant time constraint on what can be offered, particularly for short stays of 1-7 days. Each IPU will have a unique model of care, whether it is designed to provide safety and containment within 1-7 days, or perhaps more long term therapy provided within 6-8 weeks. Either way, an inpatient admission is a critical point in a person's life and it is crucial that clinicians and researchers understand how effective they are.

One key paper by Pfeiffer and Strzelecki (1990) reviewed outcome studies for adolescents in IPU treatment. The review examined the literature from 1975- 1990 and included the results of 34 studies. These papers included children (n=6), adolescents (n=17) and combined children and adolescents (n=11). Studies consisted of both qualitative and quantitative data. 23 studies were designed as post-discharge (follow-up), and the remaining 11 examined patient status at the time of discharge. This review combined follow-up and outcome. Results found that inpatient admissions were often beneficial, particularly if a specialised treatment program and aftercare were available. This review found only four studies, which examined various aspects of inpatient interventions, such as therapeutic alliance, planned discharge, completion of treatment program and the efficacy of a cognitive-based problem-solving skills training package (Gossett et al., 1977; John F. Clarkin et al., 1987; Kazdin et al., 1987; White et al., 1979). In all four studies, these interventions yielded positive outcomes and predicted a favourable post-discharge status. In terms of aftercare, only four studies were found reporting the relationship of aftercare and the post-discharge environment to outcome (Cohen-Sandler et al., 1982; Gossett et al., 1977; Koret, 1980; Stewart and Leone, 1978). All four found a strong positive association. Furthermore, the study found that clients with less symptom severity had more favourable outcomes. Age and sex were not associated with favourable outcomes, and IQ and LOS yielded only a modest relationship to outcome.

Similarly to the previous key paper, Blanz and Schmidt (2000) cautiously convey that inpatient admissions can be beneficial, especially when special aspects of treatment

interventions are fulfilled. These include those outlined previously, which include positive therapeutic alliance, planned discharge, completion of a cognitive-based problem-solving skills training package and aftercare. Healthier clients have more desirable outcomes, particularly those with adequate intelligence, later onset of symptoms and non-psychotic diagnoses. Poor family functioning was considered to be an important factor in the outcome of hospitalised adolescents. However, the review found methodological limitations for several studies, making interpretation of results challenging. Lack of research relating to LOS and outcome information was outlined, as well as factors influencing decisions to admit adolescents to IPUs.

Finally, descriptions of models of care in IPU settings remains complex and somewhat mysterious. In the absence of this information, researchers and clinicians alike are unable to distinguish the relationships between a particular model of care and certain outcome variables. Consequently, future studies need to characterise the key components of successful IPU treatment and identify those who respond favourably. In order for this to occur, there needs to be more clarity in relation to how outcomes are measured for young people.

Research in this area is accumulating, however, to the researcher's knowledge, no systematic reviews have been conducted in the last sixteen years. Given that adolescent IPUs would have changed during this time, there is limited up-to-date research to draw any firm conclusions on the effectiveness of IPUs. To address this research gap and update current practice, the main aim of this review was to assess if generic adolescent IPUs are effective. A secondary aim was to understand ways in which outcomes are measured and what domains are measured.

Methods

This review utilised the PICOT (population, intervention, control/comparison, outcomes and time) format to frame the research question. A search was undertaken to identify relevant literature pertaining to adolescents, IPUs, mental health and treatment outcomes. Searches of CINAHL (Cumulative Index to Nursing and Allied Health), MEDLINE (Medical Journals), ERIC (Education Resources Information Center),

PsychINFO and Cochrane were undertaken. The literature search was limited to studies from the January 2006 to June 2017. The years were limited to ensure the review was based on contemporary practice in adolescent IPUs. Search terms consisted of five concepts, which included adolescent, inpatient, mental health setting, treatment outcome and change (see Table 1). Searches were based on article titles, abstracts, subjects and further studies were selected through hand searching the references of relevant studies and reviews. Articles considered for inclusion were randomly double screened by a co-author. The search methodology and reported results adhere to the relevant sections of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. The review was retrospectively registered with the International Prospective Register of Systematic Reviews (PROSPERO).

Insert Table 1 Here

Table 1 Search Strategy

Inclusion Criteria

- The setting is a generic adolescent inpatient unit.
- Mean age of participants between 12 and 25.
- Written in English with full text available.
- Published between 2006 and 2017.
- Qualitative and Quantitative Studies.

Exclusion Criteria

- Disorder specific settings (Eg. Eating Disorder units, substance abuse units, Bipolar Disorder units, psychosis units, Post-Traumatic Stress Disorder units).
- Community, outpatient and/or forensic settings.
- Intellectual disability population.

Data Extraction

Following the initial search, duplicates were removed. Titles and abstracts were then screened for excluded studies and consequently removed. Once potential relevant articles were identified, the first author inspected these against eligibility criteria for inclusion. Figure 1 illustrates the PRISMA flow diagram for inclusion. Data extraction was undertaken from included articles and the following variables were entered into a spreadsheet: age, gender, ethnicity, socioeconomic status, country, diagnoses, sample size, research design, setting, treatment outcomes and follow-up time.

