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SYSTEMATIC REVIEW

Developing nurse-sensitive outcomes in acute inpatient mental health settings—A systematic review

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Abstract

Background: While nurse-sensitive outcomes (NSOs) are well established in numerous health settings, to date there is no indicator suite of NSOs for inpatient mental health settings.

Aim: To assess the relationship between nursing variables and patient outcomes in acute inpatient mental health settings to determine which outcomes can be used as indicators of the quality of nursing care.

Methods: Databases accessed were CINAHL, MEDLINE, PsycINFO and EMBASE, last searched in May 2022. The review followed the 2020 PRISMA checklist for systematic reviews. Papers published between 1995 and 2022, conducted in acute mental health care units were included. The quality of the studies was assessed using the Effective Public Health Practice Project Quality Assessment Tool. A meta-analysis was not possible because of the large number of variables and measurement inconsistencies.

Results: A total of 57 studies were reviewed. Studies were categorised according to whether they found a significant or non-significant relationship between nurse variables and patient outcomes. Seven outcomes—aggression, seclusion, restraint, absconding, pro-re-nata medications, special observations and self-harm—were identified. For each outcome, there were significant findings for several nurse variables indicating that all included outcomes could be used as NSOs. However, evidence for aggression, seclusion and restraint use as suitable NSOs was more robust than the evidence for self-harm, absconding, pro-re-nata medications and special observations.

Conclusion: All the seven outcomes can all be used to develop an NSO indicator suite in mental health inpatient settings. More work is needed to establish high-quality studies to clearly demonstrate the relationship between these outcome measures and changes in nurse variables such as nurse staffing, skill mix, work environment, nurse education and nurse experience.

Patient and Public Contribution: Patient or public contribution was not possible because of the type of the variables being explored.

KEYWORDS
inpatients, mental health nursing, mental health services, nurses, outcomes assessment

1 | INTRODUCTION

Measuring the quality of health care services is necessary to ensure that services are providing high quality, effective and efficient patient care (Allen-Duck et al., 2017). While it is important to evaluate the overall quality of patient care, measuring different aspects of health care services is also required to ensure granular data are available to improve the quality of care. One important aspect to measure is the contribution of different health care professionals to the overall quality of patient care. This type of data enables health care managers to understand the effect on patient care of any changes in workforce variables (Heslop et al., 2014). Nurses constitute the largest proportion of the health workforce budget (World Health Organisation, 2020) and are often the focus of cost-cutting exercises. Without data on the relationship between nurse variables and patient outcomes informed decisions about the nursing workforce cannot be made, and changes may result in increased adverse outcomes for patients and therefore increased costs.

Nurse-sensitive outcomes (NSOs) are patient outcomes that can be linked to the quality of nursing care (Twigg et al., 2015), and which show the value of nursing care within a health care service. Since the landmark study by Needleman et al. (2002), research linking nursing variables such as staffing level and skill mix with patient outcomes have increased exponentially and have been tested in many settings. While NSOs are now well established in numerous settings (Twigg et al., 2016), the development and conceptualisation of NSOs in mental health care have fallen behind considerably, and to date, an indicator suite of NSOs for inpatient mental health settings is not available (evidence-based list of patient outcomes relevant to nurses' scope and domain of practice and are influenced by nursing inputs and interventions) (Twigg et al., 2016).

Mental health patient outcomes such as aggression (Chou et al., 2002), self-harm (Bowers et al. 2007), absconding (Bowers et al., 2006), special observations (Stewart & Bowers, 2012) and use of Pro Re Nata medication (Baker et al., 2009) have been associated with NSO; however, the evidence is inconsistent. Pragmatic evidence summarising patient outcomes and quality of nursing care in mental health settings is needed to guide further research and practice in mental health settings. Reviews on this subject and in mental health settings have only linked NSO to patient outcomes with specific diagnoses, and in particular serious mental illnesses and in community mental health settings (Leach et al., 2020). A recent review by Hunter et al., 2022 developed nursing care process metrics. There is a need to present empirical evidence linking all mental illnesses to NSO and to examine nursing care outcome indicators to guide policy and clinical practice.

Key Points

- Nurse-sensitive outcomes (NSOs) are well established in numerous health settings, to date there is no indicator suite of NSOs for inpatient mental health settings.
- Patient outcomes including aggression, seclusion, restraint, absconding, pro-re-nata medications, special observations and self-harm as associated with nursing variables.
- These outcomes could be used to develop an NSO indicator suit in mental health inpatient settings.
- More studies are needed to demonstrate the relationship between the patient outcomes and changes in nurse variables.

2 | AIMS

The aim of this review was to explore the relationship between nursing variables and patient outcomes in acute inpatient mental health settings to determine which patient outcomes can be used as indicators of the overall quality of nursing care in these settings.

3 | METHODS

An initial scoping review (unpublished) was undertaken to inform the search strategy and see which patient outcomes potentially sensitive to nursing care have been investigated in mental health care settings in the literature. The review followed the 2020 updated Preferred Reporting Items for Systematic and Meta-analysis (PRISMA) checklist for systematic reviews (Page et al., 2021) (see Appendix S1). A total of 93 articles were identified for full-text review with 10 studies retained for further examination. Most of the studies examined aggression, seclusion, restraint, absconding, composite conflict and containment outcomes, suicide, and self-harm, with a few examining other outcomes such as patient safety, patient distress, service user involvement in care, clinical time, medication errors, falls, patient/family complaints, HoNOSCA score, incidents leading to death and forced medication. An expert panel met to discuss the results of the scoping review to identify outcomes to be investigated in the systematic review phase of the project. The following outcomes were identified for further investigation—aggression, seclusion, restraint, absconding,

pro-re-nata (PRN) medications, special observations and self-harm—as a starting point for the development of an NSO indicator suite for inpatient mental health settings. Using these outcomes, a systematic review was conducted to assess the evidence for the relationship between each of the potential indicators and nursing variables to determine whether they could be used as robust NSOs in mental health care settings.

