TITLE PAGE

Submission Title:

The association between nurse staffing and conflict and containment in acute mental health care: a systematic review

Authors:

Samuel Woodnutt1, Simon Hall1,2, Paula Libberton1, Jane Ball2, Chiara Dall’Ora1 and Peter Griffiths1

1. Authors affiliated with: University of Southampton, School of Health Sciences, Southampton, Hampshire, UK
2. Authors affiliated with: The Royal College of Nursing, 20 Cavendish Square, London, W1G 0RN

Corresponding author contact details:

Samuel Woodnutt

Email: s.woodnutt@soton.ac.uk

**Conflict of Interest:** The authors have no conflict of interests to declare

**Authorship:** all authors have fully met criteria of authorship, having:

1. Engaged in the conception and design of the study, or acquisition of data, or analysis and interpretation of data
2. Drafted the article / revised it critically for important intellectual content,
3. Given final approval of the version submitted.

**Contributions:**

* Samuel Woodnutt designed the study and acquired the data (including selection and screening), computed this in the R programme, and plotted the tables/graphs.
* Simon Hall and Paula Libberton helped draft the rationale for study and current context within mental health nursing.
* Chiara Dall’Ora, Prof Jane Ball, and Prof Peter Griffiths reviewed drafts of the manuscript and provided supervision and conceptual guidance alongside editing work. Peter Griffiths was consulted to review the final include list and resolve discrepancies.

In-text references are made to the following authors for anonymity:

SW – Samuel Woodnutt

PG – Prof Peter Griffiths

CDO – Dr Chiara Dall’Ora

**Consent:**  Patients were not involved so no patient consent was required.

**Ethical consent:** Not applied for/necessary as this is descriptive analysis of publicly available data.

**Funding:** No funding was received for this paper.

Words including (all) tables, references and (excluding title page and abstract): 7849

Words in abstract = 391

The association between nurse staffing and conflict and containment in acute mental health care: a systematic review

Abstract:

Introduction:

Conflict and containment are the most frequently reported incidents in acute mental health care settings. This systematic review seeks to examine and synthesise existing evidence on the association between nurse staffing levels, nursing skill-mix, and the occurrence of these incidents in acute mental health wards.

Methods:

Systematic review of quantitative studies examining nurse staffing levels and skill-mix (proportion of nursing shift that are registered, or experience levels). Searches were undertaken in CINAHL, Cochrane, Embase, MEDLINE, PsycINFO, SCOPUS and Web of Science.

Results:

35 observational studies were reviewed, including 32 on staffing levels (44 analyses) and 12 on skill-mix (14 analyses). Nine analyses found that higher staffing levels were associated with a reduction in reported conflict and containment incidents while nine found lower staffing levels were associated with reduced incidents. 26 studies found no significant association. For skill-mix, six analyses found that higher skill-mix was associated with a reduction in incidents, seven found no significant association while one analysis showed reduced skill-mix was associated with a reduction in incidents.

Discussion:

The results from analyses are mixed, with no clear conclusions on the relationship of staffing on incident rates. Studies often rely on routine or staff-reported data that are prone to measurement and observer bias, where most analyses did not control for important factors, e.g. patient case-mix or other patient-related factors which could have influenced the results. Although higher staffing levels are sometimes associated with increased incident reporting, this may reflect greater interaction and reporting, or residual (unmeasured) confounding and/or lack of control for mediators and effect modifiers. The review highlights the need for better risk adjustment in observational studies, more refined methodologies, and clearer definitions of outcomes to guide workforce planning and policy. Further large-scale research is necessary to understand the complex relationships between staffing, skill-mix, and safety in mental health care.

Conclusion:

There is a major staffing crisis in mental health nursing but evidence to understand the impact of this on patient outcomes and to guide staffing policies is missing, with several significant limitations in the existing evidence which need to be resolved.

Relevance to clinical practice:

Identified evidence on mental health nurse staffing levels and skill-mix is mixed and inconclusive, therefore no clear implications for workforce planning or deployment can be recommended. However, this prompts debate on the nature and efficacy of routinely-collected patient outcomes in clinical practice.

1. INTRODUCTION:

Mental health inpatient safety is a key area of concern for global policy and research ([WHO, 2021](#_ENREF_85)). In England’s National Health Service incident reporting has doubled in recent years where self-harm and aggression contribute over 44% of all reported incidents ([Woodnutt *et al.*, 2024](#_ENREF_90)). The cause of the increase is unclear and may reflect increased reporting, nonetheless these incidents are the most prevalent in mental health services globally ([Staggs, 2016](#_ENREF_75); [Weltens *et al.*, 2021](#_ENREF_83); [Ngune *et al.*, 2023](#_ENREF_55)) and therefore are an increasing demand on nursing time. Mental health nurses have crucial roles in the promotion of safety and prevention of behaviours that may harm others (e.g. violence, aggression and self-injury) such as through preventative assessment and engagement, and/or the promotion of emotional regulation ([Hurley *et al.*, 2022](#_ENREF_40)). However, there are significant global workforce deficits in mental health nursing ([Adams, Ryan and Wood, 2021](#_ENREF_1)).

The Conflict and Containment model conceptualises incidents in inpatient psychiatric settings ([Bowers, 2006](#_ENREF_13)) and is used to categorise patient safety outcomes ([Pelto-Piri *et al.*, 2019](#_ENREF_64); [Ward‐Stockham *et al.*, 2022](#_ENREF_82)), and inform guidance globally ([Australian Capital Territory, 2024](#_ENREF_4); [Council of Europe, 2024](#_ENREF_26)). There are 17 conflict and 17 containment items in the original model ([Bowers, 2006](#_ENREF_13)) (see Table 1). Conflict refers to any incident that results in harm through interaction with other patients, staff and/or self-injury and is currently the most commonly reported type of harm incident in most mental health settings ([Staggs, 2013](#_ENREF_73); [Woodnutt *et al.*, 2024](#_ENREF_90)). Conflict includes incident sub-types of aggression against others and against self (e.g. self-harm or suicide attempts), but also behaviours such as refusal of medication. Containment refers to actions that staff take to limit the freedoms of patients in mental health care to mitigate or prevent conflict including restraint, enforced sedation, and seclusion ([Bowers, 2006](#_ENREF_13); [Doedens *et al.*, 2020](#_ENREF_33); [Ngune *et al.*, 2023](#_ENREF_55)).