Insert Figure 1 here

Fig. 1 PRISMA flow diagram of systematic search procedures, yielding 16 quantitative studies

Results

Search Results

Despite including qualitative studies in the search strategy, 16 quantitative studies were identified relating to adolescent mental health treatment outcome measurement in generic IPUs (see Figure 1). The studies examined mental health treatment outcomes following episodes of inpatient care. The studies predominantly utilised empirical, prospective cohort research designs. Three studies adopted retrospective designs, whilst two were national outcome studies and a quality improvement project. Outcomes were rated from a range of perspectives including clients, caregivers and clinicians. Whilst some studies investigated one single adolescent IPU, others depicted results from several units. One study examined treatment outcomes for persons with and without intellectual disabilities. For the purpose of this review and in line with our exclusion criteria, results are reported only on those without intellectual disabilities. None of the identified studies used control groups.

Description of Studies and Settings

The details of the included studies are presented in Table 2. The majority of studies were from the US (n=4) and the UK (n=4). Two studies were from Australia and one

from New Zealand, whilst the remaining were from Canada, Japan, Turkey, Switzerland and Norway. Twelve studies presented single IPUs, whilst the remaining included multiple units. Of those who reported, the number of inpatient beds at each IPU ranged from 6 beds to 110, with the lowest from a single IPU in the UK and the latter from a single IPU in the US. Of ten studies which reported on attached services, five had attached outpatient services, whilst five had attached schools. One of these studies had both outpatient services and a school. The inpatient admission inclusion criteria was outlined in five studies. These included the following: a diagnosis of at least one DSM-IV[1] Axis 1 disorder, acute suicidal thoughts, psychosis, severe PTSD and anxiety. Another study described severe hyperactivity, violence to self or others, whilst another was imminent threat to harm self or others. Two studies outlined exclusion criteria for inpatient admissions. Those who were excluded were clients with a conduct disorder alone, intellectual disability, Eating Disorders or substance abuse. In terms of staff, nine studies described that the unit/s were staffed by the multi-disciplinary team (MDT). The type of treatment intervention/s provided at each setting were not described in seven studies. Of those, which did report, treatment interventions consisted of the following: Milieu Therapy, Individual and Group Psychotherapy, Psychoeducation, Family Therapy, Music Therapy, Recreational and Sporting Activities. Other interventions included illness and self-awareness education, anger and stress management, problem solving, medication as prescribed and artistic activities. In terms of treatment provided, school related activities were described in a number of studies (n=4).

Insert Table 2 Here

Table 2 List of Included Studies and Key Characteristics

Details of *Adolescent Participants' Characteristics*

The majority of participants were females (87.5%) and mood disorders (62.5%) were the most common primary diagnoses of adolescents. LOS varied considerably between each IPU ranging from lowest mean of 4 days to the highest mean of 335.4 days. The voluntary versus involuntary admission status of adolescents were not mentioned in

[1] Diagnostic and Statistical Manual of Mental Disorders. 4th Edition.

thirteen studies. For those studies that did report on status, all three reported that the majority in each IPU were admitted voluntarily.

Details of Outcome Measures

Each study utilised a variety of assessment tools to measure different outcomes (see Table 3). The most frequently cited measures included the Health of the Nation Outcomes Scale for Children and Adolescents (HoNOSCA) (n=7), Children's Global Assessment Scale (CGAS) (n=4), Youth Self Report (YSR) (n=3), Children's Depression Inventory (CDI) (n=3) and the Global Assessment of Functioning (GAF) (n=2). The domains which were measured mainly consisted of the following: various areas of functioning, relationships, symptom severity related to depression, anxiety, psychosis and mania, as well as risk factors. Other domains included internalising and externalising problems as well as academic abilities. All of the studies utilised clinician reports, nine included client reports in addition to clinicians, whilst three included caregivers, as well as clients and clinicians. In terms of timing, thirteen studies measured outcomes on admission and discharge. Only one study measured outcomes at the time of agreeing to be admitted, admission, discharge and one year post discharge. Three studies examined some outcomes at admission, during treatment and discharge. During treatment included 4 weeks after admission (Green et al., 2007), 14 days after admission (Greenham and Bisnaire, 2008) and the remaining study did not indicate the time-points (Herdzik, 2009).

Insert Table 3 Here

Table 3 Descriptions of Included Outcome Measures, Domains Measured, Reporters, Follow-Up Times and Improvement Values

Discussion

We have systematically identified and appraised the studies with the aim to understand if generic adolescent IPUs are effective. A secondary outcome was to assess how adolescent treatment outcomes are measured and what domains are measured.

In terms of how adolescent treatment outcomes are measured, each IPU utilized various outcome measures, at various times and with various reporters. Therefore, IPUs are inconsistent with measuring outcomes, thus limiting reliable comparisons to be made with other adolescent populations and services. The absence of set routine outcome measures in IPU settings indicate the diversity between each setting, their clientele and what domains are a priority. One needs to consider whether outcome measures for each IPU are selected based on available resources rather than measures designed specifically for IPU settings. For instance, HoNOSCA was commonly used in several studies. One item of this scale measures school attendance, yet most adolescents will not be attending school during an inpatient admission. Therefore, scores on discharge could be considered irrelevant, as the client was admitted during the rating period and thus could not attend school. Ideally, IPUs should measure a multitude of domains, as the needs of clients are varied. Measures need to be chosen based on the unique needs of the population utilising the IPU. Furthermore, measures should be adopted, which specifically measure the impact of adolescent IPU treatment. Mental health care, unlike physical care, does not have consistent measures available to reliably monitor client health and alert clinicians to negative responses to treatment (Newnham et al., 2010). This creates significant concerns for those who are engaged in treatment. Although there is no fixed pattern of change for all clients, monitoring progress provides clinicians with the opportunity to improve mental health outcomes in real time for the benefit of each particular young person (Lambert et al., 2005; Lutz, 2003; Lutz et al., 2009).