The PICOS statement (Population, intervention, context, outcomes, study design) for the review was as follows:

3.1 | Population

Mental health consumers in psychiatric inpatient units including public hospitals (public psychiatric hospitals as well as public acute hospitals with a psychiatric unit or ward) and private psychiatric hospitals. Excluding residential mental health services (including long-term aged care services), community mental health care services or forensic psychiatry care as they are deemed distinctive from general psychiatric inpatient care.

3.2 | Intervention

Nurse variables such as nurse staffing—(ratio of nurses to patients, nurse overtime, number of nurse hours per patient day (NHPPD)), nurse skill mix, practice environment, nurse interpersonal style/therapeutic behaviours, ward environment, nurse education, nurse experience levels, gender and staff morale/burnout.

3.3 | Context

Inpatient mental health settings.

3.4 | Outcomes

A reduction in rates of aggression, absconding, or self-harm or use of seclusion, restraints, PRN medication, or special observations.

3.5 | Study design

Observational/Descriptive (includes cross-sectional, prospective/cohort studies, case–control studies), and Experimental (includes experimental (RCT) and quasi-experimental (time-series, etc.)).

3.6 | Eligibility criteria

Studies were included if they met the following criteria:

1. Written in the English language
2. Published between 1995 and 2022 as thesis or scholarly articles in journals
3. Conducted in specialised mental health care facilities/psychiatric inpatient units including public hospitals (public psychiatric hospitals as well as public acute hospitals with a psychiatric unit or ward) and private psychiatric hospitals

Studies were excluded if they met the following criteria:

1. Published in a language other than English
2. Conducted solely in residential mental health services (including aged care services), community mental health care services or forensic psychiatry care
3. Outcome was staff to staff aggression
4. Focused on restraint or seclusion as process indicators, not patient outcomes

3.7 | Search strategy and information sources

The search terms covered two main concepts—nursing variables and patient outcomes. The full search strategy for each database is contained in Appendix S1. The search strategy was developed by one author based on the PICOS statement and informed by the scoping review. The strategy was further discussed with the University librarian to ensure all synonyms or equivalent subheadings were captured. The strategy focused on the version of the scoping review search strategy. Databases searched were CINAHL Plus with Full Text (EBSCOhost), MEDLINE (EBSCOhost), PsycINFO (EBSCOhost) and EMBASE (Elsevier), with study inclusion from 1995 to the present. The last search of CINAHL, MEDLINE and PsycINFO was conducted on 23 October 2020 and updated on 30 April 2022. Embase was searched on 26 October 2020 and on 10 May 2022. After the final studies were identified through the selection process, the results were compared against the studies identified through the scoping review process. Additional studies identified in the scoping review but not the systematic review were included in the selection process.

3.8 | Study selection

All references were exported into Endnote X9 (Clarivate Analytics, PA, USA) citation manager where duplicates were removed. Title and abstract screening were completed independently by two reviewers in the online platform Rayyan QCRI (Ouzzani et al., 2016). Studies were deemed appropriate for a full-text analysis if the a priori eligibility criteria were addressed. Full-text screening was undertaken by four independent reviewers working in teams. Any discrepancies were resolved after discussion between the reviewers for each paper or with a fourth reviewer if required.

3.9 | Data extraction

A data collection spreadsheet was developed to enable recording of the relevant data from each study based on previous data extraction processes used by members of the research team. Data were extracted for each study by one author to identify the nurse variables that had been investigated for each of the seven patient outcome measures, as well as other study characteristics. The seven outcomes of interest were aggression (patient verbal and physical aggression, against objects, staff or other patients), absconding, self-harm, use of seclusion, restraints (physical/mechanical or chemical), PRN medication and special observations. Outcomes were only broadly defined to capture as many studies as possible. Data were extracted on the report—author and year, the study—country, design, sample, setting, and study period, the outcomes measured and how they were measured, the nurse variables measured, and key findings. Key findings were included in the data extraction only if they related to the relationship between nurse variables and patient outcomes; therefore, there were some findings that were not included in the data extraction table.

3.10 | Quality assessment of the included studies

The Quality Assessment Tool for Quantitative Studies developed by the Effective Public Health Practice Project (Armijo-Olivo et al., 2012; Thomas et al., 2004) which allows reviewers to rate six components of each study as strong, moderate or weak was used to assess the quality of each study. The construct and content validity of this generic tool has been established, and it is considered suitable in the assessment of a wide range of study designs for systematic reviews (Deeks et al., 2003). The six components are selection bias, design, confounders, blinding, data collection methods, and withdrawals and dropouts. A global rating of strong, moderate or weak is derived from the ratings for each of these sections. Three reviewers independently assessed each study and rated the quality. Any discrepancies were resolved after discussion between the reviewers for each paper, or if these could not be resolved a fourth reviewer was consulted and the review discussed until agreement was reached.

3.11 | Synthesis methods

A meta-analysis was not conducted, and no specific effect measures were generated. Key findings were extracted as reported by the study authors. In many studies, no effect measurements were reported. There were many different nurse variables, measured in different ways, for each of the outcomes. Additionally, the seven outcomes were conceptualised and measured in different ways; therefore, a meta-analysis of the results could not be completed. A narrative synthesis was conducted. Results for each of the seven outcomes were grouped and reported together. An additional group of conflict/containment studies which included within them the seven outcomes of interest were grouped and reported separately. Studies for all seven outcomes, including the conflict/containment studies, were synthesised in a table, and categorised according to whether they found a significant or non-significant relationship between nurse variables and patient outcomes. This enabled an assessment to be made of which outcomes had the potential to be included in an NSO indicator suite for inpatient mental health settings.

3.12 | Reporting bias and certainty assessment

No reporting bias or certainty assessment was undertaken as a meta-analysis was not performed and results were synthesised narratively.