Table 1: Conflict and containment items from Bowers (2006)

|  |  |
| --- | --- |
| Conflict | Containment |
| Verbal aggression  Physical aggression against objects  Physical aggression against others  Physical aggression against self  Suicide attempt  Smoking in a no smoking area  Refusing to eat  Refusing to drink  Refusing to attend to personal hygiene  Refusing to get out of bed  Refusing to go to bed  Refusing to see workers  Alcohol misuse  Other substance misuse  Absconding  Refusing regular medication  Refusing as-required medication | Given as-required medication  Given intramuscular injection (enforced)  Transferred to psychiatric intensive care ward  Seclusion  Intermittent observation  Continuous observation  Show of force  Physically restrained  Time out  Locking the ward door  Searching of bags and pockets  Removing items  Search bed space  Sniffer dogs  No kitchen access  No bathroom access  Closed-circuit television |

Conflict and containment can lead to several negative outcomes for staff and patients ([Bowers, 2006](#_ENREF_13)). Patients subjected to high levels of containment, or who experience high levels of conflict tend to have overall poor health outcomes ([Doedens *et al.*, 2020](#_ENREF_33)). Containment can re-traumatise individuals ([Sweeney *et al.*, 2018](#_ENREF_76)), or lead to: a perception of being abused, feelings of isolation/abandonment ([Askew, Fisher and Beazley, 2019](#_ENREF_3); [Cutler *et al.*, 2020](#_ENREF_28); [Cutler *et al.*, 2021](#_ENREF_27)), and iatrogenic mental health conditions such as post-traumatic stress disorder ([Chieze *et al.*, 2019](#_ENREF_22)). Coerced-containment in mental health care is thought to have an iatrogenic link to suicide ([Large *et al.*, 2014](#_ENREF_51); [Borecky, Thomsen and Dubov, 2019](#_ENREF_12); [Jordan and McNiel, 2020](#_ENREF_44); [Ward-Ciesielski and Rizvi, 2021](#_ENREF_81)). Containment is also detrimental to nurses, where staff report higher rates of physical and moral injury after engaging in restrictive care ([Lancaster *et al.*, 2008](#_ENREF_48); [Ye *et al.*, 2019](#_ENREF_92)).

A systematic review by Ngune et al. (2023) aimed to identify nursing variables that could be associated with patient-related (safety) outcomes in acute mental health care settings. Ngune et al. (2023) reported that aggression, seclusion, restraint use, self-harm, absconding, PRN medications and special observations can be used as nursing-sensitive indicators of the quality of care ([Ngune *et al.*, 2023](#_ENREF_55)). However, the association between the number of nursing staff, or variation in the composition of the nursing team, and incidents has not been fully established ([Baker, Canvin and Berzins, 2019](#_ENREF_7); [Thibaut *et al.*, 2019](#_ENREF_77); [Woodnutt, 2023](#_ENREF_89); [Thompson, Senek and Ryan, 2024](#_ENREF_78)), and this could be a modifiable factor that is associated with reductions in adverse incidents.

There is ample evidence that nurse staffing levels (e.g. the number of nurses per shift, per patient or nurse hours per patient day) and skill-mix (a measure of the proportion of the nursing staff who are registered nurses, higher-qualified or a measure of the years of experience of the nursing team) are associated with the safety and quality of care in general/somatic healthcare settings ([Kane *et al.*, 2007](#_ENREF_46); [Ball *et al.*, 2014](#_ENREF_10); [Ball *et al.*, 2018](#_ENREF_8); [Griffiths *et al.*, 2018](#_ENREF_37); [Twigg *et al.*, 2019](#_ENREF_79); [Ball and Griffiths, 2022](#_ENREF_9)). These relationships have informed methods to estimate the nurse-staffing required to provide safe care in general medical settings ([Griffiths *et al.*, 2020](#_ENREF_38)). Whilst there is insufficient evidence to determine the best approach to identify optimal staffing levels ([Griffiths *et al.*, 2020](#_ENREF_38)), there is clear evidence that more nurses lead to less adverse incidents, missed-care and mortality ([McHugh *et al.*, 2021](#_ENREF_52); [Willis and Brady, 2022](#_ENREF_88)). Longitudinal analyses allow us to infer that inadequate staffing has a causal relationship with patient mortality ([Dall'Ora *et al.*, 2022](#_ENREF_29)). Several patient outcomes are sensitive to nurse-staffing, notably missed nursing care and increased likelihood of errors. Consequences include compromised care: inadequate assessments and care omission place patients at increased risk of complications, adverse events, and death ([Ball *et al.*, 2018](#_ENREF_8); [Griffiths *et al.*, 2018](#_ENREF_37)).

Health services currently employ and deploy mental health nurses in diverse manners and settings despite a lack of synthesized data and analyses concerning effectiveness ([Phoenix, 2019](#_ENREF_65)). United Kingdom (UK) guidance on safer staffing in mental health services is piecemeal, does not advise on the volume, specific skills or training of staff, but suggests staffing levels need to be proportionate to patient risk ([NAPICU, 2014](#_ENREF_54); [Royal College of Psychiatrists, 2020](#_ENREF_71)). A UK framework for the composition of health professions that contribute to ward care (such as medicine, nursing, occupational therapy, and social work) is available although this does not specify nursing volume, and has not been updated recently ([NHS England, 2015](#_ENREF_57)). In New South Wales, Australia, a mental health nurse-to-patient ratio minimum (1:4-1:7 respectively depending on shift) has been mandated by the Nurses & Midwives Association, although it is not clear on what evidence this has been based ([NSW Nurses & Midwives Association, 2022](#_ENREF_58)). Staffing levels or skill-mix guidance specific to mental health settings needs to be underpinned by a full review of the available evidence. Such a review is currently lacking, therefore the aim of this systematic review was to identify and synthesise evidence of association between nurse staffing levels and skill-mix and incidents in acute inpatient mental health settings.

1. METHODS

2.1 Design

This was a systematic literature review and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines ([Page *et al.*, 2021](#_ENREF_61)). This review considered two staffing configurations: the number of nursing staff providing care for patients (staffing levels), and the skill-mix within the nursing team. Staffing levels were defined as any measure of the number of nursing staff over the number of patients and/or beds in a unit: such as, staff to patient ratio, staff to bed ratio, staff hours per patient day. Skill-mix was defined in terms of the ratio between professional and non professional staff within the nursing team (e.g. proportion of registered nurses vs registered nurses and assistant staff) or skill within the professional nursing team (e.g. measures of experiences or specialists qualifications)

Many of the conflict and containment items are not routinely reported (Ward-Stockham et al., 2022; Woodnutt, 2023), or do not appear in a detectable frequency in datasets or published research (Thibault et al., 2019). Therefore, incidents that mirrored high frequency reporting in our previous analysis of English data were included ([Woodnutt *et al.*, 2024](#_ENREF_90)).

Conflict variables included were: verbal aggression, aggression against objects, aggression against others, aggression against self, suicide attempts, and refusal of medication (regular and as-required). Containment variables considered were: seclusion, restraint, and the use of sedation.

2.2 Search strategy:

Our search comprised of free-text terms and subject headings related to nurse staffing levels, mental health settings, and conflict and containment incidents (full terms are in Supplementary data, Table 1). We searched CINAHL, Cochrane, Embase, MEDLINE, PsycINFO, SCOPUS and Web of Science in May 2024. Full details of the search terms can be found in supplementary data Table 1. Following full-text screening, a manual forward (included studies’ cited by data) and backwards (reference lists of included studies) ‘snowball’ search was performed. Further details can be found in the Figure 1. Full selection criteria are reported in Table 2. We included studies written in English, and excluded studies that did not include an acute mental health care setting (e.g. solely forensic/secure mental health settings). We also excluded studies whose focus was multifactorial change in policy or procedure where the effect of staffing change could not be isolated. SW performed the searches and selection with supervision from PG and CDO, discrepancies were resolved through discussion until consensus was reached.