Discharging from an IPU can create a variety of emotions for adolescents. Whilst some may be keen to leave, others may experience anxiety at the thought of leaving a containing environment. Others might experience anger as a result of feeling abandoned or rejected. With this in mind, these emotions are likely to influence self-reports. A number of client-rated measures indicated smaller effect sizes than clinicians. One could argue which report is more accurate, as clinicians could be subject to performance bias. **Only one of the included studies examined outcomes one year post discharge.** This study found that positive outcomes were sustained for the majority of adolescents one-year post discharge. The ‘cooling off’ period between discharge and one year post-

discharge could remove the raw emotions surrounding discharge, thus producing more reliable findings.

In terms of effectiveness, most of the studies found clinically and statistically significant benefits for the majority of clients across various domains. However, each IPU would have had various client cohorts depending on countries and regions, admission policies, organisational cultures and varying LOS. For instance, Setoya et al. (2011) had a LOS of 11 months. This is a considerable length of time for a hospital admission and one would expect some improvement across this time. However, regardless of LOS, changes in symptom severity were found from admission to the follow-up time point for a number of studies. For instance, despite a short LOS of 4 or 6 days, clients improved (Barnes, 2009; Greenham and Bisnaire, 2008). Guvenir et al. (2009) suggest a dosage effect where exposure to admission is an active ingredient in change. Few studies explore this further and in the absence of Randomized Controlled Trials (RCTs) or follow-up data post discharge, it is difficult to determine. In addition, one needs to question whether each outcome measurement assessment in mental health is an intervention in itself.

Quality of Evidence

In terms of sample size, there were 6 studies with a sample of less than 100, which could be considered small. Only 50% (n=8) of studies described the selection criteria for the study population. In 14 studies, not all eligible participants that met the pre-specified criteria were enrolled. The response rates varied across studies, however of those who reported (n=13), several presented a response rate less than 50% at discharge (n=6). On the contrary, the one study with one year follow-up found a response rate of 78% (Green et al., 2007). In 7 studies, there was insufficient details describing the interventions provided and whether these were delivered consistently across the study population.

None of the individuals assessing the outcomes were blind to the interventions provided. In addition, none of the studies carried out multiple outcome assessments prior to the intervention. For all studies, blinding of participants was difficult due the

nature of the adolescent inpatient settings and interventions. In addition, a number of outcome measures were based on subjective self-reports, thus performance bias are likely to have been present. Clinicians could be considered biased, when it comes to rating their own work.

In table 4, the identified evidence is provided (National Institutes of Health, 2014). Several limitations in the quality of evidence are immediately evident. A risk of bias assessment was conducted for each study based on the National Institutes of Health (2014) assessment tool. This tool is designed to assess the quality of before-after (pre-post) studies with no control group. Based on this assessment tool, the risk of bias was poor to fair.

Limitations

This review is not without limitations. The eligibility criteria excluded articles not written in English, thus inpatient outcome studies for other cultures were excluded. Article authors were not contacted for further information. The studies included in the review all have methodological limitations. Firstly, none of the studies were RCTs. Several studies utilised a variety of clinically reliable measures, which are widely used in youth mental health care. However, the measures lacked consistency across studies, making comparisons difficult. This reflects the lack of a universal adolescent measure for IPU treatment. In addition, considering clinicians rated the majority of measures in each study, performance and rater-bias might have prevailed. A number of studies (n=6) lacked adequate sample sizes for statistical power, with sample sizes of less than 100 (Burmeister and Aitken, 2012). In addition, studies have limited systematic information on diagnoses, pharmacotherapy, symptomatology and demographics. Therefore, the ability to make firm recommendations based on the available evidence is limited.

Insert Table 4 Here

Table 4 Risk of Bias Assessment

Conclusion

The studies described support that IPU admissions are indeed helpful for adolescents. Despite the obvious demand for EBP in adolescent IPUs, the evidence base is vague and characterised by studies with small sample sizes and heterogeneous research designs. In particular, there is a paucity of well-conducted studies such as those of a longitudinal design with large sample sizes, RCTs and multiple measure informants, particularly clients. However, this is not particularly surprising as research in adolescent inpatient settings is limited. This is often limited as a result of the challenges which present when studying young people. For instance, access to services given the vulnerability of the population.

Measuring the efficacy of adolescent IPUs is difficult. These challenges include the use of comparison and control groups in such studies. Who would be an appropriate control group? How would the IPU treatment be measured? **Given these difficulties, it is important to consider alternate methods of evaluation, when measuring outcomes. One way would be to standardize outcome measures and domains for adolescent IPU settings.** Heterogeneity of the problems and treatments required, in addition to difficulties in conducting blind ratings provide further challenges.