3.13 | Outcome data collection methods

There were several ways in which the outcome data were collected in the included studies. Most commonly, outcome data were collected specifically for the research project using investigator-designed data collection forms that were completed by nursing staff ($n = 24$). Another common method was for the researchers to extract the data from hospital incident reporting forms or incident logs ($n = 12$) or from patient medical records ($n = 4$). Ten studies used administrative datasets including public statutory datasets ($n = 5$), the National Database of Nursing Quality Indicators (NDNQI) ($n = 3$) and hospital-based administrative datasets ($n = 2$). Six studies did not state their outcome data collection method.

4 | RESULTS

4.1 | Study inclusion

A total of 4833 references were retrieved. After duplicates were removed, a total of 3072 references remained for title/abstract screening. Of these, 115 references were retained for full-text review. A further 69 articles were excluded at full-text review as not meeting the inclusion criteria. Reasons for exclusion included nurse variables not measured ($n = 22$), outcomes not linked to nurse variables ($n = 20$), wrong study design ($n = 12$), wrong outcome ($n = 5$), wrong setting ($n = 4$), study reported twice in different journals ($n = 2$), no statistical analysis conducted ($n = 2$), nurses not analysed separately ($n = 1$) and outcomes not measured ($n = 1$). The details of excluded are included in Appendix S1—Excluded Studies. Additionally, there were 10 studies identified in the initial scoping review that were not located in the systematic review process that were retained for inclusion in the review. A total of 56 peer-reviewed studies were included in the final review. See Figure 1.

4.2 | Study characteristics

There were no randomised controlled trials located in this review. Most studies (n = 47) were descriptive including cross-sectional, correlational and longitudinal designs; and eight were intervention studies utilising a variety of study designs. One study was an economic evaluation.

4.3 | Quality assessment of the included studies

All studies were rated as weak or moderate overall, with particular issues regarding blinding (39 papers) and control for confounders (32). More studies were rated moderate for selection bias (36) and design (36), while data collection methods (13), selection bias (5) and withdrawal or dropouts (4) were rated strong for some studies.

All studies were included as they met the criteria for context, outcomes and design.

4.4 | Outcomes

At least one study was located for each of the outcomes included in the review. The most commonly studied outcomes were aggression, seclusion and restraint use while the least studied outcome was special observations. Results are presented for each outcome separately, and for the suite of studies focusing on conflict and containment outcomes. Studies were categorised for each outcome according to whether they found a significant or non-significant relationship between the nurse and patient outcome variables.

For the purposes of this review, Registered Mental Health, Registered Psychiatric Nurse and Registered Mental Nurse are a qualified nurse working in a mental health setting and registered by the respective professional bodies. Student nurses are pre-registration nurses underrating training, and unqualified staff are staff working with nurses as assistants but are not regulated by a professional body.

Studies were classified as having a positive relationship if the result was statistically significant and lower levels of the outcome were associated with improved or higher levels of the nurse variable. For example, if a study found that more nurses per patient (higher nurse/patient ratio) were significantly associated with lower levels of seclusion use, it was classified as having a positive relationship. Studies were classified as having a negative relationship if the result was statistically significant but higher levels of the outcome were associated with improved levels of the nurse variable. For example, if a study found that higher levels of nurse staffing (more nurses on shift) were significantly associated with higher levels of aggression, it was classified as having a negative relationship.

