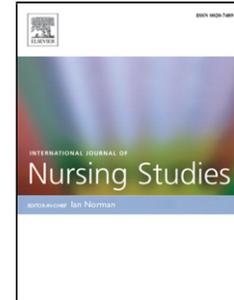# Accepted Manuscript

Title: Effectiveness and Experiences of Mental Health Nurses in Cases of Medical Emergency and Severe Physiological Deterioration: A Systematic Review

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Effectiveness and Experiences of Mental Health Nurses in Cases of Medical Emergency and Severe Physiological Deterioration: A Systematic Review

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ABSTRACT

Background: From a baseline of near zero, there has in recent years been a growing number of empirical studies related to mental health nurses' delivery of healthcare for severely physically deteriorating patients or in medical emergency situations. To date, this evidence-base has not been systematically identified, appraised, and integrated.

Objectives: To systematically identify, appraise and synthesise the available empirical evidence about mental health nurses, medical emergencies, and the severely physiologically deteriorating patient.

Design: A systematic review in accordance with relevant points of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

Data sources: Multiple electronic databases (CINAHL; PubMed; MedLine; Scopus, ProQuest Dissertations and Theses) were searched using comprehensive terms.

Review methods: Inclusion criteria: English language papers describing empirical studies (any design) about i) the effectiveness of interventions to improve any outcome related to mental health nurses' delivery of emergency medical care or care for the severely deteriorating patient; or ii) mental health nurses' emergency medical care-related knowledge, skills, experience, attitudes, or training needs. Further information was sought from study authors. Included studies were independently assessed for quality. Effect sizes from intervention studies were extracted or calculated where there was sufficient information. An integrative synthesis of study findings was conducted.

Results: A total of 22 studies, all but one published since 2011, met inclusion criteria. Ten were intervention studies and twelve were cross-sectional observational or qualitative studies. Intervention studies were all of weak quality overall and utilised pre- post designs mostly with limited post intervention follow-up time. Observational and qualitative studies were generally of good quality but only parts of the evidence from these studies were relevant to emergency physical care since most focused on mental health nurses and their routine physical healthcare practice.

Conclusions: There are currently no validated instruments to investigate mental health nurses' emergency medical care-related attitudes. More rigorous controlled trials of interventions are needed to better establish an evidence-base for educational interventions to improve this groups' emergency care-related practice.

Abbreviations used:

CJR – Clinical Judgement Rubric; ED – Emergency Department; GSES – Generalised Self Efficacy Scale; MEWS – Modified Early Warning Score; RRR – Rapid Response Report

Keywords: Mental health nurses, emergency medicine, deteriorating patient, educational interventions, attitudes, knowledge

BACKGROUND

People with diagnoses of mental disorder are at more than double the risk of all-cause mortality than others in the population; most at risk are those with

psychoses, mood disorder and anxiety; mortality rates are significantly higher in studies which include inpatients (John et al., 2018). Median years of life lost by this group is 10.1 years compared with population controls (Walker et al., 2015). While risk of unnatural causes of death are greatly increased, it is death from natural causes that remains responsible for the vast majority of mortality among people with mental disorder. In people with schizophrenia, for example, cardiovascular disease accounts for about one third of all deaths, cancer for one in six; other common causes of death are diabetes mellitus, chronic obstructive pulmonary disease, influenza, and pneumonia (Olfson et al., 2015). Implicated in increased mortality are high rates of smoking (Drope et al., 2018), obesity (Annamalai et al., 2017), exposure to high levels of antipsychotic pharmacotherapy (Tomiainen et al., 2016) and mental disorder itself (Walker et al., 2015). While accounting for a small number of deaths overall, patients with serious mental disorder are vulnerable to restraint-related death due, in part, to pre-existing conditions that increase the risk of cardiac arrest and the fact that restraint can lead to positional asphyxia (Aiken et al., 2011).

Failure to recognise and appropriately respond to significant physiological deterioration in patients admitted to mental health units has been highlighted as a factor in a number of fatal adverse events in these settings (Findlay et al., 2012). While the reasons for this are multifactorial, it is likely related to the relative infrequency of acute physiological deterioration in mental health settings and hence, staff lacking experience in recognising and responding effectively, or

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underestimating the seriousness of a situation (Australian Commission on Safety and Quality in Health Care, n.d.). Further, in a scoping review on recognising and responding to deterioration in mental state, Craze et al. (2014: p.21) have suggested that the language used in medical records and verbal handovers in mental health settings reflects the superficial nature of engagement with observation for signs of clinical deterioration of patients. Examples include: 'patient appears settled', 'patient appears to be resting' and 'no change observed'. Further evidence suggests management of physiological deterioration in mental health settings is often suboptimal due to poor communication between multiple healthcare providers from more than one team, and across different locations (Craze et al., 2014).

Documentation of physical health assessments in mental health settings has also been shown to be poor with one study finding more than half the case notes audited were missing details of appropriate assessments; even basic observations such as recording a blood pressure on admission were only recorded in 57% of case notes (Ward, 2005). Even with adequate documentation, failure to identify deteriorating patients can occur because there is a lack of knowledge of signs and symptoms indicating physiological deterioration, or failure to recognise the significance of these findings (Australian Commission on Safety and Quality in Health Care, 2008). Even in spite of the advent of 'track and trigger' systems that assist with early recognition of clinical deterioration, such as the medical emergency team criteria in Australia and the modified early warning score (MEWS) in the UK, research has identified that the sensitivity of these tools is low and their utility,

validity and reliability have not been adequately established (Australian Commission on Safety and Quality in Health Care, 2010). Regardless, patient safety organisations and experts advocate their use for early identification and improved recording of observations (National Institute for Health and Clinical Excellence, 2007; Australian Commission on Safety and Quality in Health Care, 2010).

Also implicated as contributing factors to the failure to recognise physiological deterioration in patients with mental illness are the resistant or negative attitudes of clinicians who regard their role as exclusively attending to patient's mental well-being: a number of studies have reported that mental health nurses lack confidence in conducting physical health assessment, neurological observations and emergency medical care including cardiopulmonary resuscitation (Ward, 2005). In one Australian study mental health nurses utilised significantly fewer, typically half or less, core physical assessment skills compared with surgical and medical nurses (Osborn et al., 2015). While the number of core skills would be expected to differ based on the clinical work area, of note, measuring breathing rate, pattern and related chest expansion were not skills regularly used by mental health nurses and, given changes in respiratory rate are one of the earliest signs of physiological deterioration (Mok et al., 2015), could account for a proportion of adverse events in mental health settings.

There has been a tangible and growing international response among mental health nursing academics and practitioners to this situation epitomised by a number of literature reviews covering a range of delineated areas including a decade of UK-

only research on the role of mental health nurses in physical health care (Blythe & White, 2012); consumers' and professionals' perceptions of barriers to physical health care for people with serious mental illness (Happell et al., 2012); the focus and content of nurse-provided physical health care for mental health service users (Happell et al., 2014); and the physical health of people with severe mental illness (Collins et al., 2012). A relatively recently developed tool, the Physical Healthcare Attitude Scale for mental health nurses (Robson & Haddad, 2012), has demonstrated a range of attitudes towards and involvement in physical healthcare internationally among mental health nurses (Robson et al., 2013; Haddad et al., 2016; Ganiah et al., 2017; Bressington et al., 2018) . However, for the most part the scale does not address nurses' attitudes to or involvement in emergency medical care or care of the severely physiologically deteriorating patient. Further, to our knowledge no one has thus far systematically identified and reviewed the growing literature about mental health nurses and the provision of emergency medical care or care for the patient with clear signs of severe physiological deterioration. In the context of this review, emergency medical care is defined as life-saving measures instituted in life-threatening situations, such as a cardiac arrest (Hirshon et al., 2013); while care of the severely physiologically deteriorating patient is defined as the ability to recognise and respond to observable severe physiological abnormalities prior to an adverse event (Australian Commission on Safety and Quality in Healthcare, 2017).

In this context we have conducted a systematic review to identify, appraise, and synthesise existing evidence from empirical research literature about i) mental health nurses' experience of providing emergency medical health care and care for the severely physically deteriorating patient and their related knowledge, skills, educational preparation, and attitudes; ii) the effectiveness of any interventions aimed at improving or changing mental health nurses' practice related to emergency medical care or care of the physically deteriorating patient; and iii) to identify implications for the future provision of relevant training and education, for policy, research, and practice. The specific review question being addressed therefore is: what is known from the international, English language, empirical literature about mental health nurses' skills, knowledge, attitudes, and experiences regarding provision of emergency medical care and care for the severely physiologically deteriorating patient.

METHODS

Design

Systematic review of the literature following the relevant points of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher et al., 2009).

Search strategy

The review included both effectiveness and experiential questions. We therefore devised a two-pronged literature search strategy. To capture studies about related experience we used a Population Exposure Output format review question in

which the population was defined as mental health nurses, the exposure as emergency medical and/or physiological deterioration situations or simulations, and the outcomes using experiential, social, educational, cognitive, or attitudinal terms (see Table 1). To ensure we captured studies relevant to the question of intervention effectiveness we used a Population Intervention Comparator Outcome structure (Population: mental health nurses; Intervention: any including education, policy or guideline change; Comparator: any or none; Outcome: any) (Munn et al., 2018). We searched five electronic databases: i) CINAHL, ii) PubMed, iii) MedLine, iv) Scopus, and v) ProQuest Dissertations and Theses using text words and MeSH terms. We also searched the reference list of all included studies, plus those of relevant review studies. Searching was informed by the Australian Commission on Safety and Quality in Health Care (2011) standard on recognising and responding to clinical deterioration in acute health care. The literature strategy was designed by GLD and conducted independently by GLD and EMB.