IPUs can serve for symptom stabilisation within a short stay. The inpatient admission itself can offer containment, as part of overall effectiveness, through a combination of removal from stressful environments, intensive 24-hour care and support and/or positive effects of group milieu (Green et al., 2007). However, there is uncertainty in relation to the effective components of interventions, LOS, suitability and whether positive effects gained are maintained post-discharge (Green et al., 2007). Furthermore, whilst this review demonstrates that mental health stabilisation can be achieved following an episode of inpatient care, we are unsure as to 'how' and 'why' this is achieved. There are inconsistencies in how each IPU measures outcomes and who completes the ratings.

This review presents the combined data from over 6,500 adolescent inpatients, demonstrating symptomatic improvement following IPU treatment across measures and raters. This suggests evidence of symptomatic improvement as a result of IPU

treatment, however cannot evaluate how IPU treatment would compare to treatments provided in other settings with similar populations. The complex needs of adolescents in crisis makes research into the mechanisms of change and specific IPU treatments challenging, but a worthwhile endeavour yet to be performed sufficiently.

Relevance for Clinical Practice

One of the aims of this review was to assess if adolescent IPUs are effective. The findings confirm that adolescent IPUs are effective for the majority of young people. This informs mental health nursing practice by assuring nurses that the work, which they pursue contributes to improvement. This is an extremely positive and powerful affirmation for mental health nurses, who constitute the bulk of the IPU workforce. Such information is important for mental health nurses and managers alike to be aware of, and can enhance morale and positively influence clinical practice.

This review also sought to establish how outcomes were measured in adolescent IPU settings. Whilst it is unclear which clinicians completed each of the outcome measures on IPUs, we can assume that mental health nurses completed the majority. This is a key contribution, which mental health nurses play in clinical practice on a daily basis. Given that outcome measures are often used to determine the efficacy of a particular service, there should be more value placed on this role for mental health nurses.

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Tables

Table 1 Search Strategy

Search Strategy
adolescent* or “young person*” or “youth*” or “young adult*” or teen* or teenager*
inpatient* or "in-patient*" or client or clients or clientele or patient* or "service user*”
“mental health setting*” or "inpatient unit*" or in-patient unit*" or hospitalisation or hospitalization or hospitalised or hospitalized or "acute care" or admission or admissions
“treatment outcome*” or “routine outcome measur*” or “routine outcome*” or measur* or assess* or rate* or tool* or checklist* or screen* or scale* or efficac* or effect* or evalu*
change* or improve* or progress* or deterior*
*Is a wildcard character that may be used in place of any number of characters in a search word.

Table 2 Included Studies and Key Characteristics

Author (s) (year)	Research Design	Country	Setting	Treatment	Sample Size N=	Diagnosis % of sample	Mean Age (M) Standard Deviation (SD)	Gender (%) Females (F) Males (M)	Admission Status Voluntary (V) Involuntary (I)	Length of Stay (LOS) Days Mean & Standard Deviation (SD)
(Barnes, 2009)	Empirical, Quantitative Study	US	Single IPU Bed Number: Not Specified. Attached Services: Outpatient Admission Criteria: Diagnosed with at least one DSM-IV Axis I disorder. Staff: MDT	Not Specified	422	Mood Disorders 60.7% Intermittent Explosive Disorder 15.2% Mood Disorder with Psychosis 14%	M= 15.58 SD= 1.07	F= 60%	Not Specified	M=6.12 SD= 6.6

(Bobier et al., 2009)	Empirical, Quantitative Study	NZ	Single IPU Bed Number: 8 Attached Services: Outpatient and day facilities. Admission Criteria: Does not accept conduct disorder or substance abuse disorder as the sole diagnosis. Staff: MDT	Psychoeducation Nursing. Illness Education Anger & Stress Management. Relaxation. Medication Education. Problem Solving. Self-Awareness Education. Individual Support. Sporting. Artistic activities.	46	Mood Disorders 48% Mixed Disorders 33% Psychosis 19%	Mood M=6.18 Mixed M=16.53 Psychosis M=16.78	Mood F=64% Mixed F=87% Psychosis F=44%	Not Specified	M=24.01
(Burgess et al., 2009)	National Outcome Data Collection	Australia	Multiple Units Description of Setting: Not Specified.	Not Specified	1421	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified
(Chaplin et al., 2015)	Quality Improvement Project	UK	Multiple Units: 14 Description of Setting: Not Specified.	Not Specified	151	Neurotic/Emotional Disorders (28%) Mood	M=14.4 SD= 2.51	F=60%	People without ID (V=84%)	People without ID M=78.2-117.0

						Disorders (23%) Schizophrenia (14%)				
(Duddu et al., 2016)	Retrospective Review	UK	Single IPU Bed Number: 6 Attached Services: Outpatient Admission Criteria: Eating disorders & intellectual disabilities were excluded, unless the main focus was a mental health related crisis Staff: MDT	Not Specified	97	Adjustment, anxiety disorders, PTSD, social phobia (32.6%) Emerging Personality Traits or Disorders (15.8%) Schizophrenia (14.7%)	59.8% (n=58) were 17.	F= 54.6%	V=90.7%	1st Year (M= 30) 2nd Year (M=23.2)
(Green et al., 2007)	Empirical, Quantitative Study	UK	Multiple Units 4 Child 4 Adolescent	Structured Milieu Individualised Intervention	150	Mood Disorders (43%)	M= 15.4 SD= .96	F= 46%	Not Specified	M=16.6 weeks SD=12.5

