Sheffield Hallam University

Predictors of violent incidents amongst patients in psychiatric intensive care units: A review of global evidence

GUMBER, Sneh, GUMBER, Leher and GUMBER, Anil <http://orcid.org/0000-0002-8621-6966>

Available from Sheffield Hallam University Research Archive (SHURA) at:

https://shura.shu.ac.uk/26154/

This document is the Published Version [VoR]

Citation:

Predictors of violent incidents amongst patients in psychiatric intensive care units: A review of global evidence

Sneh Gumber[1]; Leher Gumber[2]; Anil Gumber[3]*

[1]Networked Communications, MSc Mental Health Nursing, Coventry & Warwickshire Partnership NHS Trust, UK

[2]Global Mental Health, Final Year Medical Student (BSMS), Brighton & Sussex Medical School, UK

[3]Senior Health Economist, Faculty of Health & Wellbeing, Sheffield Hallam University, Collegiate Crescent, Sheffield S10 2BP, UK

*Corresponding Author(s): Anil Gumber

Senior Health Economist, Faculty of Health & Wellbeing, Sheffield Hallam University, Collegiate Crescent, Sheffield S10 2BP, UK

Tel: 01926740718, Fax: 01142255915;

Email: a.gumber@shu.ac.uk

Abstract

Aim: The objective is to identify key predictors of violent behaviour amongst patients admitted to PICUs.

Methods: A literature search was carried out in five online databases using a predefined strategy with terms relevant to the setting and population. Articles were screened based on the inclusion criteria and quality assessed using the Hawker critical appraisal tool. A thematic matrix was prepared from the final articles to highlight the pivotal predictors for violent behaviour in PICUs.

Results: Initial search without duplicates retrieved 152 articles, of which 120 were excluded after screening their title and abstract. The full-text of 32 articles was read of which a total of 10 studies with 4733 participants were included in the literature review. These studies had good designs and methodological quality. The key predictors of violent incidents were a longer duration of in-patient stay, higher readmission rate, non-voluntary admission to PICUs, previous history of violence and substance misuse, permanent staff absences, being a single young male, having low level of education and having schizophrenia.

Conclusion: The findings suggest that a variety of different factors contribute to violent incidents in PICUs. Our results may assist in the development of community and hospital-based interventions including situation management regular staff training, promoting a friendly environment and post-incident debriefs that can prevent future violent incidents in PICUs.

Introduction

Violence is a leading cause of mortality particularly among young adults (aged 15-35 years) with an estimated 1.6 million deaths every year worldwide. Incidence rates of violence are twofold higher in low and middle-income countries (32.1 per 100,000) compared to high-income countries (14.4 per 100,000) [1]. World Health Organisation defines violence as "The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community that either result in or has a high likelihood of resulting in injury, death, psychological harm, mal-development or deprivation". Violence has detrimental effects on the victim including physical, sexual and reproductive issues, psychological problems such as substance misuse, depression, and anxiety. It also has huge implications on healthcare costs and economic burden [1,2]. The violence is a result of social, economic and cultural factors therefore prevention of violent incidents is essential and should be a public health priority [3].

The risks of violence have an impact on the safety of the healthcare staff and patients and cause people to feel uncomfortable to work in a particular hospital setting. Physical aggression against healthcare workers is known to contribute to sickness, high staff turnover and reluctance to work in mental health settings all of which directly hinder patient recovery [4-6].

Violence towards healthcare workers, especially in areas such as psychiatry, have become increasingly common. Statistics from the National Health Service (NHS) have identified over 60,000 physical assaults on healthcare workers in England between 2011 and 2012, of which 69% were related to patients with mental health disorders [7]. Particular mental health conditions such as schizophrenia and personality disorders are associated with an increased risk of violence and aggression [1]. Hence violence in mental health facilities poses a big challenge with direct implications on the service delivery, outcomes, patient and staff safety [8].

Violent incidents are often initially managed through de-escalation or through medications. Upon their further escalation, the nurse is expected to use control and containment strategies including physical restraint; however, this should only be used as a last resort because it can cause harm to the patient. The National Institute for Health and Care Excellence (NICE) has produced guidelines for dealing with violence and aggression [7]. It has however been noted that healthcare professionals usually feel uncertain when dealing with violence and aggression [9].

The Psychiatric Intensive Care Units (PICUs) are special psychiatric units that are designed for short-term care for individuals who are in an acutely disturbed phase of their mental illness and present a high level of risk to themselves and to others [10]. Their high-risk behaviour might include displaying aggression towards self and others, harming others and themselves and absconding [11,12]. The most common reason for patients' admission to the PICU is their aggressive presentation [13].

PICUs are relatively smaller than other inpatient acute psychiatric wards and can generally accommodate 8-10 patients [14]. The small size of these units is essential as it facilitates close monitoring of the patients and ensures that their safety as well as of others in the Unit is maintained. Upon admission to these units, there is a significant loss of their personal freedom like they are restricted from accessing their personal items, in order to maintain a secure physical environment [10,15]. This enables them to overcome the challenges and risks presented by their behaviour. This type of safe environment can enhance the recovery of the patients, and they are also provided with the facilities of using a low stimulus room. In addition, these units also have a built-in seclusion room that can be used to manage the patient's violent behaviour and prevent them from causing harm to others [16].