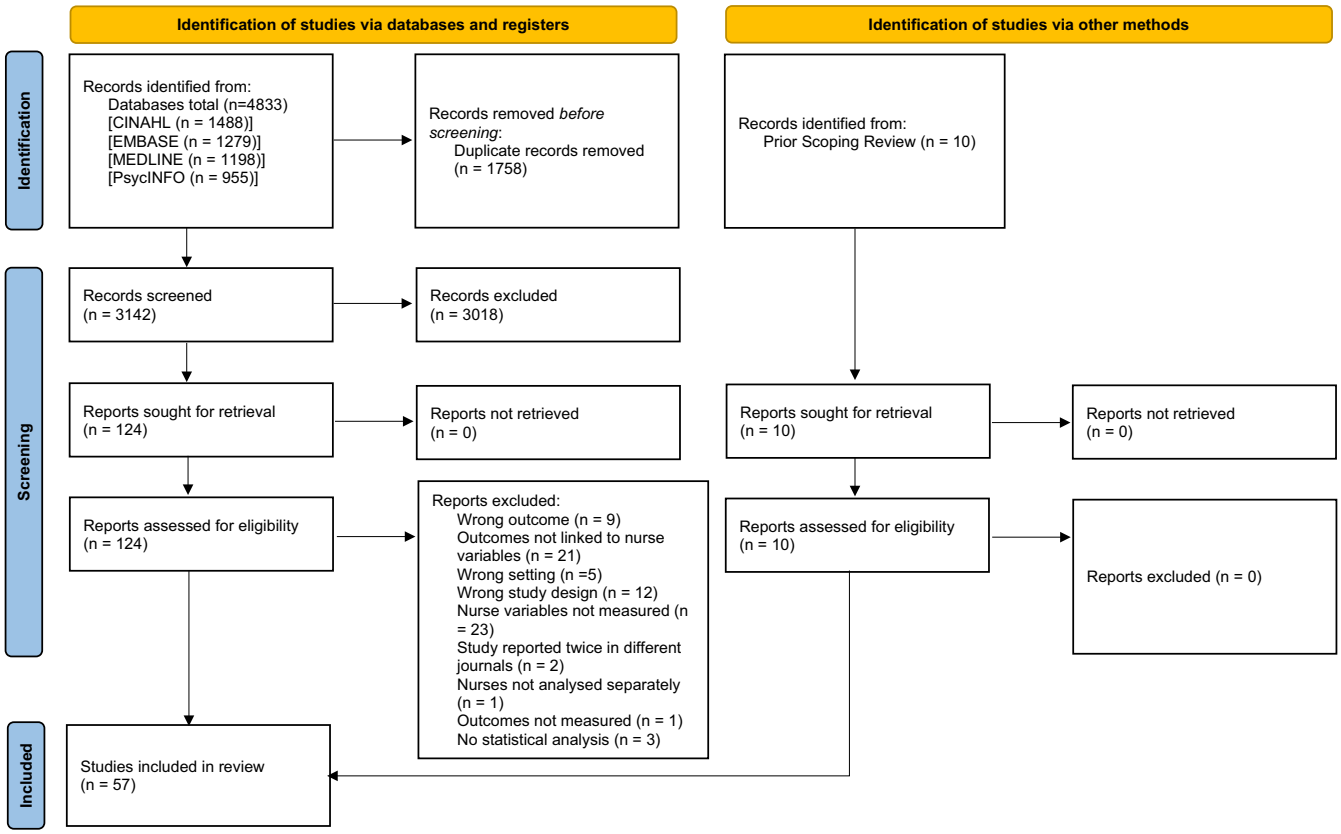

FIGURE 1 Flow diagram of search results and study selection. [Colour figure can be viewed at wileyonlinelibrary.com]

4.5 | Conflict and containment studies

Of the 56 studies located in the search process, 16 were related to three datasets from programs of research by Bowers and colleagues investigating conflict and containment rates and various nursing and other variables in acute psychiatric inpatient wards (Baker et al., 2009; Bowers, 2009; Bowers, Allan, et al., 2007; Bowers, Allan, Simpson, Jones, Van Der Merwe, & Jeffery, 2009; Bowers, Allan, Simpson, Jones, & Whittington, 2009; Bowers & Crowder, 2012; Bowers et al., 2006, 2012, 2013; Bowers, Flood, et al., 2008; Bowers, Jeffery, et al., 2007; Bowers, Whittington, et al., 2008; Bowers et al., 2010; E-Morris et al., 2010; Kartha & McCrone, 2019; Papadopoulos et al., 2012; Stewart & Bowers, 2012). Conflict and containment are patient behaviours and staff actions that form a significant part of the nurse–patient relationship in acute psychiatric inpatient wards (Bowers, 2006). There are 21 conflict behaviours and nine containment actions included in this model. Conflict behaviours are verbal aggression, physical aggression against objects, physical aggression against self, physical aggression against others, suicide attempt, smoking in non-smoking area, refusing to eat, refusing to drink, refusing to attend to personal hygiene, refusing to get out of bed, refusing to see workers, alcohol misuse confirmed, alcohol misuse suspected, other substance misuse confirmed, other substance misuse suspected, attempting to abscond, absconding (missing without permission), absconding (official report), refused regular medication, refused PRN medication and demanding PRN medication. Containment measures are given PRN medication, given intramuscular medication (enforced), transferred to psychiatric intensive care unit, seclusion, intermittent observation, continuous observation, restrained, time out and door locked. Total weighted scores for both conflict and containment can also be computed.

In this review, the seven outcomes of interest are all included within the conflict/containment model. Aggression, absconding and self-harm are conflict behaviours, and seclusion, restraint, PRN medications and special observations are containment measures. Some of the studies reported on specific outcomes within the conflict/containment model while others reported only aggregated total conflict or containment results. Rather than report these results separately under each outcome, the results of these research programs are reported together in a separate section to reflect the inter-related nature of these studies. The three research programs are the City Nurse Project, the Tompkins Acute Ward study and the City-128 Project.

4.6 | City nurse project

The City Nurse Project was designed to reduce conflict and containment through changing nurses' beliefs, attitudes and practices. There were two papers from this project that met the review inclusion criteria. The first intervention study (Bowers et al., 2006) found a significant reduction in aggression, absconding and special observations after the intervention but no effect on PRN medications and restraint use. Scores on the ward atmosphere scale also improved after the intervention. A replication study (Bowers, Flood, et al., 2008) found no effect for the intervention. While pre/post analysis showed a significant reduction in aggression, seclusion, intermittent and continuous observations, PRN medication, and restraint use, a more stringent analysis showed no effect of the intervention on conflict and containment events.

4.7 | Tompkins acute ward study

The Tompkins Acute Ward Study was a multi-method longitudinal investigation of links between adverse incidents and staff factors. Three papers related to this study, focused on aggression, absconding and self-harm, that met the review criteria were located. In the first, Bowers, Jeffery, et al. (2007) found that physical aggression decreased after the addition of nursing students to the ward (IRR = .82, p = .014), but there was no association between the arrival of the nursing students and rates of verbal aggression, absconding or self-harm. In the second paper, Bowers, Allan, et al. (2007) found that physical aggression (IRR = 1.10, 95% CI: 1.02, 1.19) and self-harm (IRR = 1.22, 95% CI: 1.11, 1.34) increased when there were more staff absences; however, the association with verbal aggression, property damage and absconding was not significant. They also reported that bank/agency staff hours were not associated with any of the outcomes. In the third paper, Papadopoulos et al. (2012) reported on total conflict and containment rates. Several nurse factors—negative staff morale, staff-staff conflict, staffing change with a negative impact, staff feeling pressured, with a high workload or stressed—were all significantly associated with increased rates of conflict and containment. Staff feeling less pressured, with a lower workload or less stress, and staffing change with a positive impact were significantly associated with decreased rates of conflict and containment.

4.8 | City-128 study

The City-128 study explored the relationship between the conflict and containment variables, as well as the relationship between conflict/containment and ward and staffing variables. The sample consisted of 136 acute psychiatric wards with their patients and staff in 67 hospitals within 26 National Health Service Trusts in England. Data collection occurred in the 2004–2005 period. There were 11 studies that used this dataset and met the review criteria.