			Bed Number: Not Specified Attached Services: Not Specified. Admission Criteria: Not Specified. Staff: Not Specified.	Strategies Psychological Therapy Medication, Psychosocial Family-Oriented & Educational Interventions.		Oppositional Defiant Disorder (ODD) (27%)				
(Greenham and Bisnaire, 2008)	Empirical, Quantitative Study	Canada	Single IPU Bed Number: 18 Attached Services: Not Specified. Admission Criteria: Acute suicidal thoughts, psychosis, nonresponse or severe side effects to medication, severe PTSD or severe anxiety or	Not Specified	211	Mood Disorders 46% Adjustment Disorders 9% Psychosis 9%	Crisis M=14.8 SD =2.0 Assessment M=14.9 SD 1.8 Transition M=15.3 SD 1.2	Crisis F= 64% Assessment F=70% Transition F= 80%	Crisis V=69% Assessment V=77% Transition V= 100%	Crisis M=4 Assessment services M=13 Youth referred for inpatient transitional care M=19

			mood disturbances. Staff: MDT							
(Guvenir et al., 2009)	Empirical, Retrospective, Quantitative Study	Turkey	Single IPU Bed Number: 10 Attached Services: Outpatient Admission Criteria: NS Staff: MDT	Individual. Parent and Family Therapy. Group, Psychological and Physical Therapy. Treatment linked with therapeutic milieu.	90	Mood Disorders 37.7% Psychosis 24.3% Anxiety Disorders 11%	M=15.3	F= 67.8%	Not Specified	M= 77.3 SD 25.5days
(Haggerty et al., 2013)	Empirical, Quantitative Study	US	Single IPU Bed Number: NS Attached Services: NS Admission Criteria: NS Staff: NS	Individual Psychotherapy. Group Therapy. Medication as Prescribed. Anger Management. Substance Use Psychoeducation. Academic	75	Mood Disorders 64% Conduct Disorders 30% Psychosis 3%	M=15.7 SD 1.19	M= 52%	Not Specified	M= 10.81 days. SD=5.23

				Programming. Recreation therapy.						
(Hanssen-Bauer et al., 2011)	Empirical, Quantitative Study	Norway	Multiple Units: 4 Bed Number: 31 Attached Services: Outpatient and School. Admission Criteria: Psychosis, severe hyperactivity, violence causing risk to self or others, anxiety, depression and delirium. Staff: Not Specified.	Ward Milieu Therapy. Individual Psychotherapy. Family Therapy. Medication. School.	192	Mood Disorders 28% Externalising 26% Neurotic 18%	M= 15.7 SD= 1.4	F= 70%	Not Specified	M= 8.5 days (range 1-351 days), 25th percentile=3 days, 75th percentile=29 days
(Herdzik, 2009)	Empirical, Quantitative Study	US	Single IPU Bed Number: 16 Attached	Psychiatric Evaluation. Individual	60	Mood Disorders 40%	M= 15	F= 58.3%	Not Specified	M= 14

			Services: School Admission Criteria: Imminent threat of harm to self or others. Staff: Not Specified.	Meetings with Staff. Psychoeducation Group Sessions. Occupational Therapy. Recreational Therapy. Family meetings. School.		Adjustment Disorders 18.3% Externalizing Disorders 11.7%				
(Mathai and Bourne, 2009)	Empirical, Quantitative Study	Australia	Single IPU Bed Number: 12 Attached Services: School Admission Criteria: Not Specified. Staff: MDT	Activity Groups. Educational & Vocational Sessions. Group Therapy. Individual Counselling. Medication as Prescribed.	157	Not Specified	M= 15.12	F= 74.5%	Not Specified	M= 10.67 days SD= 19.34
(Setoya et al., 2011)	Empirical, Quantitative Study	Japan	Single IPU Bed Number: 41 Attached Services: School	Milieu Therapy. Nursing Interventions. Individual	126	Obsessive-Compulsive Disorder 16.7%	M= 12.8 SD= 1.9	F= 60.3%	Not Specified	M=335.4 SD=336.2

			Admission Criteria: Not Specified. Staff: MDT	Psychotherapy. Family Therapy. Occupational Therapy Group Therapy. Excursions. School. Family Groups.		Eating Disorders 14.3% Pervasive Developmental Disorders 12.7%				
(Sperbeck and Mayo, 2016)	Empirical, Quantitative Study	US	Single IPU Bed Number: 110 Attached Services: Not Specified. Admission Criteria: Not Specified. Staff: Not Specified.	Not Specified	3,150	Mood Disorders 42% Disruptive Behaviour Disorders 22% Anxiety Disorders 20%	M= 13.2 SD=3.0	F= 52%	Not Specified	M= 31.8 SD=2.5
(Yuan, 2015)	Empirical, Retrospective, Quantitative Study	UK	Single IPU Bed Number: Not Specified. Attached Services: School	Not Specified	32	Not Specified	M= 16	F= 71%	Not Specified	M= 89 days

			Admission Criteria: Emotional and behavioural disorders including self-harm and suicide risk. Staff: MDT							
(Urben et al., 2015)	Naturalistic Prospective Study	Switzerland	Single IPU Bed Number: 10 Attached Services: Not Specified. Admission Criteria: Not Specified. Staff: MDT	Family Therapy. Story-Telling Workshops. Music Therapy. Media Review, Art. Emotional centred workshop. Educational & cultural focus. School	260	Mood Disorders 37% Conduct Disorders 15% Anxiety Disorders 12%	M=15.8 SD= 1.4	F= 57%	Not Specified	M= 24.9 SD=21.8