These units consist of a relatively higher number of nursing staff per patient than other psychiatric units in order to contain the violent/aggressive incidents by closely monitoring the patients and ensuring their safety is maintained [17]. This reduces their chances of self-harming or causing harm to others [10]. The presence of numerous nursing staff in PICUs also ensures that staff can spend huge amounts of time supporting patients by giving them a sense of security and hope, ultimately building a good therapeutic relationship with them [18,19].

Patients receive care and treatment for a short length of time in these units to ensure that they don't present as a threat to themselves or others. Once their behaviour becomes stable, they are then transferred to other inpatient acute wards where they continue to receive their psychiatric treatment [10].

A greater priority needs to be given to the primary prevention of violence which is to stop it from occurring in the first place [1]. This can only be done by identifying the key predictors of violence in patients.

There is a lot of recent evidence of violent incidents in acute psychiatric inpatient units but there is not much information about the underlying predictors of violence in PICUs, which makes it important to conduct this study.

This paper focuses on identifying the key predictors of violent incidents amongst patients admitted to PICUs, through systematically exploring the existing evidence. Additionally, this paper will also synthesize evidence in order to recommend, design and pilot the appropriate interventions that could minimize/prevent violent incidents from occurring in the future. This study would, therefore, contribute and enhance the safety and well-being of the healthcare staff and patients in PICUs, and thus creating a better recovery environment for the patients [20,21].

Methods

To pursue this study, a comprehensive search strategy was developed and articles from various online databases were searched systematically using the key terms. This process allowed the themes to be derived by making a clear comparison of the findings from different articles that were from a wide range of settings. Finally, a critical appraisal tool was used to comprehensively evaluate the quality, reliability, and validity, of the articles shortlisted for the review [22]. This systematic literature review thus followed the recommended process and reported results in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines [23].

Search strategy

A comprehensive list of search terms was used; that was related to the setting (PICU, psychiatric intensive care, high dependency unit), population (service user, client, patient), focus (risk factor, predict*, predisposing factor) and the phenomenon of interest (violen*, aggress*). Boolean operators such as "AND" and "OR" were also used alongside truncation and phrases to maximize the search results and ensure that only the most rel-

evant research articles were obtained. Forward and backward tracking was also used to identify any other relevant articles that may have been missed during the initial searching. Published including online articles were searched systematically in five different electronic nursing databases including Medline, Scopus, PubMed, PsycINFO and the Cumulative Index to the Nursing and Allied Health Literature (CINAHL), in accordance with the PRISMA flowchart. The results from these databases were exported to RefWorks, which is a bibliographic management tool. The following search terms were used to extract the evidence:

("PICU" OR "psychiatric intensive care" OR "high dependency unit") AND ("violen*" OR "aggress*") AND ("service user" OR "client" OR "patient*") AND ("risk factors" OR "predict*" OR "predisposing factors" OR "factor*")

Inclusion criteria

Peer-reviewed articles published in the English language, conducted in PICUs, focussing on adults, having a quantitative, qualitative and mixed study design were included. In addition, studies that reported any form of violence or aggression including verbal hostility, actual or potential physical harm were included. Studies that focussed only on self-harming behaviours were excluded. Finally, published opinions, literature reviews, book reviews, policy or guidance documents were all excluded.

Study selection and data extraction

The searches from all the five databases yielded a total number of 238 articles. Also, an additional 65 articles were found through hand searching. A total of 303 articles were identified.

Duplicates were then removed leaving 152 articles. 120 articles were excluded after the title and abstract screening were found not relevant for this study. A total of 32 articles were, thus, identified for full-text screening to determine their eligibility for inclusion in the review. 22 of those full-text articles were excluded as they did not have the relevant content. Thus, the remaining 10 articles were included in the review. Below is a PRISMA flowchart which illustrates the selection process steps for the included articles:

PRISMA flowchart
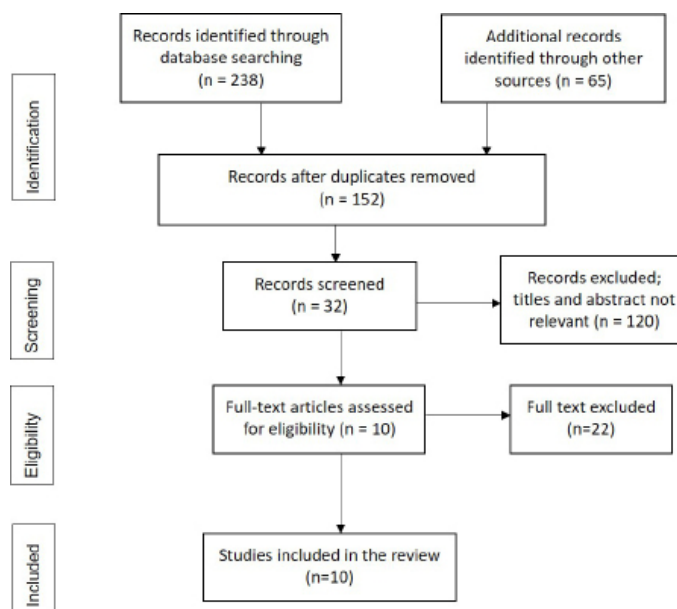
Table 1: Hawker Appraisal Tool for Scoring on Quality of the Study