In seven papers using this dataset, the research teams focused on specific conflict/containment outcomes and their relationship with a variety of staffing variables. In one of these, researchers studied nurse staffing and aggression (Bowers, Allan, Simpson, Jones, Van Der Merwe, & Jeffery, 2009). They reported that higher rates of verbal aggression were associated with higher numbers of qualified staff (IRR = 1.028 95% CI: 1.018, 1.039), bank/agency qualified staff (IRR 1.018, 95% CI: 1.010, 1.026), bank/agency unqualified staff (IRR = 1.017, 95% CI: 1.009, 1.025)

and student nurses (IRR = 1.016, 95% CI: 1.008, 1.024), but not with number of unqualified staff. Higher rates of physical aggression toward objects were associated with higher levels of qualified staff (IRR = 1.123, 95% CI: 1.088, 1.159), bank/agency qualified staff (IRR = 1.071, 95% CI: 1.040, 1.103), bank/agency unqualified staff (IRR = 1.037, 95% CI: 1.009, 1.065), but not with number of unqualified staff or student nurses. Higher rates of physical aggression toward others were associated with higher levels of qualified staff (IRR = 1.145, 95% CI: 1.105, 1.186), and bank/agency qualified staff (IRR = 1.075, 95% CI: 1.039, 1.111), but not with number of unqualified staff, bank/agency unqualified staff or student nurses. No association was found for any aggression variables with the ward atmosphere.

The dataset was also used to investigate nurse staffing and self-harm. Researchers found there was a significant decrease in self-harm rates with more qualified nurses on duty (OR .94, 95% CI: .90, .98), and a significant increase with more student nurses on duty (OR 1.05, 95% CI: 1.01, 1.09) (Bowers, Whittington, et al., 2008). Studying seclusion, E-Morris et al. (2010) reported that higher seclusion rates were associated with a higher proportion of qualified to total staff (IRR = 1.104, 95% CI: 1.011, 1.206), but not with nursing staff per bed or proportion of male staff. Higher rates of manual restraint were associated with higher numbers of qualified staff (IRR = 1.121, 95% CI: 1.071, 1.172), and number of student nurses (IRR = 1.063, 95% CI: 1.024, 1.103), but not with number of unqualified staff, bank/agency qualified staff or bank/agency unqualified staff. Higher scores on the ward atmosphere scale (a better ward atmosphere) were associated with reduced restraint rates (IRR = .856, 95% CI: .767, .956) (Bowers et al., 2012).

In another study on special observations, researchers reported that there were no staffing factors significantly associated with intermittent special observations while lower rates of continuous observations were associated with higher levels of regular qualified staff (IRR = .911, 95% CI: .894, .929) and higher bank/agency qualified staff (IRR = .842, 95% CI: .823, .862). Higher levels of continuous observations were associated with higher levels of regular unqualified staff (IRR = 1.051, 95% CI: 1.034, 1.069) and bank/agency unqualified staff (IRR = 1.240, 95% CI: 1.219, 1.260). Ward atmosphere was not significantly related to either intermittent or continuous special observations (Stewart & Bowers, 2012). Baker et al. (2009) found that refusing PRN medication was not significantly associated with any nurse staffing variables or the ward atmosphere; however, demanding PRN medication was significantly associated with the number of qualified nurses on duty (OR .897, 95% CI: .879, .914) and the number of student nurses on duty (OR .967, 95% CI: .950, .984). Bowers, Allan, Simpson, Jones, and Whittington (2009) reported that staff burnout was not associated with aggression, seclusion, restraint, self-harm, absconding, PRN medications or special observations.

In three papers in this series, the research teams reported on overall conflict/containment outcomes and their association with nursing staffing variables and the ward atmosphere. Higher total conflict rates were significantly associated with proportion of male staff and one ward atmosphere subscale, but not with the other subscales or the number of nurses per bed (Bowers, 2009), while higher total containment rates were associated with one ward atmosphere subscale but not with the other subscales or with the proportion of male staff or the number of nurses per bed (Bowers, 2009). High conflict, high containment wards were associated with high numbers of temporary and unqualified staff. High conflict, low containment wards were associated with higher numbers of male staff (Bowers et al., 2013). Bowers and Crowder (2012) investigated the temporal relationship between nurse staffing and conflict and containment rates and reported that higher regular qualified nurse staffing levels preceded higher conflict and containment rates.

Kartha and McCrone (2019) also used the dataset to conduct an economic evaluation using three different staffing levels. The cost-effectiveness analysis of the three staffing scenarios showed that the low staff scenario was cost-effective in terms of conflicts and containment averted. A production function analysis also revealed that increased staff numbers were associated with higher numbers of events.

4.9 | Specific outcomes

The remaining studies focused on specific outcomes and nurse variables. They are reported by outcome below.

4.9.1 | Aggression

Aggression was one of the most studied outcomes located in the review. The reviewed studies reported the aggression variable in a variety of ways—as assault or physical aggression toward people; physical aggression toward objects or verbal aggression toward people. There were five studies examining aggression in the conflict/containment studies and a further 16 studies from other authors that examined the relationship between patient aggression and nursing factors. The nursing factors included in these studies were nurse staffing, nurse skill mix, nurse–patient ratio, nurse education or experience, nurse interpersonal style, staff burnout, ward environment and nurse gender.

Two studies found that assaults increased when more nursing staff were present. Staggs (2013) observed that higher staffing levels were associated with higher assault rates with a one-unit increase in total nursing hours per patient day (TNHPPD) associated with a 12% increase in the assault rate. Owen et al. (1998) also reported that more nursing staff on duty was associated with higher levels of aggression (RR = 1.05, 95% CI: 1.05, 1.06 for female nurses and RR = 1.03. 95% CI: 1.03, 1.03 for male nurses). One study found no significant relationship between number of nurses and aggression (Shah, 1997).

Skill mix (mix of nurse types) was also investigated in relation to aggression. Staggs (2013) found that higher levels of RN mix were

associated with lower assault rates. An increase of 5% in RN mix was associated with a 6% decrease in the assault rate. In another study, higher levels of non-RN hours were associated with higher levels of assaults against hospital personnel (OR = 1.23, 95% CI: 1.13, 1.34), assaults against patients (OR = 1.31, 95% CI: 1.15, 1.50) and total assaults (OR = 1.21, 95% CI: 1.12, 1.31), with no association between assaults and RN hours (Staggs, 2015). However, Staggs (2016) found no relationship between assaults and RN hours or non-RN hours, and Lanza et al. (1997) also found no relationship between assaults and the number of RNs or other nurse types.