Table 3 Descriptions of Included Outcome Measures, Domains Measured, Reporters, Follow-Up Times and Improvement Values

Author(s) (year)	Outcome Measures & Domains	Reported By	Follow- Up	Measure	Admission	Discharge	One Year Follow-Up	Improvement Values, P Values[2] (P), Effect Size (ES)[3]
Barnes (2009)	BASIS-24 [4] GAF[5]	**BASIS-24:** Clients **GAF:** Clinicians	Admission and discharge	BASIS-24	M: 1.56 SD:.51	M: 1.22 SD: .43	N/A	P < .001* ES: 0.66
				GAF	M: 26.15 SD: 6.14	M:40.58 SD:8.9		P < .05* ES= 2.35**
Bobier et al. (2009)	HoNOSCA[6]	Clinicians	Admission and discharge	HoNOSCA Total Problems	M: 24.01 SD: 16.90	Not Specified	N/A	P= 0.027*
				Symptom Problems	M: 15.26 SD:5.52			

[2] * Indicates a statistically significant difference (p<0.001).
[3] ** Large effect size (d ≥ 0.8)
[4] Depression. Functioning. Relationships. Self-Harm. Emotional Lability. Psychosis. Substance Abuse.
.
[6] Behaviour, Impairment, Symptoms and Social.

Burgess et al. (2009)	HoNOS[7], HoNOS65+, HoNOSCA	Clinicians	Admission and discharge.	HoNOSCA	Not Specified	Not Specified	N/A	SEM= 57.1% "Significant Improvement" ES=0.5
Chaplin et al. (2015)	HoNOSCA[8]	Clinicians	Admission and discharge	HoNOSCA	M: 20.1 SD: 9.2	M: 10.5 SD: 6.18	N/A	P < 0.001* ES= 1.04**
Duddu et al. (2016)	CGI[9]	Clinicians	Admission and discharge	CGI	Not Specified	Not Specified	N/A	"Much Improved" 53.7%
Green et al. (2007)	CGAS[10] CSRI[11] FAD[12] FEQ[13] SDQ[14] SNASA[15]	**CGAS:** Clinicians **SDQ:** Clients and Caregivers **TRF:** Teachers **S.NASA:** Client, Caregiver and Clincians.	**CGAS:** Admission, discharge and one year follow-up.	CGAS	M: 44.0 SD: 1.1	M:56.0 SD: 1.0	M: 58.3 SD: 1.5	Admission-Discharge P < .001* ES= 10.9** Admission-Follow Up

[7] Behaviour, Impairment, Symptoms and Social.
[8] Behaviour, Impairment, Symptoms and Social.
[9] Severity of Illness, Clinical Progress & Therapeutic Efficacy.
[10] Functioning.
[11] Background Client Information.
[12] Functioning.
[13] Family Engagement.
[14] Emotional Problems. Conduct. Hyperactivity/Inattention. Peer Relationships. Prosocial Problems.

	TRF[16]	**FAD:** Clients. **CSRI:** Caregivers. **FEQ:** Clinican					P <.001* ES= 13**
			SDQ: Admission, discharge and one year follow-up.	SDQ-Caregiver	M: 22.9 SD: .75	M:20.6 SD: .82	M: 19.4 SD: .95	Admission-Discharge P < .001* ES= 3.0** Admission-Follow Up P < .01 ES= 4.6**
			TRF: Pre admission, after 4 weeks of admission and at discharge by the unit school, and at one year follow-up.	TRF	M: 42.1 SD: 3.1	M: 41.6 SD: 2.8	N/A	Admission-Discharge P <.001* ES= 0.16

[15] Functioning including social, psychiatric, educational and life skills.
[16]Demographics Functioning.

			S.NASA: admission, discharge & one year follow-up. **FAD:** Baseline/Admission **CSRI:** Prior admission and at follow-up. **FEQ:** (after 1 month of admission)	S.NASA	M: 8.5 SD: 2.6	M: 5.6 SD: .30	M: 4.0 SD: .32	Admission-Discharge P <.001* ES: 1.1** Admission-Follow Up P <.001* ES= 1.73**
Greenham & Bisnaire (2008)	CAPI[17] CBCL[18] CDI[19]	**CAPI:** Clinician **CBCL:** Caregivers **CDI:** Client	**CAPI:** Admission and	CAPI	Not Specified	Crisis M: 11.0 SD: 8.8	Not Specified	Improved=Reliable Change Index (RCI)

[17] Risk Factors. Symptoms. Functioning. Systems Support.
[18] Emotional & Behavioural Functioning.

	CSPI [20]	**CSPI:** Clinicians	discharge.		> 1.96
	MASC[21]	**MASC:** Client	**CBCL:**	Assessmen	Crisis
	YSR[22]	**YSR:** Clients	Admission	t	88% Improved
			CDI:	M:12.2	
			Admission	SD: 9.5	
			& 14 days		Assessment
			after	Transition	82% Improved
			admission.	M: 11.0	
			CSPI:	SD: 11.4	
			Admission?		Transition
			MASC:		80% Improved
			Admission		
			& 14 days		
			after		
			admission.		
			YSR:		
			Admission		
			& 14 days		
			after		
			admission.		