Study/year	Abstract and title	Introduction and aims	Method and data	Sampling	Data Analysis	Ethics and bias	Results	Transferability/ generalizability	Implications & usefulness	Total Score*
Barlow et al. (2000), [30]	Good	Good	Good	Good	Good	Poor	Good	Good	Good	34
Blomhoff et al. (1990), [34]	Poor	Fair	Good	Fair	Poor	Poor	Good	Poor	Poor	24
Iversen et al. (2016), [31]	Good	Good	Poor	Good	Fair	Poor	Good	Fair	Good	30
James et al. (1990), [33]	Poor	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Fair	24
Langsrud et al. (2018), [27]	Good	Fair	Fair	Good	Good	Good	Good	Good	Good	34
Nijman et al. (2002), [29]	Good	Good	Fair	Fair	Good	Poor	Good	Poor	Poor	28
Raja et al. (2005), [26]	Good	Fair	Fair	Fair	Fair	Good	Good	Poor	Poor	28
Saverimuttu et al. (2000), [32]	Good	Fair	Poor	Poor	Poor	Poor	Good	Fair	Fair	25
Vaaler et al. (2011), [6]	Good	Good	Good	Fair	Good	Good	Good	Fair	Poor	32
Walker et al. (1994), [28]	Fair	Fair	Poor	Poor	Poor	Fair	Fair	Fair	Fair	24

Note: *Scoring for Good: 4; Fair: 3; Poor: 2; Very Poor: 1.

All these articles were deemed fair and consistent as their scores were mostly 24 and above, therefore, they were all accepted for further assessment. This method is a useful way to filter out the articles and may prove useful in the studies that might need to conduct full-text analysis on a number of articles; however, due to a smaller number of articles, all of them were included in this study. This method ensured that this approach of the review was robust in terms of ensuring high quality, validity, and reliability of articles to be included in the review [25]. However, this tool might turn out to be very time-consuming if reviewing a large number of studies.

Study characteristics

The list of studies included in the review with its relevant characteristics is shown in Table 2 [6,26-34]. Out of the ten studies, four adopted a quantitative and the remaining six a mixed-methods design. Nine of the studies were conducted in Europe: Norway (four), UK (three), Italy (one) and Netherlands (one), whereas only one study was conducted outside Europe, in Australia. This shows that PICUs are mostly developed, managed and researched in Europe. Although there are lots of studies conducted in psychiatric wards in North America they were not included as they didn't meet the inclusion criteria. All ten studies together covered a total number of 4733 patients. The largest study done by Raja et al. [26] included 2395 patients whereas the smallest study by Langsrud et al. [27] covered 40 patients. There was a variance in the time period in which the studies were conducted, the longest being the study conducted

Raja et al. [26] for 72 months and the shortest by Walker et al. [28] lasting just 6 months.

Six studies used the completed incident forms by the nurses for data collection and analysis. Four studies gathered information by using the completion of rating scales such as BVC (Bröset Violence Checklist) and SOAS-R (Staff Observation Aggression Scale-Revised). Four studies used the patient's medical notes whereas just one study used referral letters and examination for data analysis. Langsrud et al. [25] used a sleep diary for collecting data, and two studies used questionnaires. Nijman et al. [29] used admission forms and Walker et al. [28] used the interview methods with nurses as part of their data collection.

Seven studies focused on violence and three studies focussed on dealing with aggression. These three studies were included, as aggression ultimately leads to the occurrence of violent incidents.

Table 2: Salient features of studies with their identified key predictors of violence/aggression

Study (Year) / Country	Study design/ Sample size (patients)	Primary outcome	Data collection, Time period	Key predictors of violence/aggression
Barlow et al. (2000), [30] Australia	Mixed methods, 1269	To determine prevalence and causal factors by reviewing the data collected on aggression	Incident Forms, 18 months	schizophrenia, males, young age (under 32), history of violence and substance misuse, admitted involuntarily
Blomhoff et al. (1990), [34] Norway	Mixed methods, 75	Do violent and non-violent patients differ in demographic background or clinical characteristics?	Medical notes, incident forms, referral letters and examination, 12 months	Past history of violence, admitted involuntarily, higher readmission rate, living alone, violence in the family of origin, history of substance abuse, higher level of aggression and signs of anxiety, longer length of admission
Iversen et al. (2016), [31] Norway	Quantitative, 230	To explore the aspects of violent behavior in PICU; such as verbal or physical threats and physical attacks	Incident forms, 24 months	Uneducated, schizophrenia, single, age (31-50), higher readmission rate, involuntary, males
James et al. (1990), [33] UK	Mixed methods, 280	to explore the reason for increased level of violence in PICU	Incident forms , 15 months	Increased use of temporary staff, young age (under 25), involuntary admission, less depressed, schizophrenia
Langsrud et al. (2018), [27] Norway	Mixed methods, 50	To explore the relationship between sleep duration and patient aggression	Use of rating scales, medical notes and a sleep diary, 6 months	Short sleep duration and great night-to-night variations in duration of sleep, schizophrenics
Nijman et al. (2002), [29] Netherlands	Quantitative, 98	To evaluate the accuracy of clinical and archival predictors of patient's aggressive behavior on a locked admissions ward	Rating scales SOAS-R and VAS, admission forms, 9 months	Young age, high readmission rate, involuntary admission, schizophrenia
Raja et al. (2005), [26] Italy	Quantitative, 2395	To determine the extent of hostility and violence and the factors associated with such hostility and violence in a PICU	Rating scales (Morrison's scale) and questionnaires, 72 months	Younger, single, longer length of hospitalization, higher admission rate, schizophrenia
Saverimuttu et al.(2000), [32] UK	Quantitative, 170	To investigate the proportion of male patients involved in violent incidents, in PICU	Incident forms, 15 months	Schizophrenics, males
Vaaler et al. (2011), [6] Norway	Mixed methods, 118	To investigate clinically relevant patient and environment-related predictive factors for threats and violent incidents in the first three days in a PICU population-based on evaluations done at admittance.	medical notes, examination and the completion of rating scales, 24 months	Patient grouping, younger, schizophrenia
Walker et al. (1994), [28] UK	Mixed methods, 48	To study the violent incidents in PICU	Questionnaires, medical notes, interviewing nurses and incident forms, 6 months	Involuntary admission, schizophrenic, single, unemployed, living alone, previous admissions, higher abscondence rates, past criminal record, previous drug abuse