Nurse–patient ratio and aggression were investigated in five studies. Chou et al. (2002) reported a significant relationship between the nurse–patient ratio and the severity of assaults ($r = .26$, $p < .01$), although the correlation coefficient indicates that the relationship between the two variables was weak (Schober et al. 2018). Four studies reported no relationship between nurse–patient ratio and aggression (Cheung et al., 1996; Lanza et al., 1997; Ng et al., 2001; Ridenour et al., 2015).

Other staffing variables investigated were casual staff percent, where no relationship was found with aggression (Cheung et al., 1996), and number of shifts worked by permanent, agency and student nurses (Shah, 1997), again with no relationship found with aggression.

Other variables that were investigated for their relationship with aggression were nurse experience, where Chou et al. (2002) found that less experience was associated with increased experience of being assaulted (OR = .92, 95% CI: .91, .99), while more training was associated with decreased experience of assault (OR = 11.70, 95% CI: 1.18, 54.36). However, Ridenour et al. (2015) reported that less time in the job was associated with less experience of any type of aggression (x2 = 9.6802, $p = .02$) or verbal aggression (x2 = 7.9316, $p = .05$), while Chen et al. (2008) found no clear pattern to show a relationship between aggression and length of work experience. Yu and Holbeach (2021) related aggression to unplanned nursing staff leave and found a negative moderate correlation between RAGE scores and UNSL ($r = -.34$). The effect of nurse gender on aggression was also explored with Knowles et al. (2008) finding that male patients were more likely to assault male staff (after controlling for staff gender ratio). Virtanen et al. (2011) found that male staff gender was associated with increased odds of assault on ward property (OR = 1.57, 95% CI: 1.26, 1.96). Lanza et al. (1997) reported no significant relationship between aggression and percent of staff who were female, while Ridenour et al. (2015) found no relationship between nurse gender and experience of aggression.

Significant relationships were found between aggression and nurses' interpersonal style (Bilgin, 2009), with certain characteristics increasing the experience of aggression. Nurses who were more help seeking were more exposed to verbal and physical assaults from patients both during their career (z = −2.03, $p = .04$) and in their current post (z = −2.03, $p = .04$). Nurses who were less sociable (z = −2.02, $p = .04$) and less tolerant (z = 2.41, $p = .01$) were more exposed to physical assaults while they were working in their current post.

Virtanen et al. (2011) observed that ward overcrowding was associated with aggression with excess bed occupancy of more than 10% units associated with a 2.60-fold risk of assault on an employee after adjustment for age and gender. Yakov et al. (2018) implemented a sensory reduction intervention to change the ward environment and observed that the assault rate decreased significantly after the intervention (median pre—.50, median post—.06, U = 0, $p = .002$).

4.10 | Seclusion

Seclusion was also a commonly studied outcome located in the literature. In addition to the three studies examining seclusion in the conflict/containment studies, there were eight studies that investigated seclusion and nurse factors and nine studies which investigated both seclusion and restraint use and their relationship with nurse factors.

Factors that were found to have an association with seclusion included staffing levels, where higher staffing levels were associated with lower seclusion use. Boumans et al. (2012) found that high staffing level compared to low staffing level decreased intention to seclude by .45 ($p = .00$, 95% CI: −.55, −.35) and moderate staffing level compared to low staffing level by .11 ($p = .03$). This was supported in a follow-up study where intention to seclude was associated with staffing level at all three timepoints (T1—eta2 .039, $p < .000$; T2—eta2 .041, $p < .000$; T3 eta2 .033, $p < .000$) (Boumans et al., 2015). Morrison and Lehane (1995) found that lower staffing levels were associated with increased seclusion use (z = −5.8675, $p = .001$), and O'Malley et al. (2007) reported that decreased seclusion was associated with higher nursing hours ($r = -.25$, $p = .001$), as did De Lacy, 2005.

The relationship between skill mix and seclusion was explored with decreased seclusion use reported with higher numbers of RNs in the total staffing (De Lacy, 2005), while Williams and Myers (2001) observed that higher numbers of licensed nurses were associated with higher rates of less restrictive interventions being used ($r = .379$, $p = .000$).

Nurse–patient ratio was another staffing variable that was explored with De Lacy (2005) reporting decreased seclusion use with higher nurse–patient ratios. This was supported by Donat (2002), who found that an increase in the staff-patient ratio was associated with decrease in combined seclusion and restraint ($r = -.51$, $p < .01$), while Fukasawa et al. (2018) observed the opposite, reporting that a higher number of nurses per 10 beds were associated with increased use of seclusion (OR = 2.36, 95% CI: 1.55–3.60). Three studies found no significant relationship between nurse–patient ratio and seclusion (Donat, 2003; Janssen et al., 2007; Khalil et al., 2017).

Five studies found that seclusion was not associated with nurse experience (Boumans et al., 2012; Doedens et al., 2017; Khalil et al., 2017; O'Malley et al., 2007; Williams & Myers, 2001). However, Janssen et al. (2007) observed that decreased seclusion use was associated with the variability of work experience of nursing staff (OR = .871, 95% CI: .808, .938). Seclusion use was

associated with nurse education level ($r = .465$) in one study (Khalil et al., 2017) while Newman et al. (2018) found that seclusion use decreased following a nursing education intervention. In three other studies (Doedens et al., 2017; Haefner et al., 2020; Janssen et al., 2007), no relationship was found between nurse education and seclusion.

Decreased seclusion use was associated with having two or more male nurses present on a shift ($F = 7.3$; $df = 1166$; $p = .009$) (O'Malley et al., 2007), and with more males on shift (OR = .75, 95% CI: .589, .955) (Janssen et al., 2007). Miodownik et al. (2019) found that lower duration of seclusion and restraint was associated with the presence of academic male nurses ($b = -.084$, $p = .038$) and academic female nurses ($b = -.114$, $p = .005$). However, Doedens et al. (2017) reported no relationship, noting that nurses' physical stature mediated the effect of gender, with larger physical stature associated with reduced odds of seclusion (OR = .21, 95% CI: .06, .72). Boumans et al. (2012), Khalil et al. (2017) and Morrison and Lehane (1995) all found no significant relationship between nurse gender and seclusion use.