*Table 2. Eligibility criteria*

|  |  |  |
| --- | --- | --- |
|  | Inclusion Criteria | Exclusion Criteria |
| Population | *Adult patients (aged over 18 years) in acute mental health care or whole trust/hospital settings. No restrictions were imposed on ward or hospital size.* | *All specialist mental health ward provision including forensic mental health. All*  *child and adolescent and older person’s mental health wards. General acute medical/surgical wards/hospitals.* |
| Intervention | *Nurse staffing levels within a defined ward, hospital size (e.g. as a ratio of nurses to patients/beds) or a given time period (e.g. number of nurses per shift). Deviation in nurse-staffing levels (e.g. % change in actual vs rostered).*  *Nursing skill mix: proportion of nurses who are registrants or the experience levels of staff (measure of time in role or position)* | *Evaluation of training packages, qualification level of nursing staff.*  *Studies examining nurse perception/psychological state.*  *Studies evaluating a service improvement where staffing levels or skill-mixed were modified, but their relationship to incidents could not be separated from other measures in analyses.* |
| Outcome | *Conflict: verbal aggression, aggression against objects, aggression against others aggression against self, suicide attempts, and refusal of medication (regular and pro re nata). Containment: seclusion, restraint, and the use of sedation.*  *Composite conflict and containment outcomes will be considered provided most incidents reported fall within the above definitions.* |  |
| Study Design | *Empirical (observational or experimental) studies of nurse staffing and conflict and/or containment.* | *Qualitative studies, literature and systematic reviews, grey literature* |

2.4 Data extraction, synthesis, and quality assessment:

Data were extracted using a standardized form, covering staffing and safety variables, study design, participants, effect size, confidence intervals, significance (p-value), and summary findings. Full details are in Table 2 and supplementary data Table 4.

Due to significant variation in staffing measures and analysis methods a statistical meta-analysis was not possible, therefore we adopted a narrative synthesis approach according to Campbell et al. (2020). Synthesis without meta-analysis (SWiM) ([Campbell *et al.*, 2020](#_ENREF_20)) considers prioritisation of methodological quality for inclusion in synthesis. For this review, the priorities for reporting results were: quality assessment, sample size, design, degree of error in measurement of conflict and containment and staffing variables, statistical significance, magnitude of effect size (adapted from ([Cohen, 1988](#_ENREF_24); [Chen, Cohen and Chen, 2010](#_ENREF_21))), precision (confidence intervals) and generalisability. Effect size was recorded on a seven-point scale from -3 (large inverse effect) to 3 (large positive effect), non-significant (p > 0.05) or non-reported results were given a magnitude of 0. Further details and effect sizes can be found in supplementary data, Table 3. We used R version 4.2.2 ([R Core Team, 2024](#_ENREF_68)) and the tidyverse (ver 2.0.0) package ([Wickham *et al.*, 2019](#_ENREF_86)) to produce plots**.**

Quality Assessment was conducted by SW using tools from the Joanna Briggs Institute that matched the methodology of included designs through a sum of the number of positive items ([Porritt, Gomersall and Lockwood, 2014](#_ENREF_67); [Joanna Briggs Institute, 2023](#_ENREF_43)). Appraisal tool score was converted to a percentage (where 100% = highest quality) for comparison between studies using different methods. SW conducted data extraction and quality assessment. Decisions and extractions were reviewed in meetings to resolve discrepancies, with notes and reports shared with authors PG and CDO throughout the process.

1. RESULTS

Figure 1: PRISMA Flow Diagram (word document – please insert here)

3.1 Search results

A total of 5,477 studies were identified, with 35 meeting the inclusion criteria. All were observational. Twenty-four studies were cross-sectional, six cohort, and five were case-control studies. Sample sizes ranged from 24 to 70,136. Studies varied in scope, including two comparing multiple countries, two across hospitals in the same organization, 14 with national data from multiple organizations, nine across multiple wards in one hospital, and eight at a single ward level.

Staffing levels were described in five ways: i) staff-to-bed ratio, ii) staff-to-patient ratio, iii) deviation from planned staffing, iv) staffing levels over a specific time period (e.g., 24 hours), and v) staff-completed ratings of ward staffing. Nursing skill-mix was defined in two ways: i) staff experience levels and ii) the proportion of registered nurses.

Seven studies drew samples from data collected for the City-128 study; a sample of 136 wards across 67 hospitals in the UK from 2004-2005 ([Bowers *et al.*, 2013](#_ENREF_17)). Three studies by Doedens et al. also contain overlapping data and were drawn from a ward in the Netherlands ([Doedens *et al.*, 2017](#_ENREF_31); [Doedens *et al.*, 2020](#_ENREF_33); [Doedens *et al.*, 2021](#_ENREF_32)). Two studies by Staggs contained overlapping samples drawn from a national database of American health data ([Staggs, 2015](#_ENREF_74);[2016](#_ENREF_75)). Many studies incorporated multiple eligible analyses (e.g., multiple staffing level, skill-mix, or conflict/containment measurements). In total there were 58 reported analyses of the association of staffing levels or skill mix with conflict and containment.

All studies included data from acute psychiatric wards in high-income countries. Ten studies were from the UK, nine from the USA, five from the Netherlands, one from 10 European countries, and one comparing Norway and Denmark. Other studies were conducted in Australia, Canada, Denmark, Japan, New Zealand, Norway, South Korea, Sweden, and Taiwan.

3.2 Quality Assessment

Most Included studies were of low to moderate quality, and only five studies ([Kalisova *et al.*, 2014](#_ENREF_45); [Fukasawa *et al.*, 2018](#_ENREF_36); [Park *et al.*, 2020](#_ENREF_63); [Doedens *et al.*, 2021](#_ENREF_32); [Doedens *et al.*, 2022](#_ENREF_34)) were rated positively against 80% of the criteria. Full study characteristics are available in supplementary data, Table 4.

Most studies had limitations in the lack of standardisation of measurement of the outcome (conflict and containment) variable. Most studies used routinely collected data derived from incident reports. Reliance on incident reports in most studies means that there is a pervasive risk of under reporting of the outcome, with potential systematic bias related to staffing. Three studies used direct observation by a researcher to gather data Doedens et al. (2017; 2021; 2022)) instead of relying on staff self-reports or routine data.

Only six studies ([Husum *et al.*, 2010](#_ENREF_41); [Doedens *et al.*, 2017](#_ENREF_31); [Fukasawa *et al.*, 2018](#_ENREF_36); [Park *et al.*, 2020](#_ENREF_63); [Doedens *et al.*, 2021](#_ENREF_32); [Doedens *et al.*, 2022](#_ENREF_34)) adjusted for patient variables (such as acuity of illness, diagnosis etc.) using multivariable analysis. Husum et al. (2010) considered variables such as patient length of stay, ward location, diagnosis, gender, intoxication, and clinical measures (e.g., Global Assessment of Functioning (GAF)). Fukasawa et al. (2018) examined demographic and clinical factors, including age, gender, diagnoses, legal status, medication dosage, and GAF. Park et al. (2020) adjusted for age, gender, diagnoses, previous admissions, and insomnia but excluded variables like intoxication or medication use. ([Doedens *et al.*, 2017](#_ENREF_31); [Doedens *et al.*, 2021](#_ENREF_32); [Doedens *et al.*, 2022](#_ENREF_34)) accounted for both patient and staffing factors, including staff characteristics such as physical stature. Other studies, (e.g. ([Bak *et al.*, 2015](#_ENREF_5); [Staggs, 2015](#_ENREF_74);[2016](#_ENREF_75))) adjusted only for hospital or ward related factors such as the size of wards (e.g. census), function of wards (e.g. long-stay vs short-stay acute wards) or settings (e.g. rural vs urban) with the remainder including no control for case mix.