[19] Depressive Symptoms.
[20] Symptoms. Risk Factors. Functioning. Comorbidity. Systems Factors.
[21] Anxiety.
[22] Internalising & Externalising Problems.

Guvenir et al. (2009)	CGAS[23] CDI[24] Y-BOCS[25] YMSR[26] HDRS[27] PANSS[28]	**CGAS:** Clinicians **CDI:** Clinicians **Y-BOCS:** Clinicians **YMSR:** Clinicians **HDRS:** Clinicians **PANSS:** Clinicians **GRA:** Clinicians **TSP:** Clinicians	**CGAS:** Admission and discharge. **CDI:** Admission and discharge. **Y-BOCS:** Admission and discharge. **YMSR:** Admission and discharge. **HDRS:** Admission and	CGAS CDI Y-BOCS YMSR HDRS PANSS	**CGAS** M: 41.3 SD: 10.0 **CDI** M: 28.1 SD: 14.1 **Y-BOCS** M: 33.5 SD: 11.9 **YMRS** M: 30.5 SD: 7.6 **HDRS** M: 22.6 SD: 6.0 **PANSS** M: 83.0 SD: 33.3	**CGAS** M: 65.2 SD: 10.5 **CDI** M: 7.0 SD: 5.2 **Y-BOCS** M:20.7 SD: 10.7 **YMRS** M: 8.5 SD:9.1 **HDRS** M:12.0 SD:7.7 **PANSS** M: 50.7 SD: 24.2	N/A	**CGAS** P= 0.000* ES= 2.39** **CDI** P= 0.012* ES=1.49** **Y-BOCS** P= 0.002* ES=1.07** **YMRS** P= 0.002* ES= 2.89** **HDRS** P= 0.000* ES= 1.76** **PANSS** P= 0.000* ES= 0.96**

[23] Functioning
[24] Depressive Symptoms.
[25] Obsessive & Compulsive Symptoms Scale.
[26] Mania.
[27] Depression.
[28] Positive & Negative Syndrome Scale.

			discharge.	GRA				
	GRA[29]		**PANSS:** Admission and discharge.	TSP				
			GRA: Admission and discharge.					
	TSP[30]		**TSP**: Admission and discharge.					
Haggerty et al. (2013)	BSM-25[31] SOS-10[32] GAF[33] IIP-32[34] YSR[35]	**BSM-25:** Clients **SOS-10:** Clients	**BSM-25:** Admission and discharge. **SOS-10:**	BSM-25 SOS-10	**BSM-25** M: 51.59 SD:29.9 **SOS-10** M: 36.15	**BSM-25** M: 34.28 SD:28.5 **SOS-10** M: 44.17	N/A	**BSM-25** P= 0.50* ES= 0.57 **SOS-10** P= 0.49*

[29] Individual Difficulties. Family Relationships. Academic or vocational motivation & social life.
[30] Psychiatric Symptoms. Impulsivity. Functioning.
[31] Psychiatric Symptoms.
[32] Self- & Interpersonal Relational Experience.
[33] Social, Occupational & Psychological Functioning.
[34] Interpersonal Behaviours.

		GAF: Clinicians **IIP-32:** Clients **YSR:** Clients	Admission and discharge. **GAF:** Admission and discharge. **IIP-32:** Admission **YSR:** Admission	GAF	SD: 14.35 **GAF** M: 41.57 SD:6.12	SD: 12.14 **GAF** M:51.23 SD:5.88		ES= 0.55 **GAF** P= 0.53* ES= 1.57**
Hanssen-Bauer et al. (2011)	HoNOSCA[36]	Clinicians	Admission and discharge	HoNOSCA	M: 18.7 SD: 6.3	M: 13.6 SD: 7.1	N/A	P < 0.001* ES: 0.80**
Herdzik (2009)	BASC-2[37] CDI[38] FACES-IV[39] I-TAS[40] PES[41]	**BASC-2:** Client **CDI:** Client **FACES-IV:** Clinicians **PES:** Client **PPVT-III:** Clients	**BASC-2:** Admission and discharge **CDI:**	BASC-2-Emotional Symptoms	**BASC-2-** Emotional Symptoms M: 81.8 SD:15.9	**BASC-2** Emotional Symptoms M: 56.0 SD:12.9	N/A	**BASC-2** Emotional Symptoms P < .05 ES= 1.62**

[35] Internalising & Externalising Problems.
[36] Behaviour, Impairment, Symptoms and Social.
[37] Behavioural & Emotional Strengths & Challenges
[38] Depressive Symptoms.
[39] Adaptability & Cohesion in Family Interactions
[40] Alliance to Inpatient Care.