E-Morris et al. (2010) implemented a new model of nursing care and found that restraints/seclusions decreased by 10% pre/post on the intervention wards and increased by 69% on the non-intervention wards, while Pollard et al. (2007) introduced a practice change to the ward environment and found that restraint/seclusion hours decreased significantly following the practice change ($t = 4.59$, $p < .001$).

4.11 | Restraint use

There were three studies examining restraint use in the conflict/containment studies, a further five studies that examined restraint use and nurse factors in other study types, and nine studies that examined restraint use in conjunction with seclusion.

In the studies that explored nurse staffing variables, decreased restraint use was associated with higher nurse staffing (De Lacy, 2005), and with higher RN proportion (De Lacy, 2005). A higher percentage of licensed nurses was associated with higher rates of less restrictive interventions being used ($r = .379$, $p = .000$) (Williams & Myers, 2001). Two studies found that higher nurse–patient ratio was associated with decreased restraint use (De Lacy, 2005), or decrease in combined seclusion and restraint ($r = -.51$, $p < .01$) (Donat, 2002). Fukasawa et al. (2018), however, found the opposite, that a higher number of nurses per 10 beds were associated with increased use of restraints (OR = 1.74 95% CI: 1.35-2.24). In other studies, nurse–patient ratio was not associated with restraint use (Bak et al., 2015; Donat, 2003; Khalil et al., 2017; Park et al., 2020). Bak et al. (2015) also found no relationship between restraints and use of substitute staff.

Other nurse factors explored were experience, education, and gender and their relationship with restraint use. Lindsey (2006) found that nurses were more likely to decide to restrain if they had more years of experience as an RN ($r = .486$, $p < .01$), or more years of experience as a psychiatric nurse ($r = .319$, $p < .05$). Other studies found no relationship between nurse experience and restraint use (Bak et al., 2015; Khalil et al., 2017; Williams & Myers, 2001). Bak et al. (2015) found that higher number of years of staff education was associated with reduced restraint use (OR = .34, 95% CI: .17, .66); however, both Khalil et al. (2017) and Lindsey (2006) found no relationship.

Exploring the influence of nurse gender on restraint use, Miodownik et al. (2019) found a lower duration of seclusion and restraint was associated with the presence of academic male nurses ($b = -.084$, $p = .038$) and academic female nurses ($b = -.114$, $p = .005$), while Khalil et al. (2017) reported that physical restraint use was associated with nurse gender ($r = -.341$), with male nurses using restraint more often. Kodal et al. (2018) also found that the presence of male staff was associated with increased restraint use (OR = 1.44, 95% CI: 1.01, 2.05). Lindsey (2006) found no relationship between nurse gender and restraint use.

A few other variables were also investigated in the restraint studies. Bak et al. (2015) found no relationship between the work environment and restraint use. Pollard et al. (2007) implemented an intervention to change the ward environment and found restraint and seclusion hours decreased significantly following the practice change ($t = 4.59$, $p < .001$). Yakov et al. (2018) also implemented an intervention to change the ward environment and found the percentage of restraint hours were significantly reduced following the intervention (median pre—1.37, median post—.18, $U = 4$, $p = .02$). E-Morris et al. (2010) implemented a new model of nursing care and found that restraints/seclusions decreased by 10% pre/post on the intervention wards and increased by 69% on the non-intervention wards.

4.12 | Self-harm

In addition to the five studies examining self-harm in the conflict/containment studies, there was one other study that investigated self-harm. In this study, Drew (2001) found no significant relationship between self-harm and consistency of nursing assignment.

4.13 | Absconding

Absconding was investigated in four of the conflict/containment studies. There was one other study located in the review which found a higher number of absconding events at shift changeover times when staff availability on the ward was lower (Bowers et al., 1999).

4.14 | PRN medication

There were two studies that reported on the relationship between PRN medication and nurse factors in addition to the three studies

examining PRN medication in the conflict/containment studies. No significant relationships were reported between PRN medications and staffing adequacy or nurse experience, education, or gender (Grice, 1997). Thomas et al. (2006) implemented a therapeutic activity intervention and found that there was a significant decrease in PRN medication administration on the intervention ward ($t = 3.1$, $df = 134$, $p = .002$), but not on the control ward.

4.15 | Special observations

Apart from the three studies examining special observations in the conflict/containment studies, there were no further studies that investigated special observations and nurse factors.

5 | DISCUSSION

This review presents the evidence on the relationship between nurse variables and patient outcomes in mental health inpatient settings to guide the development of an NSO indicator suite for this setting. An indicator suite for NSOs in mental health settings is needed to ensure the quality of nursing care in these settings can be measured so that the impact of changes in nurse variables on patient outcomes can be comprehensively assessed (Heslop et al., 2014). The review was unique in focusing on the relationship between nurse variables and patient outcomes. Other reviews of patient outcomes in these settings have focused on patient characteristics rather than nurse variables related to the outcomes. No other review examining the relationship between nurse variables and the outcome variables was located during the search process. This review is primarily an exploratory systematic review. It is intended to present an overview of the state of the research in terms of nurse variables and patient outcomes to open a discussion on the development of an NSO indicator suite for acute mental health inpatient settings.