Inclusion and exclusion criteria

Studies were included if they were an English language account of an empirical study (any design) which examined exposure to real or simulated medical emergencies. Studies were included if the participants were or included mental health nurses defined as such by the study authors or were described in the study as registered nurses working in a psychiatric or mental health setting. No date or setting limiters were applied.

Data extraction

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The following information was extracted from included studies: title, author, publication year, data collection years, study location (country), research objectives, aims or hypotheses, design, population, sample details and size, data sources, study variables (i.e., details of intervention) or other exposure, unit of analysis, and study findings. Further, we categorised studies as interventional or non-interventional. Intervention studies aimed to describe the impact of an educational or real world (e.g., policy or practice) change in terms of any mental health nurse- or nursing-related outcome including patient-related variables arising from nursing actions (e.g., Medical Emergency Team referral). Non-intervention studies were either descriptive of mental health nurse- or nursing- related outcomes and/or utilised case control designs to compare them with those of other occupational or professional groups. We contacted corresponding authors of included studies regarding any issues where clarification or additional data could aid the review. Where effect sizes were presented we extracted this information or where sufficient information was presented in the paper, or following correspondence with the corresponding author, we calculated the appropriate effect size statistic for the test used.

Study quality appraisal

Studies used a range of quantitative and qualitative methods and no single appraisal tool was suitable for all studies. We assessed the likelihood of bias in intervention studies with reference to criteria described by Thomas et al. (2004) and involving assessment of the likelihood of selection bias in the obtained sample, study design, potential confounders, blinding, potential for bias in data collection

from invalid instrumentation, and participant retention (see Table 2). Relevant items from the US Department of Health & Human Sciences NIH Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (NIH National Heart, Lung & Blood Institute, 2018) were used to assess cross-sectional observational studies (see Table 3). Qualitative descriptive studies were assessed using the Critical Appraisal Skills Programme (n.d.) tool (see Table 4). Quality appraisal was conducted independently by authors GLD, LR, and GE. Where agreement was unanimous this was recorded; otherwise items were discussed until consensus was reached.

Study synthesis

Meta analysis was not possible due to the heterogeneous nature of study designs and outcomes. We tabulated information about study findings and conducted an iterative process of grouping and theming results resulting in a descriptive synthesis. We carefully considered study quality in the emphasis placed on individual study findings in the results section and it underpinned our discussion and recommendations.

RESULTS

Study settings and participants

The search strategy resulted in the inclusion of 21 studies published in 22 papers (see Fig 1 flowchart inclusion flowchart; Tables 5a and 5b) involving a total of 2,076 (M[SD]=125.7[172.9], Mdn=57, range 7 to 585) mental health nurses or mental health nursing students (n= 124; 5.6%). In addition, one study (Puskar et al.,

2011) provided no details of participant numbers or characteristics, and a second (Flood et al., 2014) reported N=393 participants in total but no details of profession. We retained the study since a considerable proportion of the 280 'frontline' staff involved would be mental health nurses. Manu et al. (2015) examined Rapid Response Team calls made over a 10-month period in a US psychiatric hospital and reported the proportion made by various disciplinary groups including nurses. Studies were conducted in the UK (k=8), US (k=6), Australia, Ethiopia, Finland, India, Jordan, (all k=1); one international study was conducted across three nations, namely Qatar, China (Hong Kong), and Japan. Two papers (Robson & Haddad, 2012; Robson et al., 2013) described different analyses from the same dataset and were treated as one study for the purpose of this review.

Study designs

Of the included studies, ten examined an intervention (k=7 an educational intervention, k=1 a policy intervention, and k=2 a mixed educational/policy and practice intervention). Of the seven education-only intervention studies, k=6 evaluated a simulation and k=1 a paper-based self-instruction module. Of the intervention studies, k=7 utilised longitudinal pre- post- intervention (AB) designs, k=2 (Hermanns et al., 2011; Unsworth et al., 2012) were cross-sectional and evaluated quantitative outcomes only following the change or intervention; Unsworth et al.'s (2012) study used qualitative methods only and was also cross-sectional. All eleven non- intervention studies utilised cross-sectional designs. Of

these, *k*=4 were unmatched case control studies and *k*=2 used qualitative methods only.

Intervention/ exposure

The simulation(s) employed in intervention studies were generally described in some detail. Simulation training length was 30-minutes (Hermanns et al., 2011), half a day (Lavelle et al., 2017), and one day (Herisko et al., 2015; Chadwick & Withnell, 2016). Information on simulation intervention length was not provided by Wynn et al (2011) or Unsworth et al. (2012). Details of simulations can be seen in Table 5a; in brief, they involved manikins or human person simulators of varying sophistication ranging from a manikin of realistic weight to more sophisticated Human Person Simulators capable of producing physiological outputs or with the ability to 'speak' by researcher remote access. The simulation scenarios involved attempted suicide by hanging (Hermanns et al., 2011), care provision for diabetic medical conditions (Wynn, 2011); alcohol intoxication, drug induced psychosis, and chest infection in a patient with Alzheimer's Disease (Unsworth et al., 2012); medical deterioration and prevention of medical emergencies (Fernando et al., 2018); respiratory arrest, diabetic hypoglycaemia, hanging and choking (Lavelle et al., 2017).

Non-simulation intervention studies aimed to evaluate the effect of the introduction of standardized guidelines and associated mandatory training for nurses about Medical Emergency Team access (Puskar et al., 2011), a self-instructional module (Paulose et al., 2016), introduction of a modified early warning score sheet

and associated training (Shaddel et al., 2014), and the introduction of personal health plans for patients in a low secure forensic unit together with a single educational session on physical health care for nursing staff (Haddad et al., 2016).

Among the non-intervention studies, Herisko and colleagues (Herisko et al., 2013) employed a qualitative design involving a group interview to gather information about exposure to utilizing Medical Emergency Teams in a US psychiatric hospital. A second study by the team (Herisko et al., 2015) used an amended form of the structured interview used in the previous study to gather quantitative data. In an unpublished PhD thesis, Shanley (2012) conducted qualitative interviews with mental health nurses with experience of exposure to suicide or other sudden unexpected death of a patient. Of 15 participants, n=6 had direct experience of a fatal event including attempted resuscitation and these accounts attracted additional analyses by the researcher. In Finland, Tenkanen et al. (2011) asked Registered Nurses (licensed professionals with a 4-y university education) and Practical Mental Nurses (individuals with a 3-y vocational qualification) working in forensic psychiatric settings about their own and their counterpart group's mastery of 'Life support skills and safety in potential violent situations'. Both groups were also rated by senior and managerial nursing staff. Flood et al. (2014) conducted a national cross-sectional survey to gather information about respondents' knowledge and awareness of recommendations made in a Rapid Response Report about resuscitation training and also attempted to gauge the likelihood of the recommendations being met by asking respondents about their

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own relevant training. Several studies have surveyed mental health nurses working in practice about their attitudes to physical health care including varying elements about medical emergency and physiological deterioration (Robson & Haddad, 2012; Robson et al., 2013; Haddad et al., 2016; Wynaden et al., 2016; Ganiah et al., 2017; Bressington et al., 2018).

Outcomes measurement

The most frequently used outcomes measure was the Physical Health Attitudes Scale for Mental Health Nurses (Robson & Haddad, 2012) in k=4 studies. While the tool has demonstrated validity and reliability the outcomes of interest for this review were limited to three items describing emergency/physiological deterioration related scenarios: namely, confidence in dealing with cardiac arrest, hypoglycaemia and hyperglycaemia. The remaining Physical Health Attitudes Scale for Mental Health Nurses items relate to smoking intervention, confidence in delivering routine physical health screening and advice. No other two or more studies used the same outcomes measure. Physical Health Attitudes Scale for Mental Health Nurses was used in five non-intervention studies RRobson & Haddad, 2012; Robson et al., 2013; Haddad et al., 2016; Ganiah et al., 2017; Bressington et al., 2018; the remaining seven involved purpose-designed interview or focus group schedules in qualitative studies (Shanley, 2012; Herisko et al., 2013), while the remaining studies used purpose-designed quantitative questionnaires Tenkanen et al., 2011; Flood et al., 2014; Herisko et al, 2015; Manu et al., 2015; Gebreegziabher et al., 2017). Physical Health Attitudes Scale for Mental Health

Nurses was used in one non-simulation intervention study (Haddad et al., 2016); other non-simulation intervention studies outcomes included proxy measures of nurse behaviour including number of emergency protocols activated (Puskar et al., 2011), semi-structured knowledge questionnaire regarding management of heart attack, respiratory arrest, convulsion, and hypoglycaemia (Paulose et al., 2016), and a 1-item clinical judgement self rating scale and two clinical vignette with dichotomous correct/incorrect answers (Shaddel et al., 2014).