	PPVT-III[42]	**SOS:** Client	Admission	CDI	**CDI**	**CDI**	**CDI**
	SOS[43]	**SRP-A:** Client	and		M: 14.5	M: 9.6	P < .05
	SRP-A[44]	**WRAT-III:** Client	discharge		SD: 10.4	SD: 9.2	ES= 0.47
	WRAT-III[45]		**FACES-IV:**	SOS	**SOS**	**SOS**	**SOS**
			During		M: 34.7	M: 41	P < .05
			treatment.		SD: 15.5	SD: 15.4	ES= 0.40
			I-TAS:				
			Discharge				
			PES:				
			Discharge				
			PPVT-III:				
			During				
			treatment				
			SOS:				
			Admission				
			and				
			discharge.				
			SRP-A:				
			Admission				
			and				

[41] Perceived Effectiveness Scale.
[42] Vocabulary Test.
[43] Self- & Interpersonal Relational Experience.
[44] Relations with Parents, Interpersonal Relations, Self-Esteem & Self-Reliance.
[45] Reading Comprehension.

			discharge. **WRAT-III:** During treatment					
Mathai & Bourne (2009)	HoNOSCA[46]	Clinicians	Admission and discharge	HoNOSCA	M: 17.13 SD: 5.88	M: 9.98 SD: 4.71	N/A	P < 0.0001* ES= 1.21**
Setoya et al. (2011)	CBCL[47] CGAS[48] YSR[49]	**CBCL:** Caregivers **CGAS:** Clinicians **YSR:** Client	**CBCL:** Admission and discharge **CGAS:** Admission and discharge **YSR:** Admission and discharge	CGAS	**CGAS** M: 38.1 SD: 13.9	**CGAS** M: 57.9 SD: 14.6	N/A	**CGAS** P = 0.00* ES= 1.42**
				CBCL	**CBCL** Full Score M: 49.9 SD: 30.5	**CBCL** Full Score M: 38.7 SD: 26.6		**CBCL** Full Score P= 0.00* ES= 0.36
				YSR	**YSR** Full Score M: 63.1 SD: 26.4	**YSR** Full Score M: 53.7 SD: 28.9		**YSR** Full Score P = 0.02* ES= 0.35

[46] Behaviour, Impairment, Symptoms and Social.
[47] Emotional & Behavioural Functioning.
[48] Functioning.
[49] Internalising & Externalising Problems.

Sperbeck (2016)	BPRS-C[50] CIS[51] DASS[52] SARS[53]	**BPRS-C:** Clients **CIS:** Clients **DASS:** Clients **SARS:** Clinicians	**BPRS-C:** Admission and discharge **CIS:** Admission and discharge **DASS:** Admission and discharge **SARS:** Admission and discharge	SARS	NS	NS	N/A	SARS P= 0.000*
Yuan (2015)	CGAS[54] HoNOSCA[55]	**CGAS:** Clinicians. **HoNOSCA:** Clients and Clinicians	**CGAS:** Admission and	HoNOSCA	**HoNOSCA (Clinician)** M: 18.0	**HoNOSCA (Clinician)**	N/A	**HoNOSCA (Clinician)** P< 0.001*

[50] Behaviour Problems. Depression. Psychomotor Excitation. Anxiety. Organicity.
[51] Functioning.
[52] Anxiety & Depression
[53] Behaviours. Affect. Social & Family Functioning. Self-Harm. Academic Problems. Cognitive Functioning. Previous Treatment.
[54] Functioning.
[55] Behaviour, Impairment, Symptoms and Social.

			discharge.			SD: 7.2	M: 9.7	ES= 1.1**
			HoNOSCA:			**HoNOSCA**	SD: 2.9	**HoNOSCA**
			Admission			**(Client)**	**HoNOSC**	**(Client)**
			and			M: 25.2	**A (Client)**	P< 0.001*
			discharge			SD: 8.4	M: 10.3	ES= 1.7**
							SD: 12.4	
Urben et al. (2015)	HoNOSCA[56]	Clients?	Admission and discharge	HoNOSCA Total Score		M: 20.5 SD: 6.7	M: 13.3 SD: 6.6	N/A P< 0.001* ES= 1.07**

[56] Behaviour, Impairment, Symptoms and Social.

Table 4 Risk of Bias Assessment

	Criteria/ Yes (Y), No (N)															
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1.Was the study question or objective clearly stated?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.Were eligibility/selection criteria for the study population pre-specified and clearly described?	Y	N	N	Y	N	Y	N	N	N	Y	Y	N	Y	Y	N	Y
3. Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4. Were all eligible participants that met the pre-specified entry criteria enrolled?	N	N	N	N	Y	N	N	N	N	N	N	Y	N	N	N	N
5. Was the sample size sufficiently large to provide confidence in the findings?	Y	N	Y	N	N	Y	Y	N	Y	Y	N	Y	Y	Y	N	Y
6. Was the test/service/intervention clearly described and delivered consistently across the study population?	N	Y	N	N	Y	N	Y	Y	N	N	Y	Y	Y	N	Y	Y
7. Were the outcome measures pre-specified, clearly defined, valid, reliable, and assessed consistently across all study participants?	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8. Were the people assessing the outcomes blinded to the participants' exposures/interventions?	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9. Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	Y	Y	N	Y	Y	Y	N	N	N	N	Y	N	Y	N	N	Y
10. Did the statistical methods examine changes in outcome measures	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

from before to after the intervention? Were statistical tests done that provided p values for the pre-to-post changes?																
11. Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
12. If the intervention was conducted at a group level (e.g., a whole hospital, a community, etc.) did the statistical analysis take into account the use of individual-level data to determine effects at the group level?	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y
Quality Rating Good (G), Fair (F), Poor (P)	**F**	**P**	**P**	**P**	**P**	**F**	**P**	**P**	**P**	**P**	**F**	**F**	**F**	**P**	**P**	**F**
Good= (0-2 No)																
Fair= (2-4 No)																
Poor= (4+ No)