5.1 | Most reported patient outcomes

The review located 56 studies that explored the relationship between nurse variables and patient outcomes in mental health settings. The overall quality of the studies was weak to moderate, with limited attention paid to confounders or blinding. Sixteen of the studies were part of a program of research on conflict and containment in English psychiatric hospitals involving three datasets. Five of the conflict and containment studies only reported a composite measure of conflict/containment while the rest included examination of specific outcomes of interest in this review. The remaining 40 studies located in the review explored the relationship between nursing and patient variables in a variety of different mental health settings. Aggression, seclusion and restraint use were the focus of 36 of these studies. There were only four studies that explored self-harm, absconding or PRN medications in addition to the conflict/containment studies, with special observations not explored in any other settings. Based on the number of studies, the evidence for aggression, seclusion and restraint use as suitable NSOs is more robust than the evidence for self-harm, absconding, PRN medications and special observations, as the first three outcomes have been studied more frequently and in a wider range of settings by multiple researchers.

5.2 | Nurse variables and patient outcomes

There were many nurse variables studied in relation to each outcome. For each of the outcomes, there were significant findings for several nurse variables indicating that all the outcomes included in the review have the potential to be used as NSOs in mental health inpatient settings. However, the results of the studies for each outcome showed great variability, with no consistent pattern emerging for the relationship between nurse variables and the outcomes of interest, making it difficult to draw any conclusions about the nature of the relationship between the staffing variable and outcome. For example, in the aggression studies that investigated nurse staffing variables (nursing hours/numbers, skill mix, nurse–patient ratio) the majority (10 studies) reported no significant relationship between staffing and aggression. In two studies, the association was in the opposite direction to that which would be expected, for example higher number of nurses on duty were associated with higher rates of aggression (Owen et al., 1998; Staggs, 2013), while the skill mix studies reported associations in the expected direction (Staggs, 2013, 2015), with no relationship between nurse–patient ratio and aggression reported. Similarly, there was no conclusive evidence on the effect of nurses' personal attributes such as attitudes, gender and interpersonal styles on conflict and containment variables. Some studies showed there was increased use of containment measures such as restraints with increased proportions of male staff in the ward (Bowers, 2009) and others showed gender had no effect on levels of conflict in the ward (Doedens et al., 2017).

On the contrary, a secondary variable that was reported together with nurse factors, ward milieu, produced consistent results on its effect on aggression, seclusion, and restraint. Sensory reduction and reduced overcrowding were associated with lower rates of aggression toward staff and restraints. Similar findings have been reported in other reviews (Oostermeijer et al., 2021).

This variability may be partially explained by the quality of the evidence. Overall, the quality of the evidence was not high, with 38 (68%) studies having a weak quality rating and 18 (32%) achieving a moderate quality rating. There were no studies that were rated as strong. A limitation of this review is that weak quality studies were not excluded, and therefore, the results that are presented need to be interpreted with caution. The reason low quality studies were not excluded was so that a comprehensive picture of the extent to which the outcomes of interest had been studied could be presented, as well as presenting the study findings on the relationship between the nursing and patient variables. It was evident that more

high-quality studies in mental health settings are needed to improve the evidence base for describing the relationship between nurse and patient outcome variables and to confirm the usefulness of these outcomes as NSO indicators. As more high-quality studies are conducted, more robust review methods can be applied to assess the strength of the relationship between the nurse variables and patient outcomes using more focused inclusion and exclusion criteria.

The variability in the results may also be explained by the variety of analysis methods used. Seventeen of the studies reported only simple statistical analysis, while one used no statistical analysis and the data analysis method for another was unknown. The quality of the evidence in studies where regression modelling was not used is limited as more sophisticated analysis methods that include controlling for confounders have the potential to change the results significantly. For example, Bowers, Flood, et al. (2008) found a significant reduction in aggression, seclusion, intermittent and continuous observations, PRN medication, and restraint use after the City Nurse intervention with a simple pre/post analysis on the intervention wards, but a more stringent analysis which included control wards and confounders in the analysis showed no effect of the intervention on conflict and containment events.

The data collection methods used to measure the presence of patient outcomes were also explored in this review. Nearly all the studies used bespoke data collection methods with only ten studies using administrative datasets. If robust outcome indicators are to be developed for mental health settings, the use of administrative datasets is recommended. This enables the monitoring and reporting of outcome measures to be automated, reducing the time and cost involved in data collection and report production. Regular outcome reporting is necessary to ensure the quality of nursing care is maintained and improvements implemented (Kilbourne et al., 2018). The variability in the taxonomy and nomenclature of nurse variables and patient outcomes may have resulted in some of the studies being missed. The differences in the definition of these terms were due to the variety of countries where these studies were conducted.

6 | CONCLUSION

The patient-related outcomes of aggression, seclusion, restraint use, self-harm, absconding, PRN medications and special observations can all be used to develop an NSO indicator suite in mental health inpatient settings. More work is needed to establish high-quality studies to clearly demonstrate the relationship between these outcome measures and changes in nurse variables such as nurse staffing, skill mix, work environment, nurse education and nurse experience. The reviewed evidence was of variable quality, and this must be considered and rectified in future endeavours. Research linking the four outcomes including self-harm, absconding, PRN medication and special observations to nursing variables had mixed results; a primary study using a large administrative dataset is needed to explore these variables. Additionally, further work is also needed to examine other outcomes not covered by this review that could potentially be used as indicators of the quality of nursing care in mental health inpatient settings. For example, physical health outcomes such as falls and mortality already established as NSOs in acute care settings require further exploration in mental health settings. The integration of the seven outcome measures into administrative datasets should be explored so that outcomes can be reported regularly, consistently, and easily.

7 | RELEVANCE FOR CLINICAL PRACTICE

This review has contributed to the knowledge base for NSO indicators in mental health settings, recommending the incorporation of seven outcome indicators into hospital administrative datasets. Recommended outcomes are aggression, seclusion, restraint use, self-harm, absconding, PRN medications and special observations. The establishment of an indicator suite of NSOs in mental health settings has the potential to improve the quality of patient care by providing useful data on the impact on patient outcomes associated with any changes in nurse variables.

AUTHOR CONTRIBUTIONS

All authors meet the four criteria established by the ICMJE for authorship. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; and Drafting the work or revising it critically for important intellectual content; and Final approval of the version to be published; and Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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No conflicts of interest are noted.

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ETHICS STATEMENT

N/A—review only.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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