The remaining simulation intervention studies used a researcher-completed observation rubric (Lasater, 2007), routinely collected medical transfer data, and a participant satisfaction with training questionnaire (Wynn, 2011), and purpose-designed tools aimed at capturing participants' self-reported knowledge, confidence, and attitudes to emergency scenarios (Herisko et al., 2013; Lavelle et al., 2017). Lavelle et al. (2017) also collected qualitative data from a structured survey questionnaire and from focus groups, while Fernando et al. (2018) included a course evaluation form and open questions. Hermanns et al. (2011) collected data using a Self-Report Suicide Clinical Simulation Evaluation Tool, a nine-item tool requiring participants to self-assess against content and process objectives on a 5-point Likert scale. The outcome in this study relevant to the current review was level of agreement that the simulation had improved their understanding of relevant metabolic and physiological changes during a simulation of finding a patient hanging from a door in an apparent suicide attempt. Unsworth et al.'s (2012) cross-sectional study utilised qualitative methods only to elicit accounts from participants

of the value of the simulation interventions investigated. Each simulation study also described how, to varying extents, they encouraged participants to 'think aloud' during exercised or video-recorded sessions. These data were usually then incorporated into the analysis.

Study quality

All ten intervention studies were rated as being of weak quality overall (See Table 2). None included any sort of control condition and there was no concealment to intervention or evaluation. Of the longitudinal studies, withdrawals were mostly non-existent though probably largely because measures were taken before and immediately after the training and longer term outcomes were only captured qualitatively. Haddad et al. (2016) conducted follow-up data collection at 4-months retaining just over 80% of the original sample.

Quality of the cross-sectional studies was generally higher than intervention studies (*Mdn* score = 6, range 5-7, maximum possible 7) and it should be noted that quality of interventional studies might have been more favourably rated had they merely aimed to describe related phenomena rather than evaluate an intervention. The quality of the two qualitative studies varied widely: Shanley's (2012) PhD thesis provided a rich detailed account of nurses' experience of encountering suicide-type emergencies and is recommended.

Study findings

Simulation intervention studies

In the study by Wynn (2011) participants underwent scenarios involving simulations of providing diabetes care and, during which, circumstances might change according to evolving conditions (e.g., wrong clinical decisions might lead to escalating crisis such as cardiac arrest). There was a favourable statistically significant change from the pre- to the post intervention measurement of clinical judgment and 80% of participants were satisfied with the training. Additionally, the researcher reported a 55% fall in medical emergencies involving patients with diabetes in the month following the training. Fernando et al. (2018) reported statistically significant (large effect size [η^2]) improvements in knowledge following intervention, while Lavelle et al. (2017) reported a similarly large effect size for knowledge and moderate effect sizes (Cohen's d) for positive changes in confidence and attitudes following simulated learning. Satisfaction with the training in Fernando's study (2018) was rated on four questions. Mean positive affirmation of the questions was 99% (range 98-100%). rated positively by 99% of attendees. Qualitative data reported in these studies comprised exclusively positive comments about inter-professional learning, leadership and teamwork, reflection, communication, confidence, and personal responsibility. Chadwick and Withnell (2016) reported that self-efficacy self-ratings in relation to relevant statements about dealing with emergency or physiological deterioration situations improved. While they presented no inferential statistics, secondary analysis shows that change on all ten items was statistically significant in that participants were more likely to rate themselves moderately or highly confident in each area following the simulation compared to the baseline assessment where they more commonly rated themselves

as having no or only slight confidence (effect sizes [Cramer's v] ranging from small [.21] to large [.52]).

Hermanns et al. (2011) cross-sectional study found that participants reported a mean score of 1.4 on 'understanding of metabolic and physiological changes' where 1='strongly agree' and 5 'strongly disagree'. Unsworth et al. (2012) qualitative-only study found participants reporting that their simulation training had helped them to 'bridge the gap' in terms of providing an opportunity to practice skills that may occur only rarely in the clinical setting. They said that the training had raised their awareness of the possibility of patient physiological deterioration and had helped them recognise gaps in their own knowledge. They appreciated having learnt alongside adult nursing students especially as this had given them an additional perspective and they had found the simulation authentic. Finally, they had expressed surprise and shock that events such as intoxication and substance misuse could escalate to emergency levels and reported that, in future, they would be less likely to advise service users to 'sleep it off' given the importance of maintaining physiological observations.

Non-simulation intervention studies

Haddad et al. (2016) found a statistically significant difference on the Physical Health Attitudes Scale for Mental Health Nurses' total score at 4-month follow-up, but not on any of the four subscales. Changes on one of three items specific to emergency or physiological deterioration situations was statistically

significant (hyperglycaemia) and for two non-significant (cardiac arrest, hypoglycaemia) (Mark Haddad, Personal correspondence 24th April 2018).

Paulose et al. (2016) reported that mean scores on individual knowledge tests about managing heart attack, respiratory arrest, convulsion, and hypoglycaemia all improved significantly following provision of a self-instruction intervention; in addition the frequency of those rated as having 'very good' knowledge in each area increased from 3% to 90%, 7% to 87%, 0% to 80%, and 0% to 83% respectively. Accordingly, effect size for each was uncommonly large with post-intervention Hedge's *g* scores indicating shifts of 3.07 – 4.27 *z-scores* (i.e. SDs) from the pre-intervention level. A combined total knowledge score also increased significantly (*Mean* [SD] 22.06 [1.92] vs. 30.04 [2.82]; Hedges' *g* =3.31) (Bhattacharya Chanu, personal correspondence 2nd May 2018).

Puskar et al. (2011) study examined the number of Condition A (Arrest) and Condition C (Crisis) referrals made to a Medical Emergency Team following introduction of protocols and associated training. They reported a rise in Condition C reporting, presumably reflecting increased confidence in nurses to report early, and a decline in Condition A reports. Concurrently, there were falls in the number of fatal outcomes following the protocol introduction.

Shaddel et al. (2014) examined the effect on confidence and knowledge of mental health and learning disability nurses of a brief teaching session and introduction of a Modified Early Warning Score (MEWS) for physiologically deteriorating patients. Significantly more nurses identified the correct course of

action in two scenarios following the intervention (φ = .71) and nurses also reported more confidence in their clinical judgement following introduction of the MEWS (*r* = .87).

Non-interventional descriptive studies

Four non-intervention studies (Robson & Haddad, 2012; Wynaden et al., 2016; Ganiah; 2017; Bressington et al., 2018) used the Physical Health Attitudes Scale for Mental Health Nurses to assess the attitudes of mental health nurses regarding physical health care. In addition, we present baseline data from Haddad et al.'s (2016) intervention study as it also used the Physical Health Attitudes Scale for Mental Health Nurses; thus Physical Health Attitudes Scale for Mental Health Nurses data is available for *N*=1,523 individuals. Across studies the proportion of respondents agreeing that they were confident they could resuscitate a client who had had a cardiac arrest was 67.3% (Ganiah et al., 2017), 73.0% (Robson et al., 2013), 82.3% (Wynaden et al., 2016), 86.0%, 87.0%, and 45.0% in Qatar, Hong Kong, and Japan respectively (Bressington et al., 2018) and 84.2% (Haddad et al., 2016).

Flood et al. (2014) found mixed levels of awareness among respondents to their national survey about recommendations about resuscitation practice in mental health settings in the Rapid Response Report. Only 36% of 'frontline' staff reported being aware of the recommendations. However, 82% of these had received some level of resuscitation training in the past year. Only 27%, compared with 26% of community staff and 48% of senior/managerial staff reported any actual experience

of resuscitation. There was a reported compliance rate of 67% with the report recommendation that units where rapid tranquilisation or seclusion might be used should have access to staff trained in immediate life support and relevant equipment. Respondents' qualitative feedback suggested a lack of knowledge around emergency drug administration and lack of confidence in working with elderly people.

Tenkanen et al. (2011) study of nursing staff working in forensic mental health settings in Finland explored differences between groups of Registered and Practical Mental Health Nurses' own and reciprocal group ratings of overall mastery of various domains including life support skills. Both groups were also rated by senior nurses/ managers. Results suggested that Practical Mental Health Nurses overestimated their own group's mastery of life skills relative to Registered Nurses and managers' ratings while Registered Nurses' also overestimated their own mastery relative to other raters but to a lesser magnitude. The authors conclude that, based on broader information than this one topic area, Registered Nurses are better equipped in the skills required to provide effective care in the forensic environment.

Gebreegziabher Gebremedhn et al. (2017) compared self-report attitude and skill ratings of different professional undergraduate groups in relation to performing cardiopulmonary resuscitation. Only a small proportion (3.0%) of N=506 participants were mental health nursing students. They did not differ significantly

from any other group in terms of attitudes and rated themselves only as less skilled than anaesthetists.

Shanley (2012) found that physical presence during an inpatient sudden death or suicide added considerable qualitative complexity to their experience and reaction than for nurses who were *informed of* the suicide or other sudden death (i.e., community mental health nurses). Specifically, the former professed more concern about the outcome of coroner's inquest reports.

Herisko et al.'s (2013, 2015) studies of mental health nurse's experience of exposure to a Medical Emergency Team both found that nurses' reported both positive and negative forces impacting on decisions to refer to Medical Emergency Team. However, in the larger survey study (Herisko et al., 2015) more respondents agreed with 'negative forces' statements (M [SD] = 70.7[16.6]) than with 'positive forces' statements (M[SD]=51.1[21.2]). Qualitative data suggests difficulties include the increased workload from calling the Medical Emergency Team, lack of experience, lack of participation in the Medical Emergency Team, unfamiliarity with patients, uncertainty whether symptoms meet Medical Emergency Team criteria, interruptions, and preferring to call the House Officer first. There was agreement from most participants with statements suggesting that physical healthcare for psychiatric patients is complex (M[SD]=76.3[13.8]). Finally, Manu et al (2015) reported that the majority of 169 Rapid Response Team activations were made by staff nurses (72.8%). The authors concluded that the introduction of a

Rapid Response Team empowered nurses to refer when the more traditional practice was for the patient's psychiatrist to call a medical consultant.