Results

Key predictors

Out of the ten, nine studies identified the risk factor of violent incidents as having schizophrenia condition. The other important risk factors found were: Gender (three), young age (five), single and low level of education (three), previous history of substance misuse and past violence (three), higher readmission rate (five), length of hospitalization (two), involuntary admission status (six), and environmental factors like lack of nursing staff (two).

Demographics

Barlow et al. [30] showed that violence is more common in males (14.9%) as compared to female patients (12.2%). This was also supported by Iversen et al. [31] which showed 56.5% of males were aggressive as compared to 54.2% females. Saverimuttu et al. [32] showed 67.1% of males were aggressive and 30.5% of females were aggressive. They also stated 52% of males were involved in assaultive behaviour and 80% of females were involved in self-harm. Five studies showed that being young was a key predictor of violence [6,26,29,30,33]. James et al. [33] specified that violence was more common in people who are 25 years or younger. Three studies found that a low level of education and being single was also a key predictor of violence [26,28,31].

History of substance misuse and violence

Three studies showed that substance misuse was a key predictor of violence [28,30,34]. Walker et al. [28] showed the patients who have a history of substance misuse/past violence are approximately 80% more likely to be violent. Most of the violent patients are also likely to continue using illicit substances. Furthermore, these studies identified individuals having a history of past violence as a predictor of future violence as well. In addition, Blomhoof et al. [34] identified violence in the family of origin as the key predictor of future violence by the patients.

Diagnosis

Nine studies found that the mental state of the patient was the most likely contributing factor of violence, in particular schizophrenia being the common diagnosis [6,26-33]. Saverimuttu et al. [32] stated that schizophrenia is the most common diagnosis (42.9%) to lead to violent incidents. Langsrud et al. [27] reported that patients with schizophrenia have longer sleep duration as compared to patients with other diagnoses. The chance of becoming violent increases as their sleep is more likely to get disturbed in the PICU environment. Therefore, patients with schizophrenia are at a high risk of being involved in violent incidents.

Readmission rate and length of hospitalization

Five studies reported that most of the patients who were violent had a higher rate of readmission as compared to those patients who were non-violent, and this could be a predictor of future violence as well [26,28,29,31,34]. Walker et al. [28] found that 81% of the admitted violent patients had multiple previous admissions. Blomhoof et al. [34] found out that the average length of hospitalization was much longer (24.9 days) in violent patients as compared to the non-violent patients (12.1 days). This was equally supported by another study reporting a longer length of hospitalization [26]. Three studies also found out that violence is most likely to occur within the first few days of hospital admission [29,30,34]. Barlow et al. [30] identified that most of the violent incidents took place in the first 2 days of admission. Therefore, PICU staffs need to be careful in dealing with violent patients especially in the first few days of their admission.

Admission status

Six studies identified that most violent patients were admitted involuntary to the hospital which is another key predictor of violence [28-31,33,34]. Iversen et al. [31] stated that the share of involuntary admission in violent patients (66.5%) was much higher than voluntary admission. This could also be because of their non-compliant behaviour with medications [28].

Environmental factors

The decrease in permanent nursing staff in PICU has acted as another strong predictor of violence due to lack of disciplined care; two studies supported this statement [27,33]. The time of the day and the year was also found to be added risk factors for violent incidents. Two studies focussed on the time of the day of the violent incidents and found that they were more common during weekdays in the daytime, particularly at 1 pm and 8 pm, when there are a lot of activities occurring on the ward and staff are more involved with the patients [28,31]. Iversen et al. [31] found that most (40.9%) violent incidents occurred in summer, July being the most predictive month. The quieter season of the year was autumn where only 12.6% violent incidents occurred.

Themes

Table 3 outlines the thematic matrix which identifies the common themes that were derived from the included articles. Six themes emerged were: (1) measure of inpatient violence, (2) Change in behaviour due to a history of violence & substance misuse, (3) Intervention, (4) Time of incident, (5) Cause of violence, and (6) demographic & socioeconomic background of patients.