Studies with higher quality (relative to other included studies) contained larger sample sizes yet relied on routinely collected data on conflict and containment. These studies demonstrated greater precision in their confidence intervals, spanned longer time frames, and used multivariable analyses to adjust for confounding, effect modifying or mediating factors. In contrast, studies with lower quality typically had smaller sample sizes and relied on repeated safety incident reports from a limited patient population, which may not represent broader trends. Furthermore, studies conducted during periods of policy changes aimed at reducing incidents often faced confounding factors, as changes in practice or regulations may have influenced outcomes, limiting the generalisability and validity of their findings. Further details of quality appraisal can be found Tables 6-8 in the supplementary data.

3.3 Conflict and containment outcomes:

Table 3 summarizes staffing and outcome measurements across all studies. Conflict was defined as aggression or violence in 14 studies (e.g. ([Chou, Lu and Mao, 2002](#_ENREF_23); [Staggs, 2015](#_ENREF_74); [Doedens *et al.*, 2022](#_ENREF_34))), as a composite variable (aggression all types, or all types of conflict) in three ([Bowers, 2009](#_ENREF_14); [Bowers and Crowder, 2012](#_ENREF_16); [Bowers *et al.*, 2013](#_ENREF_17)), as medication refusal or discretionary nurse use in one ([Baker, Bowers and Owiti, 2009](#_ENREF_6)) and as self-harm in one (Bowers et al., 2008). Containment was measured as seclusion (supervised confinement) in 11 studies (e.g. ([Bak *et al.*, 2015](#_ENREF_5); [Fukasawa *et al.*, 2018](#_ENREF_36))), restraint (manual or mechanical) in six (e.g. ([Bak *et al.*, 2015](#_ENREF_5); [Kodal, Kjær and Larsen, 2018](#_ENREF_47)), and as a composite variable in five (e.g. ([Kalisova *et al.*, 2014](#_ENREF_45); [Park *et al.*, 2020](#_ENREF_63))).

One study ([Cook *et al.*, 2020](#_ENREF_25)) included all reported incidents, noting that a significant proportion were aggression related.

Table 3:

(SEPARATE DOCUMENT)

3.4 Staffing levels and conflict and containment:

Staffing levels were analysed in 32 studies using various approaches, with many conducting multiple analyses on staffing and its relationship to conflict or containment. Thirteen studies focused on staff-to-patient ratios, eleven on staff-to-bed ratios, four on deviations from planned staffing levels, and three on total staffing hours. ([Rogerson *et al.*, 2021](#_ENREF_70)) used a composite measure of staffing and space which included staff to patient ratios alongside other aspects of the facility.

Figure 2 summarizes the findings, which were mixed. Some stronger studies (e.g., Staggs, 2015; Park et al., 2020) found marginally reduced conflict and containment associated with increased staffing, while others (e.g., Bowers, 2009; Fukasawa et al., 2018) reported small increases under similar conditions. Overall, among 44 analyses from 32 studies, equal numbers found increased (n = 9) and decreased (n = 9) conflict and containment when staffing levels rose. However, most analyses (n = 26) reported no association, with 18 not specifying parameters.

Three methodologically robust studies warrant further discussion. Fukasawa et al. (2018) in a study of 10,013 psychiatric admissions in Japan found that increased nursing staff per 10 patient beds doubled the likelihood of seclusion (aOR = 2.36, CI = 1.55–3.60) and increased restraint (aOR = 1.74, CI = 1.35–2.24). Conversely, Park et al. (2020) analyzed 70,136 South Korean health insurance records and found that higher staff-to-patient ratios were linked to reduced psychiatric emergency treatments (aOR = 0.92, CI = 0.84-1.00, p<0.05).

Staggs (2015) conducted a retrospective analysis of two years of U.S. psychiatric inpatient data, differentiating between aggression directed toward staff and patients. The study identified a paradoxical relationship: higher nursing hours per patient day were associated with an increase in assaults on staff (RR = 1.11, CI = 1.02–1.21, p = 0.015) but a decrease in assaults on other patients (RR = 0.81, CI = 0.71–0.93, p = 0.004).

Figure 2: (SEPARATE FILE)

3.5 Nursing skill-mix and conflict and containment:

Figure 3 summarizes studies on skill-mix and conflict/containment, plotting point estimates, sample sizes, and quality. Comparatively, less studies examined the skill-mix of staff where 12 studies reported 14 analyses: six found that higher skill-mix was associated with reduced incidents, seven found no significant relationship and one found higher skill mix was associated with increased incidents.

Staff experience showed mixed associations with conflict and containment, with three analyses reporting significant links. Chou et al. (2002) found more nursing experience was associated with reduced aggression (OR = 0.91, CI = 0.84-0.98, p < 0.05), though a concurrent violence reduction program may have influenced results. Owen et al. (1998) reported increased aggression with fewer mental health nurses (RR = 1.35, CI = 1.09-1.68, p = 0.006). In contrast, ([Weltens *et al.*, 2021](#_ENREF_83)) found greater experience was associated with more aggression reporting (OR = 3.5, CI = 1.32-8.26, p < 0.05), though the small sample was small and the duration of study short. Four studies ([Morrison and Lehane, 1995](#_ENREF_53); [Janssen *et al.*, 2007](#_ENREF_42); [Bak *et al.*, 2015](#_ENREF_5); [Doedens *et al.*, 2017](#_ENREF_31)) reported non-significant reductions in conflict and containment with increased experience, though Morrison & Lehane (1995) did not report parameters. Two studies ([O'Malley *et al.*, 2007](#_ENREF_59); [Doedens *et al.*, 2021](#_ENREF_32)) found no association, but neither provided parameters.

Proportion of registrants:

Staggs (2013) found that a higher proportion of registered nurses was associated with reduced aggression and violence (RR = 0.94, CI = 0.90-0.97, p < 0.05), while ([Williams and Myers, 2001](#_ENREF_87)) found that a higher registered nurse proportion was associated with greater use of least-restrictive interventions (r = 0.379, p < 0.05). Doedens et al. (2022) reported no association between teams comprising all registered nurses (as opposed to a mixture with unregistered care assistants) and aggressive behaviour.

Figure 3:

DISCUSSION:

This review synthesises quantitative studies on mental health nurse staffing levels, skill-mix, and patient safety incidents. Studies examining staffing levels used varied approaches, including staff-to-patient ratios, staff-to-bed ratios, deviations from planned staffing, and total staffing hours. Findings were mixed, with approximately equal numbers of analyses reporting increased and decreased conflict and containment associated with higher staffing levels, while most found no significant association. Notably, three robust studies (Fukasawa et al, 2018; Park et al., 2020; Staggs, 2015) highlighted contrasting results, with higher staffing linked to both increased and decreased incidents depending on the context.