DISCUSSION

We conducted a systematic review of the empirical literature about mental health nurses and emergency medical and clinical physiological deterioration situations. We took a broad approach to searching the literature due to a paucity of research on actual observations of care and included studies involving real or simulated situations and included studies involving mental health nursing students and multidisciplinary professional groups in addition to those including only mental health nurses. Nevertheless, only 21 studies met our review inclusion criteria. Further, some of these papers were only partially relevant since their main focus was on routine physical healthcare (Robson & Haddad, 2012; Robson et al., 2013; Wynaden et al., 2016; Ganiah; 2017; Bressington et al., 2018). Nevertheless, we included relevant results from these studies because they do represent some of the more contemporary sources of information. Nevertheless, we can state with confidence that there is a paucity of research in this important area of mental health nursing practice. Irrespective of the quantity of available research, the risk of bias of included studies, in particular the intervention studies, was generally significant.

Effectiveness

Of the evaluation studies, none employed a control group and none can truly support the conclusion that the intervention, usually a simulation, was responsible for any subsequent improvement in practice. Nevertheless, as far as what are largely

routine evaluations conducted as part of routine practice, they do suggest that the sessions are relevant, worthwhile, challenging, enjoyed by participants, and feasible to implement. While there may be substantial costs to simulated learning or training, the review tends to support its use in mental health for more than 'non-technical' and interprofessional communication skill development. Immersive experiences that authentically replicate 'real life' physiological deterioration, may be helpful in developing mental health nurses' awareness, self-efficacy, confidence and critical thinking skills in medical emergencies whilst mitigating any risk or safety issues. The key educational benefits of simulation include opportunities to practice in a safe environment and receive feedback and debriefing, being exposed to a variety of scenarios, in a controlled enviornment and assessment of learning (Lateef, 2010). Further the review supports the need for greater awareness and training among mental health nurses of the policies and protocols within workplaces, which can increase confidence levels in reporting early or escalating using 'track and trigger' systems. Regardless, there is clearly a need for more rigorous evaluations conducted using valid and reliable instrumentation and using clear, reproducible protocols. Clearly we also need to look to the evidence on the effectiveness of various types of training, including simulation, for emergency situations in general and not just those involving mental health nursing. Of interest, meta-analysis has suggested that high fidelity manikins are moderately better than low fidelity manikins in improving skills when follow-up occurs immediately post training. However, when follow-up occurs at one year then there is no accrual of benefit (Cheng et al., 2015).

Experiences

There were clearly 'mixed' experiences among the mental health nurses in terms of their knowledge levels, skills, attitudes, education and training needs. Uncertainty and apprehension often due to poor knowledge and lack of awareness can contribute to a 'blinkered' approach to physiological deterioration in mental health and can further contribute to what is often referred to as diagnositic overshadowing; where "physical and/or behavioural symptoms are inappropriately accredited to mental illness" (Geiss et al., 2018: p.327). Further the review also highlighted that factors such as the availability of rapid response teams seemed to have a positive effect in empowering mental health nurses with the autonomy to independently 'make the call' to escalate a situation if concerned; potentially heightening clinical judgement skills and perhaps should be used more widely in mental health practice (Manu et al., 2015).

Next, what is the evidence about mental health nurses' emergency-related outcomes relative to those of other professional groups? Again, we are somewhat hampered by the quality of evidence since the only case control studies were unmatched and we could not safely infer that differences were due to occupational as opposed to other variables. In terms of investigating attitudes, Physical Health Attitudes Scale for Mental Health Nurses is a welcome addition to the mental health nursing educational and development toolkit. It is likely that attitudes about physical healthcare will impact on nursing practice, although this should be tested. Given Physical Health Attitudes Scale for Mental Health Nurses' psychometric properties

it should be used more widely and could be used as an outcomes measure in a well-designed case control study. Others (Herisko et al., 2015; Lavelle et al., 2017) have recognised the need to target outcomes related to education specifically related to emergency situations rather than to physical healthcare in general. While it is undoubtedly desirable that mental health nurses deliver routine screening, monitoring, and health promotion it may not be sufficient to conflate these outcomes with those relevant to emergency care or severe physiological deterioration.

Limitations

Any review is limited by the quality of included studies and those included here were not methodologically strong. Given that mental health inpatient services are common across the world it is possible that there may have been studies published in non-English languages that may have met the inclusion criteria. It is also possible that individual hospitals or services may have conducted audits of processes and outcomes in relation to, say, resuscitation training.

Implications for research

We cannot say with certainty how well prepared mental health nurses are prepared for dealing with physical emergencies and severe physiological deterioration. Further research is needed to systematically assess nurses' attitudes, skills and knowledge and the translational impact of various educational interventions on patients' safety and health outcomes research.

Conclusion

Although there are considerable gaps in the literature examining mental health nurses' knowledge, skills and confidence in recognizing and managing mental health consumers who are physiologically deteriorating. The current review suggests that education alone does not guarantee change in attitudes and nursing practice. This has implications for mangers and policy makers who need to put in place relevant, effective strategies for their nursing staff to support and adequately prepare them to manage such challenging situations, and develop monitoring and evaluative systems to ensure compliance and measure consumers' outcomes.

Contribution of the paper

'What is already known about the topic?'

- People with mental illness have higher rates of all-cause mortality than those without mental illness.
- Until recently very little was known about the effectiveness of emergency medical care provided by mental health nurses for their patients.
- A growing body of empirical literature has emerged in recent years.

'What this paper adds'

- There is some overlap between research into routine physical health care and emergency medical care.
- Intervention studies for improving relevant skills of mental health nurses are largely of low quality; more rigorous evaluation is required.
- The review found there are no validated instruments to investigate mental health nurses' emergency medical care-related attitudes.

REFERENCES

Aiken, F., Duxbury, J., Dale, C., & Harbison, I. (2011). Review of the Medical Theories and Research Relating to Restraint Related Deaths. University of Central Lancashire & Caring Solutions (UK). Accessed 31st July 2018 at: https://www.uclan.ac.uk/research/explore/groups/assets/Review_of_the_Medical_Theories_and_Research_Relating_to_Restraint_Related_Deaths.doc

Annamalai, A., Kosir, U., & Tek, C. (2017). Prevalence of obesity and diabetes in patients with Schizophrenia. *World Journal of Diabetes*, 8(8): 390-396. doi: 10.4239/wjd.v8.i8.390

Australian Commission on Safety and Quality in Health Care (n.d.). *Mental Health Fact Sheet 1: An Overview of Recognition and Response Systems.* ACSQHC: Sydney, NSW. Accessed 5th July 2018 at: https://www.safetyandquality.gov.au/wp-content/uploads/2012/02/MH-fact-sheet-1-overview.pdf

Australian Commission on Safety and Quality in Health Care. (2008). *Recognising and Responding to Clinical Deterioration: Background Paper*. Sydney: ACSQHC. Accessed 31st July 2018 at: https://www.safetyandquality.gov.au/wp-content/uploads/2012/01/BackgroundPaper.pdf

Australian Commission on Safety and Quality in Health Care. (2010). *National Consensus Statement: Essential Elements for Recognising and Responding to Clinical Deterioration*. Sydney: ACSQHC.

Australian Commission on Safety and Quality in Health Care. (2011). National safety and quality health service standards. ACSQHC: Sydney, NSW. https://www.safetyandquality.gov.au/wp-content/uploads/2011/01/NSQHS-Standards-Sept2011.pdf. Accessed 2 Aug 2018.

Australian Commission on Safety and Quality in Health Care. (2017). *Standard 8: Recognising and Responding to Acute Deterioration*. ACSQHC: Sydney, NSW. https://www.safetyandquality.gov.au/wp-content/uploads/2017/11/Recognising-and-Responding-to-Acute-Deterioration.pdf. Accessed 14th March 2019.

Blythe, J. & White, J. (2012). Role of the mental health nurse towards physical health care in serious mental illness: An integrative review of 10 years of UK Literature. *International Journal of Mental Health Nursing*, 21:193-201. doi:10.1111/j.1447-0349.2011.00792.x

* Bressington, D., Badnapurkar, A., Inoue, S., Ma, H. Y., Chien, W. T., Nelson, D., & Gray, R. (2018). Physical Health Care for People with Severe Mental Illness: the Attitudes, Practices, and Training Needs of Nurses in Three Asian Countries. *International Journal of Environmental Research and Public Health, 15*(343). doi:10.3390/ijerph15020343

* Chadwick, A. L., & Withnell, N. (2016). Developing confidence in mental health students to recognise and manage physical health problems using a learning

intervention. *Nurse Education in Practice, 19*: 25-30. doi:10.1016/j.nepr.2016.04.002

Cheng, A., Lockey, A., Bhanji, F., Lin, Y., Hunt, E.A., & Lang, E. (2015). The use of high-fidelity manikins for advanced life support training—A systematic review and meta-analysis. *Resuscitation*, 93: 142-149. doi: https://doi.org/10.1016/j.resuscitation.2015.04.004

Collins, E., Tranter, S., & Irvine, F. (2012). The physical health of the seriously mentally ill: an overview of the literature. *Journal of Psychiatric and Mental Health Nursing*, 19: 638-646. doi:10.1111/j.1365-2850.2011.01831.x

Craze, L., McGeorge, P., Holmes, D., Bernardi, S., Taylor, P., Morris-Yates, A., McDonald, E. (2014). *Recognising and Responding to Deterioration in Mental State: A Scoping Review*. Sydney: Australian Commission on Safety and Quality in Health Care. Accessed 6/7/2018 at: https://www.safetyandquality.gov.au/wp-content/uploads/2014/08/Recognising-and-responding-to-deterioration-in-mental-state.-A-scoping-review.docx

Critical Appraisal Skills Programme. (n.d.). *CASP Qualitative Checklist*. CASP: Oxford. https://casp-uk.net/wp-content/uploads/2018/03/CASP-Qualitative-Checklist-Download.pdf. Accessed 1 Aug 2018.