Table 3: Thematic matrix

Study	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5	Theme 6
	Measure of inpatient violence	Change in behaviour due to a history of violence & substance misuse	Intervention	Time of incident	Cause of violence	Patient demographics
Barlow et al. [30]	√	√		√	√	
Blomhoff et al. [34]		√			√	
Iversen et al. [31]	√			√	√	√
James et al. [33]			√	√	√	
Langsrud et al. [27]				√	√	

Nijman et al. [29]	√					
Raja et al. [26]	√		√	√	
Saverimuttu et al. [32]	√				√
Vaaler et al. [6]	√				
Walker et al. [28]		√		√	√	√

Discussion

Main findings

This study provided an insight into the main predictors of violence among patients in PICUs. Several predictors were evident including demographic characteristics (being male, young and low levels of education), diagnosis of schizophrenia, previous history of violence and substance misuse and environmental factors (lack of staffing and time of the day and month). The findings of this study are consistent with previous studies on associations with violence at the individual patient level. For example, the male gender, young age, and substance misuse have been associated with an increased risk of violence in other studies including those included in meta-analyses in general psychiatric wards [35].

The findings of this review demonstrated that young males are more likely to be involved in violent confrontations in PICUs. This is supported by other studies [35-37]. Several reasons have been proposed for this in previous studies including neurobiological variations such as males having more strength than females, and societal gender roles like males being more involved in arguments as compared to females [38]. In addition, males are also more likely to display high-risk behaviours such as harming others and absconding and this will lead to their admission to a PICU [10,11,39,40].

It is also important to recognize the impact of individuals' psychosocial factors that can contribute to future violent behaviours. Swanson et al. [41] identified multiple factors that can predispose individuals including being homeless, having a history of past violent acts and witnessing violence. Additionally, a family history of violence has been reported as a key predictor of subsequent engagement in violence. Other psychosocial factors identified were: experiencing adverse life events in childhood, lack of social support and bullying in school [42]. Previous literature has reported a strong negative correlation between the level of education, i.e. the acts of violence with individuals from lower education levels being more likely to display violence. This is largely believed to be due to a lack of understanding and insight into their diagnosis which can reduce engagement with treatment [43].

Involuntary admission was identified as a key predictor of violence, both in this study and previous research [35,44,45]. Detention of individuals under a section of the Mental Health Act against their will is strongly associated with violent incidents and thus will lead to high prevalence rates of violence [46].

Substance misuse and the previous history of violence have also been linked with the high incidence of violence in individuals [47,48]. Those individuals with a history of violence are also more likely to misuse substances [49]. Therefore, substance misuse problems are common in forensic settings as this contains patients with a criminal history. This clearly reflects that there is an increased violence risk in these types of settings [50].

The findings of this study reported Schizophrenia to be the most common diagnosis in the patients admitted to PICUs, as compared to other mental health diagnoses. Previous studies highlight that violence is more common in people diagnosed with schizophrenia and they are more likely to be both victims and perpetrators of violence [37].

Several other factors have been associated with violence that was specific to a study. Amore et al. [36] found that violence is common in individuals who are single and are from low socioeconomic status. The socioeconomic background could be an important predictor of future violence because of the individuals' lifestyle and health behaviour. They will be less socially involved with others and have less money because of their status, and this might cause them to be involved in violent or criminal acts. The authors state that the sociodemographic variables of the patients are more important in the prediction of future violence, than their clinical variables such as their diagnosis [36]. In contrast, other studies state that the clinical variables such as diagnosis of the patients are more important in predicting their future violence especially if they are experiencing positive symptoms of their illness such as thought disturbance, hallucinations, and delusions [51].

Violence is frequently observed in all psychiatric settings and nursing staff is the most commonly affected healthcare professionals. Many incidents of violence in psychiatric settings are underreported and are not dealt with appropriately [52]. The rates of violence are particularly higher in forensic settings (that contain patients having a history of violence and crime) as compared to acute psychiatric units. Therefore, all psychiatric settings including forensic settings often face staff shortages. The lack of staffing especially regular ones has been associated with an increased likelihood of violent incidents. Violence in hospitals also results in high costs for healthcare organizations and a possible reduction in the quality of care received by the patients [53-55]. The possibility of violent incidents can be reduced by having enough number of staff on the ward. Therefore, NICE has developed guidelines for safe staffing which must be followed to avoid frequent violent incidents [56].

The causes of violence are not very well explored, however only some factors have been identified till yet, which are: environmental factors, patient-related factors, and factors related to communication between nurses and patients [3,57].

Ridenour et al. [58] showed that more violent incidences with psychiatric settings take place in the evening shift between 3 PM and 11 PM compared to aggression during the day shift which was different from the current findings that reported most incidences between 1 PM and 8 PM. This might be because this study was looking at all the acute psychiatric inpatient units whereas this review just focussed on PICUs.

Strengths and limitations

This is the first systematic literature review to identify the predictors of violence in PICUs. Five different databases were used with an extensive search strategy for data collection. The wide scope of these databases ensured the inclusion of all the studies that were relevant to the topic. These were then analyzed to identify a number of predictors of violent incidents in PICUs. The articles that were found included qualitative, quantitative and mixed methods design. This ensured that a wide range of data was included in the analysis. The use of mixed methods design was useful as it included a combination of qualitative and quantitative information and provided an opportunity to conduct in-depth research. However, conducting in-depth research was not possible due to the availability of resources and time. Therefore, in the future, a mixed-methods design should be used to conduct a similar study. However, this review has some limitations in terms of a high degree of diversity among individual studies particularly in relation to outcome measures.