Studies examining skill-mix were fewer, with similarly inconsistent findings. While some evidence suggests that a higher proportion of experienced or registered staff may reduce incidents of conflict and containment, other studies reported no significant relationship. The heterogeneity in study designs, definitions of staffing measures, and outcome reporting likely contribute to these mixed findings, limiting firm conclusions about the role of staffing levels and skill-mix in managing conflict and containment.

The literature is predominantly observational, relying heavily on routine or staff-reported data. However, despite concerns of systematic observer or measurement bias in routine data, differing significant associations were identified in different samples, indicating at least a partial explanatory relationship between staffing and conflict and containment. However, said bias may have led to an over or underestimation of effects, making it difficult to determine whether higher staffing levels or improved skill-mix genuinely enhance care or merely influence reporting behaviour. The results across studies suggest there is a mixed and likely context-dependent relationship between staffing and conflict and containment.

Notwithstanding the above, findings on staffing levels are inconsistent, with studies supporting higher staffing levels counterbalanced by equally rigorous studies showing the opposite (see Figure 2). While Staggs’ (2015) analysis suggests staffing levels may have a differential impact on various incident types, most studies relied on composite outcomes (e.g. measures of ‘all aggression’). Evidence on skill-mix, particularly the proportion of registered psychiatric nurses, is more consistent but limited, making it difficult to establish clear patterns.

The impact of staff experience levels is unclear, with few studies examining this and reporting mixed results. All studies of experience-levels lacked robust methods to control for covariates and had relatively small samples, limiting their reliability. While higher skill-mix overall appears linked to reduced conflict and containment, methodological weaknesses—such as lack of adjustment for key patient-related factors reduce the strength and generalisability of these findings.

As Griffiths et al. (2016) highlight, there are several sources of bias that are common in observational studies linking staffing to safety outcomes. Staffing levels could influence incident reporting, with higher staffing leading to more incidents being recorded. Additionally, without proper risk adjustment, higher staffing might reflect higher-risk environments rather than a direct impact on safety. Incident categorization is also crucial; Staggs (2015) showed that increases in one type of aggression may coincide with decreases in another, complicating the interpretation of composite variables (used by most included studies) and potentially obscuring true relationships.

Most studies did not adjust for case-mix or account for environmental factors that may influence psychiatric outcomes. Whilst seclusion was the most frequently studied clear outcome (assessed in 12 studies where analyses could be separated and considered independently), aggression—often a precursor to seclusion and other coercive interventions—has generally received minimal attention ([Al-Maraira and Hayajneh, 2019](#_ENREF_2)). Aggression was most frequently analysed by studies as a composite variable, thus meaning the relationship between staffing and types of aggression (e.g. aggression to staff, or aggression to patients) is impossible to discern at this time. Research shows that aggression reporting is also influenced by ward design features ([Ulrich *et al.*, 2018](#_ENREF_80); [Rogerson *et al.*, 2021](#_ENREF_70)), as well as staff characteristics, such as years of experience and staff’s personal/professional histories ([Schlup, Gehri and Simon, 2021](#_ENREF_72)).

The work of Doedens et al. (2017; 2021) further highlights that nursing staff characteristics, including gender, personality traits, and stature may also influence conflict and containment rates. However, no other included studies controlled for these factors in their multivariable analyses. These findings indicate that staffing levels or skill-mix could partially explain variation in aggression and seclusion rates, although due to issues with quality the overall picture is unclear.

Most statistically significant results were identified through cross-sectional analysis. Even among the studies that did adjust for case-mix, results remain inconsistent, suggesting that there may

be unmeasured confounding, and/or lack of control for effect modifiers or mediators. For example, Fukasawa et al. (2018) found that higher staffing levels were associated with greater use of seclusion and restraint, while Park et al. (2020) reported the opposite—that higher staffing levels were linked to less restraint and reduced use of 'psychiatric emergency treatment' (sedation). However, neither study considered compositional aspects of the nursing team (e.g. how many nurses were substantively employed, how many nursing staff were or were not registered with a professional body); both of which could have plausibly influenced results. Lack of management for effect modifiers and mediators, including different staffing types and proportions, is a gap in available literature, and further studies that include this may begin to alleviate the lack of clarity.

The disparity in reported associations between studies underscores the complexity of the relationship between staffing levels and incidents, suggesting that the effects of staffing may be context-dependent and influenced by other, unexamined factors. The inconsistency of findings, even among studies with stronger designs and case-mix adjustment, highlights the need for more refined methodologies and a deeper exploration of the underlying mechanisms at play.

Findings linking higher staffing to increased incident reporting could arise in several ways. More staff lead to more patient interactions, increasing the likelihood of conflict, and may make staff more inclined to initiate containment procedures ([Bowers, 2009](#_ENREF_14); [Bowers *et al.*, 2009](#_ENREF_15); [Staggs, 2015](#_ENREF_74)). Planned interventions may also be delayed until sufficient staff are available, skewing results. Wards with higher patient numbers may see more interactions, further distorting data ([Weltens *et al.*, 2021](#_ENREF_83)). Additionally, registered staff may report incidents more frequently due to their expertise ([Hamed and Konstantinidis, 2022](#_ENREF_39)), and senior staff may be more likely to notice and report incidents. A survey of UK mental health nurses found that a third felt staffing levels were insufficient, with nearly half reporting compromised care (Thompson, Senek and Ryan, 2024), suggesting that lowering staffing levels is unlikely to improve care.

Research in somatic/physical settings has linked indicators like missed-care to outcomes like mortality, where the impact is predictable and clear ([Dall'Ora *et al.*, 2022](#_ENREF_29)). In contrast, mental health indicators often conflict with health service targets ([Woodnutt, 2023](#_ENREF_89); [Woodnutt *et al.*, 2024](#_ENREF_90)). For instance, increased containment may reduce hospital length-of-stay (Park et al., 2020), a key UK health policy target ([NHS, 2019](#_ENREF_56)), and patients with higher risks may be assigned to wards with better staffing (Fukasawa et al., 2018). These complexities make it difficult to use certain outcomes as reliable proxies for care quality.

Limitations:

There are two main limitations of this review. Firstly, data extraction and quality appraisal were undertaken by a single reviewer (SW). However key decisions were checked and errors in extraction are unlikely to alter the conclusions. Secondly, the review was limited to published peer reviewed literature, but it seems unlikely that a large body of unpublished literature of higher quality exists that might change the overall conclusions.

Implications for policy, practice and research:

While the evidence offers few, if any, direct policy implications, safe staffing in mental health settings remains a critical issue. Large-scale, longitudinal research with better risk adjustment is needed. The current lack of clarity reflects the evolving field of mental health workforce research, where outcomes often have divergent interpretations (Woodnutt, 2023; Woodnutt et al., 2024). There is a need to focus on how data can drive mental health nursing effectiveness ([Rice, Stalling and Monasterio, 2019](#_ENREF_69)), presenting an opportunity to better define and measure mental ill-health and improve care delivery. Increasing the volume, proportion, and skill of mental health nurses is a global goal ([World Health Organization, 2022](#_ENREF_91)), though using data to guide staffing decisions remains challenging.