Drope, J., Liber, A.C., Cahn, Z., Stoklosa, M., Kennedy, R., Douglas, C.E., Henson, R., & Drope, J. (2018). Who's still smoking? Disparities in adult cigarette smoking prevalence in the United States. *CA: A Cancer Journal for Clinicians*, 68(2): 106-115. https://doi.org/10.3322/caac.21444

* Fernando, A., Attoe, C., Jaye, P., Cross, S., Pathan, J., & Wessely, S. (2017). Improving interprofessional approaches to physical and psychiatric comorbidities through simulation. *Clinical Simulation in Nursing, 13*(4): 186-193. doi:10.1016/j.ecns.2016.12.004

Findlay, G.P., Shotton, H., Kelly, K., & Mason, M. (2012). *Time to intervene? A review of patients who underwent cardiopulmonary resuscitation as a result of an in-hospital cardiorespiratory arrest*. London: National Confidential Enquiry into patient Outcome and Death. Accessed 6/7/2018: http://www.ncepod.org.uk/2012report1/downloads/CAP_summary.pdf

* Flood, C., Gull, N., Thomas, B., Gordon, V., & Cleary, K. (2014). Is knowledge and practice safer in England after the release of national guidance on the resuscitation of patients in mental health and learning disabilities? *Journal of Psychiatric and Mental Health Nursing, 21*(9): 806-813. doi:10.1111/jpm.12126

* Ganiah, A. N., Al-Hussami, M., & Alhadidi, M. M. B. (2017). Mental Health Nurses Attitudes and Practice Toward Physical Health Care in Jordan. *Community Mental Health Journal, 53*(6): 725-735. doi:10.1007/s10597-017-0143-6

*Gebreegziabher Gebremedhn, E., Berhe Gebregergs, G., Anderson, B. B., & Nagaratnam, V. (2017). Attitude and skill levels of graduate health professionals in performing cardiopulmonary resuscitation. *Advances In Medical Education And Practice, 8*: 43-50. doi:10.2147/AMEP.S114726

Geiss, M., Chamberlain, J., Weaver, T., McCormick, C., Raufer, A., Scoggins, L., … Edmonson, D. (2018). Diagnostic Overshadowing of the psychiatric population in the Emergency Department: physiological factors identified for an Early Warning System. *Journal of the American Psychiatric Nurses Association*, 24(4): 327–331. https://doi.org/10.1177/1078390317728775

* Haddad, M., Llewellyn-Jones, S., Yarnold, S., & Simpson, A. (2016). Improving the physical health of people with severe mental illness in a low secure forensic unit: An uncontrolled evaluation study of staff training and physical health care plans. *International Journal of Mental Health Nursing, 25*(6:, 554-565. doi:10.1111/inm.12246

Happell, B., Scott, D., Platania-Phung, C., Nankivell, J. (2012). Should we or shouldn't we? Mental health nurses' views on physical health care of mental health consumers. *International Journal of Mental Health Nursing*, 21:202-210. doi: 10.1111/j.1447-0349.2011.00799.x.

Happell, B., Platania-Phung, C., Scott, D., & Nankivell, J. (2014) Communication with colleagues: frequency of collaboration regarding physical health of consumers with mental illness. *Perspectives in Psychiatric Care*, 50: 33-43. doi: 10.1111/ppc.12021

* Herisko, C., Puskar, K., & Mitchell, A. M. (2013). Psychiatric Nurses' Beliefs, Attitudes, and Perceived Barriers about Medical Emergency Teams. *Issues in Mental Health Nursing, 34*(10), 725-730. doi:10.3109/01612840.2013.823633

* Herisko, C. A., Puskar, K. R., Mitchell, A. M., Habib, M., & Ren, D. (2015). Medical Emergency Team Response Processes for Behavioral Health Inpatient Units: Implications for Nursing Education. *Issues in Mental Health Nursing, 36*(9): 678-684. doi:10.3109/01612840.2015.1021937

* Hermanns, M. S., Lilly, M. L., & Crawley, B. (2011). Using clinical simulation to enhance psychiatric nursing training of Baccalaureate students. *Clinical Simulation in Nursing, 7*(2): e41-e46. doi: 10.1016/j.ecns.2010.05.001

Hirshon, J.M., Risko, N., Calvello, J.B., Stewart de Ramirez, S., Narayan, M., Theodosis, C., O'Neill, J. & for the Acute Care Research Collaborative at the University of Maryland Global Health Initiative. (2013). Health systems and services: the role of acute care. *Bulletin of the World Health Organization, 91: 386-388.* doi: http://dx.doi.org/10.2471/BLT.12.112664

John, A., McGregor, J., Jones, I., Lee, S.C., Walters, J.T.R., Owen, M.J.,… & Lloyd, K. (2018). Premature mortality among people with severe mental illness: new evidence from linked primary care data. *Schizophrenia Research*. doi:10.1016/j.schres.2018.04.009

Lasater, K. (2007). Clinical Judgment Development: Using Simulation to Create an Assessment Rubric. *Journal of Nursing Education, 46*(11): 496-503.

Lateef, F. (2010). Simulation-based learning: Just like the real thing. Journal of Emergencies, Trauma, and Shock, 3(4), 348-352.

* Lavelle, M., Attoe, C., Tritschler, C., & Cross, S. (2017). Managing medical emergencies in mental health settings using an interprofessional in-situ

simulation training programme: A mixed methods evaluation study. *Nurse Education Today, 59*: 103-109. doi:10.1016/j.nedt.2017.09.009

* Manu, P., Loewenstein, K., Girshman, Y.J., Bhatia, P., Barnes, M., Whelan, J… McManus, M. (2015). Medical rapid response in psychiatry: Reasons for activation and immediate outcome. *Psychiatry Quarterly, 86*: 625-632. doi: 10.1007/s11126-015-9356-4

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med, 6*(7): e1000097. doi:10.1371/journal.pmed.1000097

Mok, W., Wang, W., Cooper, S., Neo Kim Ang, E., & Ying Liaw, S. (2015). Attitudes towards vital signs monitoring in the detection of clinical deterioration: scale development and survey of ward nurses. *International Journal of Quality in Healthcare*, 27:207-213. https://doi.org/10.1093/intqhc/mzv019

Munn, Z., Srtern, C., Aromataris, E., Lockwood, C., & Jordan, Z. (2018). What kind of systematic review should I conduct? A proposed typology and guidance for systematic reviewers in the medical and health sciences. *BMC Medical Research Methodology, 18*(5): 1-9. doi:DOI 10.1186/s12874-017-0468-4

National Institute for Health and Clinical Excellence. (2007). *Acutely Ill Patients in Hospital: Recognition of and Response to Acute Illness in Adults in Hospital.* London: National Institute for Health and Clinical Excellence.

NIH National Heart, Lung, and Blood Institute. Study quality assessment tools [cited 2018, April 28th]. Available from: https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools. In *Quality Assessment Tool for Observational Cohort and Cross Sectional Studies*.

Olfson, M., Gerhard, T., & Huang, C. (2015). Premature mortality among adults with schizophrenia in the Jones, D., Baldwin, I., McIntyre, T., Story, D., Mercer, I., Miglic, A., Goldsmith, D., & Bellomo, R. (2006). Nurses' attitudes to a medical emergency team service in a teaching hospital. *Quality and Safety in Health Care*, 15: 427-432. doi: 10.1136/qshc.2005.016956

Osborn, S., Douglas, C., Reid, C., Jones, L., Gardner, G., on behalf of RBWH Patient Assessment Research Council. (2015). The primacy of vital signs--acute care nurses' and midwives' use of physical assessment skills: a cross sectional study. *International Journal of Nursing Studies*, 52: 951-962. doi: https://doi.org/10.1016/j.ijnurstu.2015.01.014

* Paulose, B., Xaviour, S., & Bahattacharya, C. (2016). Awareness of medical emergencies occur in patients among psychiatric care area nurses to prevent unnecessary delay and save a life *International Journal of Science and Research, 5*(11): 133 - 137.

* Puskar, K., Smith, M. D., Herisko, C., & Urda, B. (2011). Medical Emergencies In Psychiatric Hospitals. *Issues in Mental Health Nursing, 32*(10): 649-653. doi:10.3109/01612840.2011.587631

* Robson, D., & Haddad, M. (2012). Mental health nurses' attitudes towards the physical health care of people with severe and enduring mental illness: the

development of a measurement tool. *International Journal of Nursing Studies, 49*(1): 72-83. doi:10.1016/j.ijnurstu.2011.07.01

* Robson, D., Haddad, M., Gray, R., & Gournay, K. (2013). Mental health nursing and physical health care: A cross-sectional study of nurses' attitudes, practice, and perceived training needs for the physical health care of people with severe mental illness. *International Journal of Mental Health Nursing, 22*(5): 409-417. doi:doi:10.1111/j.1447-0349.2012.00883.x

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. M. Wright, & M. E. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs.* (pp. 35-37). Windsor, UK.: NFER-NELSON.