Implications for future clinical practice

Violence management in PICUs can be significantly improved by identifying patients who are at a high risk of engaging in violence. Therefore, it is essential to improve the awareness of these predictors among staff working in PICUs. This will allow them to effectively identify high-risk individuals and develop interventions to deal with them. Some of the predictors identified in the current study are unavoidable such as demographic characteristics and previous history of violence. However, there should be a greater focus on modifiable factors such as the physical environment, staffing, improving patients' insight into their illness and their engagement with the treatment.

The incidence of violence can be significantly reduced by improving the physical environment of the patients [59]. Several strategies have been proposed in previous research including better lighting facilities, double-glazed bedroom doors and windows. Improved natural light in patients' bedrooms rooms has been shown to enhance their mood and general wellbeing [60]. The provision of double-glazed windows and doors that are sound-proof can enable them to have better sleep. It is important for these patients to get enough sleep as sleep disturbances have been positively associated with violent incidents [27].

Staff attitudes and skills are another important consideration. As previously highlighted, staffing levels on PICUs are a concern [61]. There are many violent incidents in PICUs. Additionally, many staff working in psychiatric services do not feel confident in managing violence [16]. Thus, the provision of quality and the regular number of staff may enhance therapeutic relationships with patients and reduce the risk of violent incidents. In addition, staff working in such settings should also undergo appropriate regular training on identifying, managing and preventing violent behaviours. This may include using techniques such as de-escalation to prevent violent incidents from escalating further [62]. Restraint should be only considered as a last resort to manage these types of incidents and should be performed in accordance with the National Institute for Health and Care Excellence's guidelines [42]. Finally, the provision of seclusion facilities that enables patients to have some space to calm down has been shown to be beneficial, but this should also be used after other options have been tried or exhausted [62].

Therapeutic ward-based activities have been shown to improve patient recovery. Efforts could be made to improve the availability of therapeutic interventions on a daily basis for patients. This is because their boredom has been linked with violent behaviour [31]. Thus, the provision of simple relaxation activities can distract patients from triggers of aggression and can improve their therapeutic relationships with staff [61,8]. Staff working in PICUs should offer more one to one intervention with patients to enable them to discuss any distressing issues [27]. This will also enable them to carry out appropriate risk assessments and determine the early warning signs and potential triggers thereby preventing any violent incidents. The use of validated risk assessment tools, such as BVC (Bröset Violence Checklist) and SOAS-R (Staff Observation Aggression Scale-Revised) can be used to predict short term risk of violence in patients. These tools were used by Langsrud et al. [27] and Nijman et al. [29], and have proved to be effective in identifying violent patients in the short term. Finally, there should be a greater focus on improving awareness among patients of potential triggers for violence and reducing substance misuse which are key predictors of violence. The development of educational interventions that improve knowledge on the risks associated with substance misuse may prevent patients from using illicit substances. In addition, educating individuals about their diagnosis and recognizing key signs of their deterioration can empower them to manage their symptoms more effectively [63,64].

Conclusion

The key predictors of violent incidents among patients in psychiatric intensive care units were identified using a systematic literature review methodology. They were found to be; their demographic status (being a young male who is less educated); being admitted involuntarily for the treatment of schizophrenia; having a previous history of violence and substance misuse. Violent patients have a higher readmission rate and longer duration of hospital admission. It was also found that the hospital environmental factors could equally contribute towards the patients to become aggressive and violent; this included the shortage and frequent turnover of permanent nursing staff which leads to patients' boredom. This review noticed the inadequacy of recording incidents and outcomes following validated procedures due to varied hospital management and settings. Therefore, future research could focus on a similar topic using validated tools to explore the violence/aggression in PICUs operating in multi-geographical settings. Some bespoke interventions which could reduce future violent incidents in PICUs may be piloted in a few hospital settings and be recommended for scaling-up. Future research could also focus on collating and applying some examples of the best practices for effectively dealing with violent patients. Some of the interventions could be not very cost-effective if applied in the hospital settings, therefore, it would be better to explore and identify interventions in the community settings to reduce the risk factors and prevent patients from conducting violent acts. Initially, only those individuals will be focussed on who are from a lower socioeconomic background and have a past history of violence and substance misuse. The successful outcome will lead to an increase in the focus on individuals who fit into the categories of any of the key predictors identified from this study. The success of these interventions will result in fewer hospital admissions which will ultimately result in cost-savings for the NHS. The reoccurrence of violent incidents could also significantly be reduced by run-

ning a combined therapy or awareness training session which will be aimed at those individuals who are at a risk of violence, which can be found out from the findings of this study. The frequency of this session will be dependent on the area and the number of individuals who are registered to attend these sessions. Upon succeeding with the interventions, a policy could be implemented for dealing with violent incidents in order to minimize/prevent it from reoccurring.

Acknowledgement

References

1. World Health Organisation. World report on Violence and Health. 2002.

2. Sullivan P. Developing evidence--based care in mental health nursing. Nursing Standard. 1998; 12: 35-38.

3. Niu S, Kuo S, Tsai H, Kao C, Traynor V, et al. Prevalence of workplace violent episodes experienced by nurses in acute psychiatric settings. PLoS One. 2019; 14: e0211183.

4. Clarke D, Brown A, Griffith P. The brøset violence checklist: Clinical utility in a secure psychiatric intensive care setting. Journal of Psychiatric and Mental Health Nursing. 2010; 17: 614-620.