CONCLUSION:

The current staffing crisis in mental health nursing underscores the urgent need for robust evidence to guide policies and improve patient outcomes. However, existing research on the relationship between staffing, skill-mix, and conflict/containment outcomes is limited by inconsistent findings, poor study design, and inadequate adjustment for confounders. A key challenge lies in identifying meaningful indicators from administrative data that accurately reflect the safety and quality of care. While there is no evidence to support reducing staffing levels or diluting the skill mix to improve outcomes, further large-scale studies are needed. These studies must control for known confounders, mediators and effect modifiers to better understand the impact of staffing on outcomes and inform effective workforce planning.

RELEVANCE TO CLINICAL PRACTICE:

This review summarizes the literature on staffing levels and skill-mix of inpatient mental health nurses in acute settings, focusing on high-frequency incidents. Given the mixed and inconclusive evidence, no clear recommendations for workforce planning or deployment can be made. However, it highlights the need to reconsider the nature and efficacy of routinely collected information, and how data should be defined and collated to better inform workforce planning and policy. Mental health settings need tailored reporting categories, as workforce factors influencing key outcomes (e.g., self-injury) likely differ from other settings. This would give clinicians and researchers clearer insights into improving safety and care quality. Whilst we understand many aspects of patient harm in mental health environments, we know far less about the organisational and workforce factors that drive or prevent it.

References:

Adams, R., Ryan, T. and Wood, E. (2021) 'Understanding the factors that affect retention within the mental health nursing workforce: A systematic review and thematic synthesis', *International Journal of Mental Health Nursing*, 30(6), pp. 1476-1497.

Al-Maraira, O.A. and Hayajneh, F.A. (2019) 'Use of restraint and seclusion in psychiatric settings: A literature review', *Journal of Psychosocial Nursing and Mental Health Services*, 57(4), pp. 32-39.

Askew, L., Fisher, P. and Beazley, P. (2019) 'What are adult psychiatric inpatients' experience of seclusion: A systematic review of qualitative studies', *Journal of Psychiatric and Mental Health Nursing*, 26(7-8), pp. 274-285.

Australian Capital Territory (2024) *Safewards: making wards safe*. Available at: <https://www.act.gov.au/health/providing-health-care-in-the-act/nurses-and-midwives/safewards-making-wards-safe#:~:text=Safewards%20is%20a%20program%20that,reduce%20conflict%20and%20containment%20practices>.

Bak, J. *et al.* (2015) 'Comparing the effect of non-medical mechanical restraint preventive factors between psychiatric units in Denmark and Norway', *Nordic Journal of Psychiatry*, 69(6), pp. 1715-1725.

Baker, J.A., Bowers, L. and Owiti, J.A. (2009) 'Wards features associated with high rates of medication refusal by patients: a large multi-centred survey', *General Hospital Psychiatry*, 31(1), pp. 80-89.

Baker, J.A., Canvin, K. and Berzins, K. (2019) 'The relationship between workforce characteristics and perception of quality of care in mental health: A qualitative study', *International Journal of Nursing Studies*, 100, p. 103412.

Ball, J.E. *et al.* (2018) 'Post-operative mortality, missed care and nurse staffing in nine countries: A cross-sectional study', *International journal of nursing studies*, 78, pp. 10-15.

Ball, J.E. and Griffiths, P. (2022) 'Consensus Development Project (CDP): An overview of staffing for safe and effective nursing care', *Nursing Open*, 9(2), pp. 872-879.

Ball, J.E. *et al.* (2014) '‘Care left undone’during nursing shifts: associations with workload and perceived quality of care', *BMJ quality & safety*, 23(2), pp. 116-125.

Betemps, E.J., Somoza, E. and Buncher, C.R. (1993) 'Hospital characteristics, diagnoses, and staff reasons associated with use of seclusion and restraint', *Psychiatric services*, 44(4), pp. 367-371.

Borecky, A., Thomsen, C. and Dubov, A. (2019) 'Reweighing the ethical tradeoffs in the involuntary hospitalization of suicidal patients', *The American Journal of Bioethics*, 19(10), pp. 71-83.

Bowers, L. (2006) 'On conflict, containment and the relationship between them', *Nursing Inquiry*, 13(3), pp. 172-180.

Bowers, L. (2009) 'Association between staff factors and levels of conflict and containment on acute psychiatric wards in England', *Psychiatric services*, 60(2), pp. 231-239.

Bowers, L. *et al.* (2009) 'Identifying key factors associated with aggression on acute inpatient psychiatric wards', *Issues in mental health nursing*, 30(4), pp. 260-271.

Bowers, L. and Crowder, M. (2012) 'Nursing staff numbers and their relationship to conflict and containment rates on psychiatric wards—A cross sectional time series Poisson regression study', *International journal of nursing studies*, 49(1), pp. 15-20.

Bowers, L. *et al.* (2013) 'Correlation between levels of conflict and containment on acute psychiatric wards: the city-128 study', *Psychiatric Services*, 64(5), pp. 423-430.

Bowers, L. *et al.* (2012) 'Manual restraint and shows of force: The City‐128 study', *International Journal of Mental Health Nursing*, 21(1), pp. 30-40.

Bowers, L. *et al.* (2008) 'Relationship between service ecology, special observation and self-harm during acute in-patient care: City-128 study', *The British Journal of Psychiatry*, 193(5), pp. 395-401.

Campbell, M. *et al.* (2020) 'Synthesis without meta-analysis (SWiM) in systematic reviews: reporting guideline', *bmj*, 368.

Chen, H., Cohen, P. and Chen, S. (2010) 'How big is a big odds ratio? Interpreting the magnitudes of odds ratios in epidemiological studies', *Communications in Statistics—simulation and Computation*, 39(4), pp. 860-864.

Chieze, M. *et al.* (2019) 'Effects of seclusion and restraint in adult psychiatry: a systematic review', *Frontiers in psychiatry*, 10, p. 491.

Chou, K.-R., Lu, R.-B. and Mao, W.-C. (2002) 'Factors relevant to patient assaultive behavior and assault in acute inpatient psychiatric units in Taiwan', *Archives of psychiatric nursing*, 16(4), pp. 187-195.

Cohen, J. (1988) *Statistical power analysis for the behavioral sciences*. 2nd edn. Hillsdale, NJ: Lawrence Erlbaum Associates.

Cook, R.M. *et al.* (2020) 'An observational study on the rate of reporting of adverse event on healthcare staff in a mental health setting: An application of Poisson expectation maximisation analysis on nurse staffing data', *Health informatics journal*, 26(2), pp. 1333-1346.