* Shaddel, F., Khosla, V., & Banerjee, S. (2014). Effects of introducing MEWS on nursing staff in mental health inpatient settings. *Progress in Neurology and Psychiatry,* March/April, 24-27.

* Shanley, O. (2012). *A Qualitative Study of Mental Health Nurses' Experiences of Patient Suicide or Unexpected Death and its Aftermath*. PhD Thesis. King's College London. King's Research Portal. Retrieved from https://kclpure.kcl.ac.uk/portal/files/30761208/2012_Shanley_Oliver_96002602_ethesis.pdf

*Tenkanen, H., Tiihonen, J., Repo-Tiihonen, E., & Kinnunen, J. (2011). Interrelationship between core interventions and core competencies of forensic psychiatric nursing in Finland. *Journal of Forensic Nursing, 7*(1): 32-39. doi:10.1111/j.1939-3938.2010.01093.x

Thomas, B. H., Ciliska, D., Dobbins, M., & Micucci, S. (2004). A process for systematically reviewing the literature: providing the research evidence for public health nursing interventions. Worldviews *On Evidence Based Nursing, 1*(3), 176-184. doi:10.1111/j.1524-475X.2004.04006.x

Tomiainen, M., Mittendorfer-Rutz, E., Björkenstam, C., Suvisaari, J., Alexanderson, K., & Tiihonen, J. (2016). Antipsychotic treatment and mortality in schizophrenia. Schizophrenia Bulletin, 41(3): 656-663. https://doi.org/10.1093/schbul/sbu164

* Unsworth, J., McKeever, M., & Kelleher, M. (2012). Recognition of physical deterioration in patients with mental health problems: the role of simulation in knowledge and skill development. *Journal of Psychiatric and Mental Health Nursing, 19*(6): 536-545. doi:10.1111/j.1365-2850.2011.01828.x

Walker, E.R., McGee, E., & Druss, B.G. (2015). Mortality in mental disorders and global disease burden implications: A systematic review and meta-analysis. *JAMA Psychiatry*, 72(4), 334-341.

Ward, D. (2005). Improving physical health care in a mental health trust. *NursingTimes*, 101(7): 32-33.

* Wynaden, D., Heslop, B., Heslop, K., Barr, L., Lim, E., Chee, G. L., . . . Murdock, J. (2016). The chasm of care: Where does the mental health nursing responsibility lie for the physical health care of people with severe mental

illness? *International Journal of Mental Health Nursing, 25*(6): 516-525. doi:doi:10.1111/inm.12242

* Wynn, S. D. (2011). Improving the quality of care of veterans with diabetes: a simulation intervention for psychiatric nurses. *Journal of Psychosocial Nursing & Mental Health Services, 49*(2): 38-45. doi:10.3928/02793695-20110111-01

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Figure 1: PRISMA flowchart

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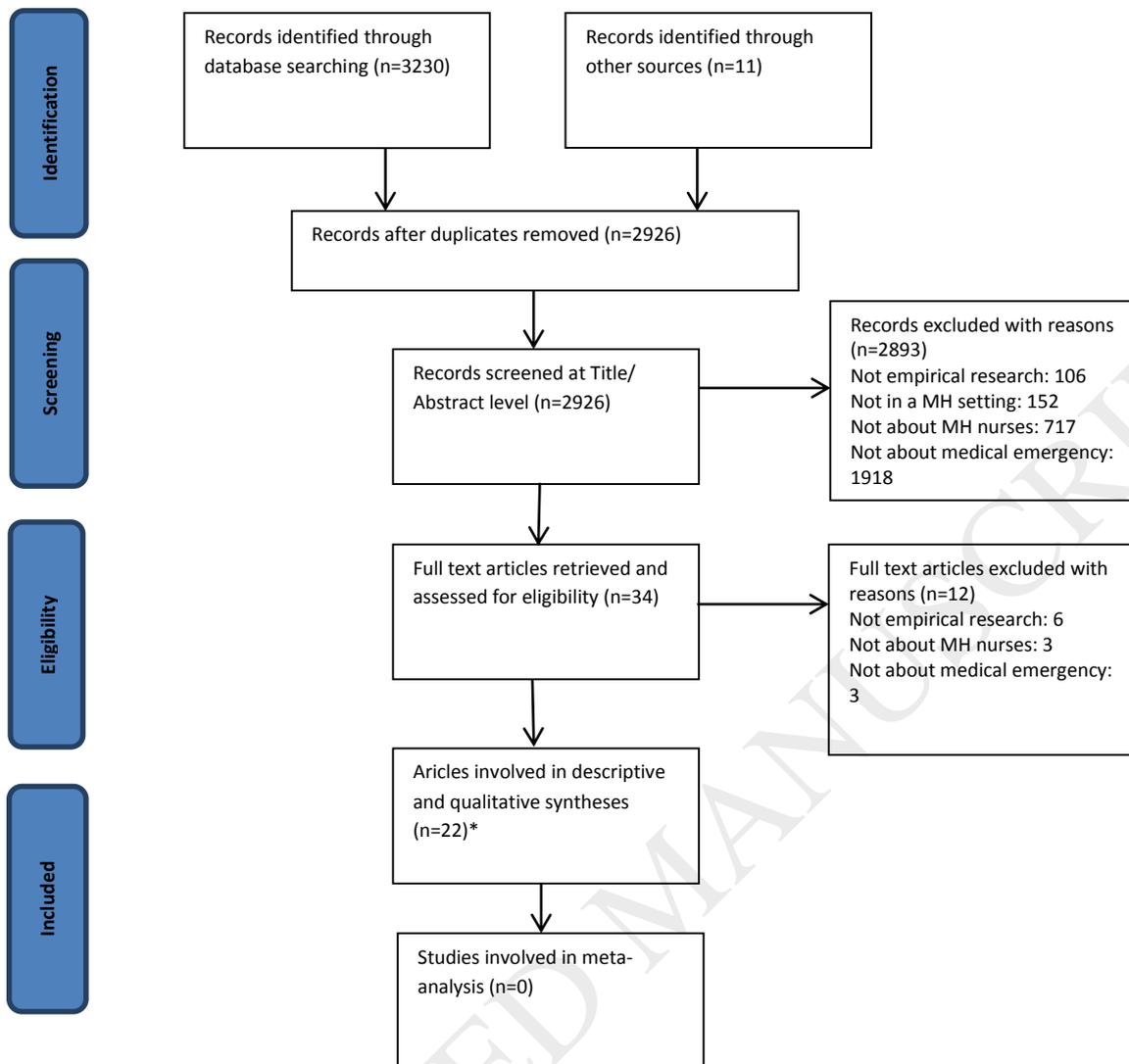
Table 1a: Keywords used in the electronic database search (PEO format)

Population		Exposure		Outcome
((Mental health or psychiatr* or mental) and Nurs*).	AND	(Medical Emergency OR Emergency Medicine OR Emergency Treatment OR Emergency Therapy OR Emergency Nursing OR Emergency Medical Services OR Emergency Care OR Emergency Health Services OR Medical Emergency Services OR Clinical Deterioration OR unexpected death or cardiopulmonary arrest or severe clinical deterioration or escalating care or rapid response systems or core physiological observations or emergency assistance or unplanned transfer to higher level care or cardiac arrest or intensive care unit readmission or repeat rapid response system calls OR simulation)	AND	(education OR preparation OR training OR knowledge OR experience OR belief OR opinion OR attitud* OR perception* OR values OR understanding OR knowledge OR skills)

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Table 1b: Keywords used in the electronic database search (PICO format)

Population		Intervention		Comparator		Outcome
((Mental health or psychiatr* or mental) and Nurs*).	AND	(Medical Emergency OR Emergency Medicine OR Emergency Treatment OR Emergency Therapy OR Emergency Nursing OR Emergency Medical Services OR Emergency Care OR Emergency Health Services OR Medical Emergency Services OR Clinical Deterioration OR unexpected death or cardiopulmonary arrest or severe clinical deterioration or escalating care or rapid response systems or core physiological observations or emergency assistance or unplanned transfer to	AND	Any or Waiting list OR Placebo OR Repeated Measures	AND	(education OR preparation OR training OR knowledge OR experience OR belief OR opinion OR attitud* OR perception* OR values OR understanding OR knowledge OR skills)

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		higher level care or cardiac arrest or intensive care unit readmission or repeat rapid response system call) AND (Training or Education OR Preparation OR Simulation OR Policy OR Guideline)			

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Table 2: Intervention evaluation study quality assessment

Study	Selection Bias	Study Design	Confounders	Blinding	Data collection	Withdrawals	Overall
Puskar et al. (2011)	Strong	Moderate	Weak	Weak	Moderate	Weak	Weak
Hermanns et al. (2011)	Weak	Weak	Weak	Weak	Weak	Moderate	Weak
Wynn (2011)	Moderate	Moderate	Weak	Weak	Strong	Strong	Weak
Unsworth et al. (2012)	Weak	Weak	Weak	Weak	Moderate	Weak	Weak
Shaddel et al. (2014)	Weak	Moderate	Weak	Weak	Strong	Strong	Weak
Chadwick & Withnell (2016)	Weak	Weak	Weak	Weak	Strong	Strong	Weak
Haddad et al. (2016)	Moderate	Weak	Weak	Weak	Moderate	Strong	Weak
Paulose et al. (2016)	Weak	Weak	Weak	Weak	Weak	Strong	Weak
Fernando et al. (2017)	Moderate	Moderate	Weak	Weak	Weak	Strong	Weak
Lavelle et al. (2017)	Moderate	Moderate	Weak	Weak	Weak	Strong	Weak