5. Lantta T, Anttila M, Kontio R, Adams, C, Välimäki, M, et al. Violent events, ward climate and ideas for violence prevention among nurses in psychiatric wards: A focus group study. International Journal of Mental Health Systems. 2016; 10: 27.

6. Vaaler A, Iversen V, Morken G, Fløvig J, Palmstierna T, et al. Short-term prediction of threatening and violent behaviour in an acute psychiatric intensive care unit based on patient and environment characteristics. BMC Psychiatry. 2011; 11: 44.

7. National Institute for Health and Excellence. Violence and aggression: the short-term management of violent and physically threatening behaviour in mental health, health and community settings. NICE Guidelines - Draft for consultation. 2014.

8. Richter D, Whittington R. Violence in mental health settings: Causes, consequences, management. New York, NY: Springer. 2006.

9. Harwood, R. How to deal with violent and aggressive patients in acute medical settings. Journal of the Royal College of Physicians of Edinburgh. 2017; 47: 176-182.

10. Bowers L, Jeffery D, Bilgin H, Jarrett M, Simpson A, et al. Psychiatric intensive care units: A literature review. International Journal of Social Psychiatry. London, England: Sage Publications. 2008.

11. Brown S, Bass N. The psychiatric intensive care unit (PICU): Patient characteristics, treatment and outcome. Journal of Mental Health. 2004; 13: 601-609.

12. Gintalaite K, Tandon V, Woochit V. FC11-06 - female - only psychiatric intensive care unit (PICU): Prospective study of patient demographics and outcomes at Elizabeth casson house, Bristol, UK. European Psychiatry. 2011; 26: 1875.

13. Bowers L, Flood C. Nurse staffing, bed numbers and the cost of acute psychiatric inpatient care in England. Journal of Psychiatry and Mental Health Nursing. 2008; 15: 630-637.

14. Erikson M. Limiting patients as a nursing practice in psychiatric intensive care units to ensure safety and gain control. Perspectives in Psychiatric Care. 2015; 51: 241-252.

15. Pereira S, Sarsam M, Bhui K, Paton C. The London survey of psychiatric intensive care units: Psychiatric intensive care; patient characteristics and pathways for admission and discharge. Journal of Psychiatric Intensive Care. 2005; 1: 17-24.

16. Bowers L, Stewart D, Papadopoulos C, Dack C, Ross J,et al. Inpatient violence and aggression: A literature review. 2011.

17. Brown S, Langrish M. The impact of a new psychiatric intensive care unit on the rest of an in-patient psychiatric service. Journal of Psychiatric Intensive Care. 2006; 2: 126-128.

18. Foster C, Smedley K. Investigating the nature of mental health nursing within an adolescent psychiatric intensive care unit: Identifying nursing interventions that contribute to the recovery journey of young people. University of Salford. 2016.

19. National Institute for Health and Excellence. Violence and aggression: Short-term management in mental health, health and community settings. 2015.

20. National Association of Psychiatric Intensive Care and Low Secure Units. 2014.

21. NHS Institute for Innovation and Improvement. Focus on – psychiatric intensive care units (PICUs). 2008.

22. King Edward Memorial Hospital Library. What is a systematic review and how does it differ from a literature review. 2019.

23. Moher D, Liberati A, Tetzlaff J, Altman D. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine. 2009; 6: e1000097.

24. Hawker S, Payne S, Kerr C, Hardey M, Powell J. Appraising the evidence: Reviewing disparate data systematically. Qualitative Health Research. 2002; 12(9): 1284-1299.

25. Evans D, Kowanko, I. Literature reviews: Evolution of a research methodology.The Australian Journal of Advanced Nursing. 2006; 18: 33-38.

26. Raja M, Azzoni A. Hostility and violence of acute psychiatric inpatients. Clinical Practice and Epidemiology in Mental Health: CP & EMH. 2005; 1: 11.

27. Langsrud K, Kallestad H, Vaaler A, Almvik R, Palmstierna T,et al. Sleep at night and association to aggressive behaviour; patients in a psychiatric intensive care unit. Psychiatry Research. 2018; 263: 275-279.

28. Walker Z, Seifert R. Violent incidents in a psychiatric intensive care unit. The British Journal of Psychiatry. 1994: 164: 826-828.

29. Nijman H, Merckelbach H, Evers C, Palmstierna, T, Campo J. Prediction of aggression on a locked psychiatric admissions ward. Acta Psychiatrica Scandinavica. 2002; 105: 390-395.

30. Barlow K, Grenyer B, Ilkiw-Lavalle O. Prevalence and precipitants of aggression in psychiatric inpatient units. Australian and New Zealand Journal of Psychiatry. 2000; 34: 967-974.

31. Iversen V, Aasen O, Güzey I, Helvik A. Incidence of violent behaviour among patients in psychiatric intensive care units. Journal of Psychiatry. 2016; 30: 67-78.

32. Saverimuttu A, Lowe T. Aggressive incidents on a psychiatric intensive care unit. Nursing Standard. 2000; 14: 33-36.

33. James D, Fineberg N, Shah A, Priest R. An increase in violence on an acute psychiatric ward. A study of associated factors. The British Journal of Psychiatry. 1990; 156: 846.

34. Blomhoff S, Seim S, Friis, S. Can prediction of violence among psychiatric inpatients be improved? Psychiatric Services. 1990; 41: 771-775.