Council of Europe (2024) *Hospital-based initiatives*. Available at: <https://www.coe.int/en/web/bioethics/hospital-based-initiatives/-/highest_rated_assets/2fqlxqVUZDqT/content/safewards-international?_com_liferay_asset_publisher_web_portlet_HighestRatedAssetsPortlet_INSTANCE_2fqlxqVUZDqT_assetEntryId=99736633&_com_liferay_asset_publisher_web_portlet_HighestRatedAssetsPortlet_INSTANCE_2fqlxqVUZDqT_redirect=https%3A%2F%2Fwww.coe.int%2Fen%2Fweb%2Fbioethics%2Fhospital-based-initiatives%3Fp_p_id%3Dcom_liferay_asset_publisher_web_portlet_HighestRatedAssetsPortlet_INSTANCE_2fqlxqVUZDqT%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26_com_liferay_asset_publisher_web_portlet_HighestRatedAssetsPortlet_INSTANCE_2fqlxqVUZDqT_cur%3D0%26p_r_p_resetCur%3Dfalse%26_com_liferay_asset_publisher_web_portlet_HighestRatedAssetsPortlet_INSTANCE_2fqlxqVUZDqT_assetEntryId%3D99736633%23p_com_liferay_asset_publisher_web_portlet_HighestRatedAssetsPortlet_INSTANCE_2fqlxqVUZDqT#p_com_liferay_asset_publisher_web_portlet_HighestRatedAssetsPortlet_INSTANCE_2fqlxqVUZDqT>.

Cutler, N.A. *et al.* (2021) 'How does the environment influence consumers' perceptions of safety in acute mental health units? A qualitative study', *Journal of Clinical Nursing*, 30(5-6), pp. 765-772.

Cutler, N.A. *et al.* (2020) 'Nurses' influence on consumers' experience of safety in acute mental health units: A qualitative study', *Journal of Clinical Nursing*, 29(21-22), pp. 4379-4386.

Dall'Ora, C. *et al.* (2022) 'Nurse staffing levels and patient outcomes: A systematic review of longitudinal studies', *International Journal of Nursing Studies*, p. 104311.

De Cangas, J.P. (1993) 'Nursing staff and unit characteristics: Do they affect the use of seclusion?', *Perspectives in Psychiatric Care*, 29(3), pp. 15-22.

Doedens, P. *et al.* (2017) 'Nursing staff factors contributing to seclusion in acute mental health care–an explorative cohort study', *Issues in Mental Health Nursing*, 38(7), pp. 584-589.

Doedens, P. *et al.* (2021) 'Influence of nursing staff characteristics on seclusion in acute mental health care—A prospective two-year follow-up study', *Archives of Psychiatric Nursing*, 35(5), pp. 491-498.

Doedens, P. *et al.* (2020) 'Influence of nursing staff attitudes and characteristics on the use of coercive measures in acute mental health services—A systematic review', *Journal of psychiatric and mental health nursing*, 27(4), pp. 446-459.

Doedens, P. *et al.* (2022) 'Association between characteristics of nursing teams and patients' aggressive behavior in closed psychiatric wards', *Perspectives in psychiatric care*, 58(4), p. 2592.

Donat, D.C. (2002) 'Impact of improved staffing on seclusion/restraint reliance in a public psychiatric hospital', *Psychiatric rehabilitation journal*, 25(4), p. 413.

Fukasawa, M. *et al.* (2018) 'Relationship between the use of seclusion and mechanical restraint and the nurse-bed ratio in psychiatric wards in Japan', *International journal of law and psychiatry*, 60, pp. 57-63.

Griffiths, P. *et al.* (2018) 'The association between nurse staffing and omissions in nursing care: a systematic review', *Journal of advanced nursing*, 74(7), pp. 1474-1487.

Griffiths, P. *et al.* (2020) 'Nursing workload, nurse staffing methodologies and tools: A systematic scoping review and discussion', *International Journal of Nursing Studies*, 103, p. 103487.

Hamed, M.M.M. and Konstantinidis, S. (2022) 'Barriers to incident reporting among nurses: a qualitative systematic review', *Western journal of nursing research*, 44(5), pp. 506-523.

Hurley, J. *et al.* (2022) 'Utilizing the mental health nursing workforce: A scoping review of mental health nursing clinical roles and identities', *International Journal of Mental Health Nursing*, 31(4), pp. 796-822.

Husum, T.L. *et al.* (2010) 'A cross-sectional prospective study of seclusion, restraint and involuntary medication in acute psychiatric wards: patient, staff and ward characteristics', *BMC Health Services Research*, 10(1), pp. 1-9.

Janssen, W. *et al.* (2007) 'The influence of staffing levels on the use of seclusion', *International journal of law and psychiatry*, 30(2), pp. 118-126.

Joanna Briggs Institute (2023) *Critical Appraisal Tools*. Available at: <https://jbi.global/critical-appraisal-tools> (Accessed: 03/03/2023).

Jordan, J.T. and McNiel, D.E. (2020) 'Perceived coercion during admission into psychiatric hospitalization increases risk of suicide attempts after discharge', *Suicide and Life‐Threatening Behavior*, 50(1), pp. 180-188.

Kalisova, L. *et al.* (2014) 'Do patient and ward-related characteristics influence the use of coercive measures? Results from the EUNOMIA international study', *Social psychiatry and psychiatric epidemiology*, 49, pp. 1619-1629.

Kane, R.L. *et al.* (2007) 'The association of registered nurse staffing levels and patient outcomes: systematic review and meta-analysis', *Medical care*, pp. 1195-1204.

Kodal, J.S., Kjær, J.N. and Larsen, E.R. (2018) 'Mechanical restraint and characteristics of patient, staff and shifts in a psychiatric ward', *Nordic Journal of Psychiatry*, 72(2), pp. 103-108.

Lancaster, G.A. *et al.* (2008) 'Does the position of restraint of disturbed psychiatric patients have any association with staff and patient injuries?', *Journal of psychiatric and mental health nursing*, 15(4), pp. 306-312.

Lanza, M.L. *et al.* (1997) 'Staffing of inpatient psychiatric units and assault by patients', *Journal of the American Psychiatric Nurses Association*, 3(2), pp. 42-48.

Lanza, M.L. *et al.* (1994) 'Environmental characteristics related to patient assault', *Issues in Mental Health Nursing*, 15(3), pp. 319-335.

Large, M. *et al.* (2014) 'Nosocomial suicide', *Australasian Psychiatry*, 22(2), pp. 118-121.

McHugh, M.D. *et al.* (2021) 'Effects of nurse-to-patient ratio legislation on nurse staffing and patient mortality, readmissions, and length of stay: a prospective study in a panel of hospitals', *The Lancet*, 397(10288), pp. 1905-1913.

Morrison, P. and Lehane, M. (1995) 'The effect of staffing levels on the use of seclusion', *Journal of psychiatric and mental health nursing*, 2(6), pp. 365-366.

NAPICU (2014) *National Minimum Standards for Psychiatric Intensive Care in General Adult Services*. London: NAPICU. Available at: <https://napicu.org.uk/wp-content/uploads/2014/12/NMS-2014-final.pdf>.

Ngune, I. *et al.* (2023) 'Developing nurse‐sensitive outcomes in acute inpatient mental health settings—A systematic review', *Journal of Clinical Nursing*, 32(17-18), pp. 6254-6267.