Table 3: Cross-sectional, observational studies quality assessment (adapted from National Heart, Lung, and Blood Institute

	Tenkanen et al (2012)	Robson et al (2013)	Flood et al (2014)	Herisko et al (2015)	Manu et al (2015)	Wynaden et al (2016)	Ganieh et al (2017)	Gebre eg-ziabher et al (2017)	Bressing-ton et al (2018)
Research question or objective in this paper clearly stated	x	x	x	x	x	x	x	x	x
Study population clearly specified and defined	x	x	x	x	x	x	x	x	x
Participation rate of eligible persons at least 50%	x	x	NR	x	x	x	x	x	-
Subjects selected or recruited from the same or similar populations and in the same time period	x	x	x	x	x	x	x	x	-
Sample size justification, power description, or variance and effect estimates provided	NR	x	-	NR	-	-	-	-	x
Inclusion and exclusion criteria for being in the study pre-specified and applied uniformly to all	x	x	x	x	x	x	x	x	x
Outcome measures clearly defined, valid, reliable, and implemented consistently	x	x	x	x	x	x	x	x	x

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Total (max 7)	6	7	5	6	6	6	6	6	5

x Condition achieved; - condition not achieved; NR = Not Reported;

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Table 4: Quality appraisal of qualitative studies

	Shanley (2012)	Herisko et al (2013)
Clear statement of research aims	X	X
Qualitative method appropriate	X	X
Design appropriate to address research aims	X	-
Recruitment strategy appropriate to study aims	X	-
Data collected in a way that addressed the research issue	X	-
Researcher-participant relationship adequately considered	X	-
Ethical issues considered	X	-
Data analysis rigorous	X	-
Clear statement of findings	X	-
How valuable is the research?	X	-
Total (max 10)	10	2

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Table 5a: Included studies (Part 1: Interventional studies)

#	Study Country	Data Collection	Design.	Data sources	Sample	Intervention	Level of analysis	Main findings
1	Puskar et al (2011) US	1996 - 2005	Case study and retrospective longitudinal design	Psychiatric clinic statistics [emergency protocols activated, adverse patient outcomes]	Mental Health Nurses. No details of N or characteristics	Guidelines and annual mandatory training for Medical Emergency Team access: two Medical Emergency Team callout levels 1. C (Crisis); 2. A (Arrest). C allows early Medical Emergency Team referral.'No penalty' clause for referring nurses	Service	Rise in Condition As and decline in Condition Cs. Reduction in adverse events (deaths, seizures)
2	Hermanns et al (2011) US	not reported	Cross-sectional post-intervention.	9-item self-report Suicide Clinical Simulation Evaluation Tool. Observation. Student vocalisation	N=10 student nurses	30-min educational simulation of attempted suicide by hanginginvolving a manikin.	Class	Understanding of metabolic and physiological changes $M(SD)$=1.4 (0.49) where 1 = 'strongly agree'.
3	Wynn (2011)	not reported	Longitudinal pre-post	Lasater (2007) Clinical	N=20 Mental Health	Educational simulations of diabetic medical conditions using HPS. 'Live' scenarios		Significant improved pre- post- test CJR scores. All students improved by Time B. 80% participants

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	US			Judgment Rubric (CJR). Diabetes-related medical transfer data. Satisfaction.	Nurses in a Veterans Mental Health Hospital.	allow reaction to participants' decisions e.g., mistakes can result in cardiac arrest		satisfied. Number of medical emergencies involving patients with diabetes fell 55% in post-intervention month.
4	Unsworth et al (2012) UK	not reported	Cross-sectional post-intervention qualitative evaluation	Focus group. Content analysis.	N=15 Mental Health Nurse students in training conducted jointly with adult nurses.	Educational simulations (alcohol intoxication, drug induced psychosis, chest infection in a patient with Alzheimer's disease): patient manikin capable of physiological outputs. Instructors 'speak' for the mannequin from adjacent control room. Response involves vital signs monitoring, recognition of medical emergency.	Student cohort	**Bridging the gap**: The intervention facilitated skills learning in context of the rarity of opportunity in vivo. Raised awareness of possibility of patient physical deterioration. Helped students recognise gaps in knowledge. **Learning inter-professionally**: Working with adult students/ university professionals involved collective assessment skills used. **Authenticity:** the simulation was experienced as authentic. **Reflection and learning:** More likely to take action
5	Shaddel et al (2014) UK	2014	Longitudinal AB	Two vignettes and a 1-item self confidence in clinical	N=19 nursing staff in 2 forensic units and	Introduction of Modified early Warning Score (Wirral Community NHS Trust 2012) 15 minutes training on using MEWS.	Three wards	*M* confidence pre- 3.73 post- 4.63(P<.0001; r =0.87[1]). Correct management decision made by 42.1% of nurses pre- and 92.1% post- training (P<.0001, φ=.71[2]).

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				judgement rating.	1 learning disability unit.			
6	Chadwick & Withnell (2016) UK	not reported	Longitudinal AB	10-item Modified Generalised Self Efficacy Scale (GSES; Schwarzer & Jerusalem, 1995) [58].	N=95 Year 3 Mental Health Nurse students completed x2 questionnaires	1-d educational simulation involving Human Patient Simulators.	Student cohort	Proportion self-rating in top two GSES categories increa-sed on all 10-items *Mdn* +36.0% (range +16.0% to +49.0%). Chi squaredanalyses of high/ moderate confidence vs. slight/no confidence all significant <.01 (Cramer's *VM*[*SD*]=.37[.12], range .21-.52.)[1].
7	Haddad et al. (2016) UK	not reported	Longitudinal AB	Physical Health Attitudes Scale for Mental Health Nurses (see Robson et al., 2013)	N=49 pre-post-questionnaires (81% response) Mental Health Nurses and nurses' aides.	Introduction of personal health plan for patients, and aneducation session on physical health assessment and manage-ment of patients with severe mental health problems	Mental Health Nurse sample	Cardiac ArrestM[SD] A 4.2(0.69) B 4.3(.67) P>.05 Hypoglycaemia: M[SD] A 3.8 (0.82) B 3.85 (.89) P>.05 Hyperglycaemia M[SD] A 3.6 (1.1) B 3.8 (1.01) P<.05 Hedge's *g* = -0.2 (small)

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#	Authors	Data Collection	Study design.	Data sources	Sample	Intervention	Level of analysis	Main findings
8	Paulose et al (2016) India	not reported	Longitudinal AB.	Semi-structuredknowledge questionnaires regarding heart attack respiratory arrest, convulsion, hypoglycaemia	N=30 psychi-atric staff nurses. *Mdn* experience 6-12 months	Education. Self-Instruction Modules provided.	Group.	*M*(*SD*) AB scores Heart Attack 3.5(.77) v 6.3 (.66) 80 p<.0001) Hedge's *g* = 3.80; Respiratory arrest 3.3 (1.08) v 6.4 (.73) p<.0001 Hedge's *g* = 3.28; Convulsion 2.9(1.24) v 5.8(.40) p<.0001, Hedge's *g* = 3.07); Hypoglycaemia 2.8(.81) v 5.6(.40) p<.0001, Hedge's *g* 4.27)[2]. Overall Max. score 26 p<.05?
9	Lavelle et al (2017) UK	not reported	Longitudinal AB. Mixed methods.	Quantitative question-naires: knowledge, confidence, and attitudes. Incident reporting for 7 months pre-	n=36 Mental Health Nurses and n=17 others attended	0.5-day educational simulation using high fidelity mannequin. Scenarios including	Service	Knowledge total (Cohen's *d* = .7) confidence total (*d* = .52) and attitudes (*d* = .34)[3] all changed significantly pre-

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| | | | | post- intervention.: medi-cation, illness & injury, self-harm & suicide. Qualitative survey. Focus group at 3-months | sessions *Mdn* at each session 7 (range 4-10) | respiratory arrest, hanging, choking. | | post intervention. Most items changed significantly. Incident reporting increased post training. For meds issues, illness and injury, suicide and self-harm. Qualitative: themes: confidence (up), team working skills (improved), communications skills (greater), reflective practice (better) , personal responsibility (more). |
| 10 | Fernando et al (2018) UK | not reported | Longitudinal AB. | Self-evaluation form. 21-item questionnaire examining knowledge, attitudes, and confidence. | 63 nurses and junior doctors (15 [24%] Mental Health Nurses) | Educational simulation. 1-d Simulation Workshop At the Mental-Physical Interface (SWAMPI).Most scenarios about | Regional | Improvements in knowledge, attitudes, and confidence (all large effect size eta squared ($\eta2$) = 0.63, 0.25., 0.61 respectively). |

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				Course evaluation form yes/no answers plus open questions. Tools guided by the literature and piloted prior to use.		psychiatric emergencies but one about medical deterioration. Learning Objectives were: Medical deterioration in psychiatry - Prevention of medical emergencies – Inter-professional working between general and psychiatric hospital		Satisfaction ratings 99% Qualitative: Inter-professional learning, leadership and teamwork, reflection, communication

[1] Cramer's V 0.1 = Small Effect Size, 0.3 = Medium, 0.5 = Large (Cohen, 1988); [2] Hedge's g 0.2 = Small Effect Size, 0.5 = Medium, 0.8 = Large. N.B. Hedge's g = 1 indicates the two groups differ by 1 *SD*, Hedge's g = 2 indicates they differ by 2 *SDs*. and so on. [3] Cohen's *d* 0.2 = Small Effect Size, 0.5 = Medium, 0.8 = Large; η2 Small effect size = 0.01, Medium = 0.06, Large = 0.14

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Table 5b: Included studies (Part 2: Non-interventional studies)

#	Authors	Data Collection	Study design.	Data sources	Sample	Exposure	Level of analysis	Main findings
11	Shanley (2012) UK	not reported	Cross-sectional. Qualitative	Interviews. Grounded theory.	N=6 Mental Health Nurses. with experience of a suicide	Previous direct exposure to on-ward suicide of a patient.	Regional	Emotional and psychological effects combined with managing an extremely challenging clinical situation. Challenges included immediate shock at finding dead/dying patient and somatic anxiety. Felt blame would be apportioned by managers. Did not feel they had made an error but found 'closure' difficult.