35. Iozzino L, Ferrari C, Large M, Nielssen O, Girolamo G. Prevalence and risk factors of violence by psychiatric acute inpatients: A systematic review and meta-analysis. PLoS One. 2015; 10: e0128536.

36. Amore M, Menchetti M, Tonti C, Scarlatti F, Lundgren E, Esposito W, Berardi D. Predictors of violent behaviour among acute psychiatric patients: Clinical study. Psychiatry and Clinical Neurosciences, 2008; 62: 247-255.

37. Fazel S, Gulati G, Linsell L, Geddes J, Grann M. Schizophrenia and violence: Systematic review and meta-analysis. PLoS Medicine. 2009; 6: e1000120.

38. Prinz J. Psychology today. 2012.

39. Cullen A, Bowers L, Khondoker M, Pettit S, Achilla E, et al. Factors associated with use of psychiatric intensive care and seclusion in adult inpatient mental health services. 2018. Epidemiology and Psychiatric Sciences. 2018; 27: 51-61.

40. Tardiff K, Koenigsberg H. Assaultive behaviour among psychiatric outpatients. American Journal of Psychiatry. 1985; 142: 960-963.

41. Swanson J, Swartz M, Essock S, Osher F, Wagner R, Goodman L. The social-environmental context of violent behaviour in persons treated for severe mental illness. American Journal of Public Health. 2002; 92: 1523-1531.

42. Rueve M, Welton R. Violence and mental illness. Psychiatry (Edgemont). 2008; 5: 34-48.

43. Zeng J. Frequency and risk factors of workplace violence on psychiatric nurses and its impact on their quality of life in china. Psychiatry Research. 2013; 210: 510-514.

44. Dack C, Ross J, Papadopoulos C, Stewart D, Bowers L. A review and meta-analysis of the patient factors associated with psychiatric in-patient aggression. Acta Psychiatrica Scandinavica. 2013; 127: 255-268.

45. D'Ettorre G, Pellicani V. Workplace violence toward mental healthcare workers employed in psychiatric wards. Safety and Health at Work. 2017; 8: 337-342.

46. Arnetz J, Hamblin L, Essenmacher L, Upfal MJ, Ager J, Luborsky M. Understanding patient-to-worker violence in hospitals: A qualitative analysis of documented incident reports. Journal of Advanced Nursing. 2015; 71: 338- 348.

47. Johnson E, Belfer M. Substance abuse and violence: Cause and consequence. Journal of Health Care for the Poor and Underserved. 1995; 6: 113-121.

48. Virk I. Aggression rate in acute inpatient psychiatric units: Impact of substance abuse and psychosis. MOJ Addiction Medicine & Therapy. 2017; 3.

49. O'Rourke M, Wrigley C, Hammond S. Violence within mental health services: How to enhance risk management. Risk Management and Healthcare Policy. 2018; 11: 159-167.

50. Quanbeck C. Forensic psychiatric aspects of inpatient violence. Psychiatric Clinics of North America. 2006; 29: 743-760.

51. Link B. Psychotic symptoms and the violent/illegal behaviour of mental patients compared to community controls. Violence and Mental Disorder: Developments in Risk Assessment, Chicago, IL, US: University of Chicago Press. 1994; 137-159.

52. Owen C, Tarantello C, Jones M, Tennant C. Violence and aggression in psychiatric units. Psychiatric Services. 1988; 49: 1452-1457.

53. Arnetz J, Arnetz B. Violence towards health care staff and possible effects on the quality of patient care. Social Science & Medicine. 2001; 52: 417-427.

54. Kelly E, Fenwick K, Brekke J, Novaco R. Well-being and safety among inpatient psychiatric staff: The impact of conflict, assault, and stress reactivity. Administration and Policy in Mental Health and Mental Health Services Research. 2016; 43: 703-716.

55. Tikva S, Chintz D, Stern Z, Bulbis F. Violence against physicians and nurses in a hospital: How does it happen? A mixed-methods study. Israel Journal of Health Policy Research. 2017; 6: 59-12.

56. National Institute for Health and Care Excellence. Safe staffing for nursing in inpatient mental health settings. 2014.

57. Angland S, Dowling M, Casey D. Nurses' perceptions of the factors which cause violence and aggression in the emergency department: A qualitative study. International Emergency Nursing. 2014; 22: 134-139.

58. Ridenour M, Lanza M, Hendricks S, Hartley D, Rierdan J, et al. Incidence and risk factors of workplace violence on psychiatric staff. Work. 2015; 51: 19-28.

59. Mair J, Mair M. Violence prevention and control through environmental modifications. Annual Review of Public Health. 2003; 24: 209-225.

60. Kotru A. (2013). Hospital room lighting may worsen patients' mood, pain. 2013.

61. Hoyt N, Puder D, Friedman G. Reducing inpatient violence in a psychiatric hospital. 2019.

62. Richmond J, Berlin J, Fishkind A, Holloman G, Zeller S, et al. Verbal de-escalation of the agitated patient: Consensus statement of the American association for emergency psychiatry project BETA de- escalation workgroup. The Western Journal of Emergency Medicine. 2012; 13: 17-25.

63. Global Citizen. Education reduces violence. 2014.

64. Morgan E. Females are outperforming males on every educational level, and that has staggering implications for the future of our society. 2018.