NHS (2019) *NHS Mental Health Implementation Plan 2019/20 – 2023/24*. Available at: <https://www.longtermplan.nhs.uk/wp-content/uploads/2019/07/nhs-mental-health-implementation-plan-2019-20-2023-24.pdf>.

NHS England (2015) *New NHS safe staffing framework for mental health wards*. Available at: <https://www.england.nhs.uk/2015/06/mh-safe-staffing/> (Accessed: 08/02/2023).

NSW Nurses & Midwives Association (2022) *Ratios, Pay and Conditions: Award Claim 2022*. NSW, Australia. Available at: <https://www.nswnma.asn.au/wp-content/uploads/2022/08/Ratios-Claim-2022-FINAL.pdf>.

O'Malley, J.E. *et al.* (2007) 'Factors influencing seclusion rates in an adult psychiatric intensive care unit', *Journal of Psychiatric Intensive Care*, 3(2), pp. 93-100.

Owen, C. *et al.* (1998) 'Violence and aggression in psychiatric units', *Psychiatric services*, 49(11), pp. 1452-1457.

Page, M.J. *et al.* (2021) 'The PRISMA 2020 statement: an updated guideline for reporting systematic reviews', *International journal of surgery*, 88, p. 105906.

Palmstierna, T. and Wistedt, B. (1995) 'Changes in the pattern of aggressive behaviour among inpatients with changed ward organization', *Acta Psychiatrica Scandinavica*, 91(1), pp. 32-35.

Park, S. *et al.* (2020) 'Nurse staffing and health outcomes of psychiatric inpatients: A secondary analysis of National Health Insurance claims data', *Journal of Korean Academy of Nursing*, 50(3), pp. 333-348.

Pelto-Piri, V. *et al.* (2019) 'Feeling safe or unsafe in psychiatric inpatient care, a hospital-based qualitative interview study with inpatients in Sweden', *International journal of mental health systems*, 13, pp. 1-10.

Phoenix, B.J. (2019) 'The current psychiatric mental health registered nurse workforce', *Journal of the American Psychiatric Nurses Association*, 25(1), pp. 38-48.

Pollard, R. *et al.* (2007) 'Organizational and unit factors contributing to reduction in the use of seclusion and restraint procedures on an acute psychiatric inpatient unit', *Psychiatric Quarterly*, 78, pp. 73-81.

Porritt, K., Gomersall, J. and Lockwood, C. (2014) 'JBI's systematic reviews: study selection and critical appraisal', *AJN The American Journal of Nursing*, 114(6), pp. 47-52.

R Core Team (2024) *R: A language and environment for statistical computing.* (Version 4.2.2) [Computer program]. R Foundation for Statistical Computing.

Rice, M.J., Stalling, J. and Monasterio, A. (2019) 'Psychiatric-mental health nursing: Data-driven policy platform for a psychiatric mental health care workforce', *Journal of the American Psychiatric Nurses Association*, 25(1), pp. 27-37.

Rogerson, M. *et al.* (2021) 'The relationship between inpatient mental health ward design and aggression', *Journal of Environmental Psychology*, 77, p. 101670.

Royal College of Psychiatrists (2020) *CCQI 326:* *Quality Standards for Liaison Psychiatry Services*. Royal College of Psychiatrists.

Schlup, N., Gehri, B. and Simon, M. (2021) 'Prevalence and severity of verbal, physical, and sexual inpatient violence against nurses in Swiss psychiatric hospitals and associated nurse‐related characteristics: Cross‐sectional multicentre study', *International journal of mental health nursing*, 30(6), pp. 1550-1563.

Staggs, V.S. (2013) 'Nurse staffing, RN mix, and assault rates on psychiatric units', *Research in nursing & health*, 36(1), pp. 26-37.

Staggs, V.S. (2015) 'Injurious assault rates on inpatient psychiatric units: associations with staffing by registered nurses and other nursing personnel', *Psychiatric services*, 66(11), pp. 1162-1166.

Staggs, V.S. (2016) 'Deviations in monthly staffing and injurious assaults against staff and patients on psychiatric units', *Research in nursing & health*, 39(5), pp. 347-352.

Sweeney, A. *et al.* (2018) 'A paradigm shift: relationships in trauma-informed mental health services', *BJPsych advances*, 24(5), pp. 319-333.

Thibaut, B. *et al.* (2019) 'Patient safety in inpatient mental health settings: a systematic review', *BMJ open*, 9(12), p. e030230.

Thompson, E., Senek, M. and Ryan, T. (2024) 'Analysis of a nursing survey: reasons for compromised quality of care in inpatient mental health wards', *International Journal of Mental Health Nursing*, 33(1), pp. 52-61.

Twigg, D.E. *et al.* (2019) 'A quantitative systematic review of the association between nurse skill mix and nursing‐sensitive patient outcomes in the acute care setting', *Journal of advanced nursing*, 75(12), pp. 3404-3423.

Ulrich, R.S. *et al.* (2018) 'Psychiatric ward design can reduce aggressive behavior', *Journal of Environmental Psychology*, 57, pp. 53-66.

Ward-Ciesielski, E.F. and Rizvi, S.L. (2021) 'The potential iatrogenic effects of psychiatric hospitalization for suicidal behavior: A critical review and recommendations for research', *Clinical Psychology: Science and Practice*, 28(1), p. 60.

Ward‐Stockham, K. *et al.* (2022) 'Effect of Safewards on reducing conflict and containment and the experiences of staff and consumers: A mixed‐methods systematic review', *International journal of mental health nursing*, 31(1), pp. 199-221.

Weltens, I. *et al.* (2021) 'Aggression on the psychiatric ward: Prevalence and risk factors. A systematic review of the literature', *PLoS One*, 16(10), p. e0258346.

Weltens, I. *et al.* (2023) 'Staff and ward factors associated with aggression development on an acute closed psychiatric ward: an experience sampling method study', *Bmj Open*, 13(2).

WHO (2021) *Mental health crisis services: promoting person-centred and rights-based approaches*. World Health Organization.

Wickham, H. *et al.* (2019) 'Welcome to the Tidyverse', *Journal of open source software*, 4(43), p. 1686.

Williams, J.E. and Myers, R.E. (2001) 'Relationship of less restrictive interventions with seclusion/restraints usage, average years of psychiatric experience, and staff mix', *Journal of the American Psychiatric Nurses Association*, 7(5), pp. 139-144.

Willis, E. and Brady, C. (2022) 'The impact of “missed nursing care” or “care not done” on adults in health care: A rapid review for the Consensus Development Project', *Nursing Open*, 9(2), pp. 862-871.

Woodnutt, S. (2023) 'Changing the focus of adverse incident reporting in mental health nursing', *Mental Health Practice*, 26(6).

Woodnutt, S. *et al.* (2024) 'Analysis of England's incident and mental health nursing workforce data 2015–2022', *Journal of Psychiatric and Mental Health Nursing*.

World Health Organization (2022) *World mental health report: transforming mental health for all*. Geneva. Available at: <https://www.who.int/publications/i/item/9789240049338>.

Ye, J. *et al.* (2019) 'Physical restraint in mental health nursing: A concept analysis', *International journal of nursing sciences*, 6(3), pp. 343-348.