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| 12 | Tenkanen et al (2011) Finland | not reported | Cross-sectional, unmatched case control. | 24-item questionnaire on core interventions and mastery of specific skills related to violence management including 7 items (α=.86) relating to 'Life support skills and safety in potential violent situation' | N=260 Registered Nurses/ Practical Mental Nurses†/ Managers in forensic wards | None/ routine practice | National | 89% of Registered Nurses report Registered Nurses to have 'extremely or fairly well' mastery of related knowledge and skills but only 52% rated PMNs similarly; 74% of Managers rated Registered Nurses to have mastery but only 42% of PMNs. 72% of PMNs self-assess as having mastery; 68% rate Registered Nurses as having mastery. Objectively, PMNs/ Registered Nurses overrate their own mastery though PMNs more so. |

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13	Herisko et al (2013) US	not reported	Cross-sectional qualitative	Group interview with 14 questions structured around a survey questionnaire used in Jones et al .	Mental Health Nurses. N=7 convenience sample from aged, adult, and child & adolescent care settings	Medical Emergency Team utilization/ routine practice	Group	**Beliefs:** Mental Health Nurses work with patients with complex medical problems; know Medical Emergency Team criteria; training is adequate; Medical Emergency Team is preventative; aids patient management, is educational;**Attitudes:** Glad Medical Emergency Team exists, it is not over used; confident would call Medical Emergency Team if warranted;**Perceived barriers:** Increased workload and disruptive; lack of experience with and participation in Medical Emergency Team; unfamiliarity with patients; unsure if symptoms meet criteria; House Officer can transfer without calling Medical Emergency Team so call them first.
14	Robson & Haddad (2012); Robson et al (2013) UK	not reported	Cross-sectional survey.	Physical Health Attitudes Scale for Mental Health Nurses (Robson & Haddad, 2012). Items related to patient cardiac arrest and symptoms of hyperglycaemia.	N=585 Mental Health Nurses. 62.2% F; *Mdn* Age 31-40; 55.8% White; Years qualified	None/ routine practice	NHS Mental Health Trust	'I am confident that I could resuscitate a client who had a cardiac arrest' 420/575 (73.0%) agreed. *M*(*SD*) 3.83 (0.92). 'I am confident in assessing signs and symptoms of hypo-glycaemia': Hypoglycaemia: 390/578 (67.4%) agreed. *M*(*SD*) 3.67(0.92). Hyperglycaemia: 366/578 (63.3) *M*(*SD*) 3.61(0.95)

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					M 13.3 (9.9) yrs; RGN qualification 24.3%.			
1 5	Flood et al (2014) UK	not reported	Cross-sectional survey, unmatched case control.	Self-report 'awareness of RRR', Resuscitation training and experience. Compliance with RRR Standard 4: Units where rapid tranquilisation, physical intervention, or seclusion used to have access to staff trained in immediate life support. Errors reported	N=393 staff (280 'frontline') from 19 of 58 possible mental health care providers	Rapid Response Report/routine practice	National	**Aware of RRR**: 21% of community staff, 36% of frontline staff, 50% of senior/managerial staff. **Training:** Basic Life Support 57%, 48%, 42% Any training reported: 61%, 82%, 83%; Immediate life support 2% ,25%, 31%; **Experience**: Yes: 26%, 27%, 48% 67% compliance reported with action 4. **Qualitative feedback:** Not enough training around emergency drug administration; skills and knowledge around working with elderly people lacking.**Errors reported** pre- and post- RRR. Pre- death 18, severe mod 8; Post 5, 8. (NB time periods not equal)

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#	Authors	Data Collection	Study design.	Data sources	Sample	Exposure	Level of analysis	Main findings
16	Herisko et al (2015) US	not reported	Cross-sectional survey.	17-item Mental Health Nurses' attitudes and perceived barriers about modified Medical Emergency Team Survey. One open-ended question.Descriptive statistics only.	Registered Nurses. N=102 M age=40. 76.5% F. 38.2%; MH experience 9.3-years	Medical Emergency Team utilization.	Hospital	4-'Factors': Patient focused (complexity of patients); Positive forces for calling the Medical Emergency Team; Negative forces for calling the Medical Emergency Team; Seeking assistance. Internal reliability .78. Changes to training made as a result of the results and a problem solving algorithm. Describe as being 'liked' but no numbers presented. Negative forces for calling a Medical Emergency Team statements more strongly agreed with (M 71) than positive forces (M=51). Strong agreement that physical healthcare for psychiatric patients is complex (M=76% agree).
17	Manu et al (2015) US	Feb-Nov 2012	Cross-sectional survey	Rapid Response Team activations from a 222-bed psychiatric hospital.	N=169 Rapid Response Team activations. 72.8% by Mental Health	None/ routine practice	Hospital	169 activations made by 72.8% staff nurses, 5.9% nurse practitioners, 21.3% others. 64.5% Rapid Response Team calls made for acute change of condition, 26.2% Abnormal physiological parameter, 8.3% non-specific concern. Resulted in: Rapid Response Team transferred 127 (75.2%) to ED;ED physicians decided n=46 (27.2%] required admission. 'Appears to break with traditional pattern of

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					Nurses. No details of N or characteristics			patient's psychiatrist calling a medical consultant; nurses' given more authority allowing them to use independent judgement'
1 8	Wynade n et al (2016) Australai	not reporte d	Cross- section al survey.	Physical Health Attitudes Scale for Mental Health Nurses (see Robson & Haddad, 2012)	N=170. 63.3% F; Mdn age 31-44;	None/routin e practice	Site	Cardiac Arrest 140/170 (82.3%) agreed
1 9	Ganiah et al (2017) Jordan	2017	Cross- section al survey.	Physical Health Attitudes Scale for Mental Health Nurses (see Robson & Haddad, 2012). Arabic translation.	N=225 Mental Health Nurses M age 32.5 (7.22) 59.9% M.	None/ routine practice	Natio nal	Cardiac Arrest A 136/225 (67.3) 3.73 (1.04).11(0.79) Hypoglycaemia: 150/225 (74.3) 3.88 (0.97) Hyperglycaemia: 144/225 (64.0%) 3.89 (0.94) Also did top items re training needs none of which are emergency stuff.

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| 2 0 | Gebreeg-ziabher et al (2017)\n\nEthiopia | 2013 | Cross-section al survey, unmatc hed case control. | Purpose-designed questionnaire: attitude (10-items) and skills (8-items) about Basic Life Support and Advanced Cardiovascular Life Support based on UK Resuscitation Council (2010) Guidelines and American Heart Association (2005) accreditation criteria | N=461 (66.4% M) final year undergra duate students. 14 (3.0% Mental Health Nurse students) | None/ routine practice | Hosp ital | Mental Health Nurses (*M [SD]* =7.3[1.8]) no different to other professions on attitude scores; significantly less skilled (*M[SD}* = *1.7[1.8])* than anaesthetist participants(3.9[1.4]) but not others. N.B. all professions mean skill scores below adequate. Mental Health Nurses least likely to believe that they were adequately equipped to perform CPR nut few other substantial differences. |
| 2 1 | Bressingt on et al (2018)\n\nQatar, Hong | 2016-2017 | Cross-section al survey, unmatc hed | Physical Health Attitudes Scale for Mental Health Nurses (see Robson & Haddad, 2012) | N=481 Mental Health Nurses (39% | None/ routine practice | Natio nal/ Inter natio nal | **Cardiac Arrest**: *Qatar* 119/136 (86) 4.18 (0.77); *HK* 124/143 (87) 4.09 (0.71); *Japan* 89/200 (45) 3.2 (0.99); **Hypoglycaemia:***Qatar* 132/138 (96) 4.34 (0.62); *HK* 125/143 (87) 4.11 (0.64); *Japan* 91/200 (46) 3.5 (0.87). |

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Kong, Japan		case control	and Physical Health Attitudes Scale for Mental Health Nurses translated into Japanese	response rate)			**Hyperglycaemia:***Qatar*: 128/138 (93) 4.25 90.60); ***HK*** 113/143 (79) 3.92 (0.67); ***Japan*** 65/200 (33) 3.04 (0.86). Personal correspondence, Bressington , April 2018.
†Registered Nurses are licensed prof-essionals; Practical Mental Nurses have vocational training only							