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REVIEW

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Interventions to reduce physical restraints in general hospital settings: A scoping review of components and characteristics

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Abstract

Aims and objectives: To describe the characteristics of interventions for reducing physical restraints in general hospital settings.

Background: Physical restraints, such as bedrails and belts in beds and chairs, are commonly used in general hospital settings. However, there is no clear evidence on their effectiveness but some evidence on potential risks for harm.

Design: Scoping review.

Methods: We conducted a systematic database search (MEDLINE via PubMed, CINAHL, Cochrane Library; March 2020) and snowballing techniques. We included both interventional studies and quality improvement projects conducted in general hospital settings and published in English or German language. Two reviewers independently performed the study selection and data extraction. The Scoping Reviews (PRISMA-ScR) Checklist was used.

Results: We included 31 articles (published between 1989 and 2018), 15 quality improvement projects and 16 intervention studies. Only five studies used a controlled design. Most studies and quality improvement projects investigated multicomponent interventions including education (predominantly for nursing staff) and additional components (e.g. case conferences). Three studies examined simple educational programmes without additional components.

Conclusions: A large number of multicomponent interventions for preventing and reducing physical restraints in general hospital settings have been developed. The interventions differed widely regarding the components, contents and settings. Well-designed evaluation studies investigating the effects of such interventions are lacking.

Relevance to Clinical Practice: Multicomponent educational interventions might be one approach to change clinical practice, but only insufficient information is available about potential effects of these approaches.

KEYWORDS

acute care, geriatrics, hospitals, physical restraints, scoping review

1 | INTRODUCTION

Physical restraints such as bedrails, belts in beds or chairs, and geriatric chairs with fixed tables are commonly used in general hospital settings in many countries despite their unclear effectiveness and potential risks for harm (Benbenbishty, Adam, & Endacott, 2010; Krüger, Mayer, Haastert, & Meyer, 2013; Minnick, Mion, Johnson, Catrambone, & Leipzig, 2007; O Flatharta, Haugh, Robinson, & O'Keeffe, 2014). We define physical restraint as "any action or procedure that prevents a person's free body movement to a position of choice and/or normal access to his/her body by the use of any method that is attached or adjacent to a person's body and that he/she cannot control or remove easily" (Bleijlevens, Wagner, Capezuti, & Hamers, 2016).

Prevalence rates of physical restraints differ widely among different hospital settings, ranging from 0% to 47%, and there is evidence for pronounced variations in prevalence rates between comparable wards in different hospitals (Benbenbishty et al., 2010; Minnick et al., 2007; O Flatharta et al., 2014). Important risk factors for physical restraint use in general hospital settings are older age, care dependency, an increased risk of falls and cognitive impairment, that is dementia or delirium (Benbenbishty et al., 2010; Bower, McCullough, & Timmons, 2003; Hofsø & Coyer, 2007). Accordingly, the main reasons for using physical restraints are safety issues, for example to prevent falls and fall-related injuries or to ensure safe medical treatment (Bower et al., 2003; Möhler & Meyer, 2014).

Two systematic reviews investigating the effects of physical restraints for reducing falls and fall-related injuries in general hospital settings found no or inconsistent evidence based on observational studies with several methodological limitations (Healey, Cronberg, & Oliver, 2009; Healey, Oliver, Milne, & Connelly, 2008). The use of physical restraints is associated with several adverse effects, for example decreased patient well-being, increased feelings of fear, anger and discomfort, decreased mobility, increased risk of pressure ulcers and incontinence, and serious injuries (Demir, 2007; Strout, 2010). These adverse effects may have a negative impact on patients' recovery and rehabilitation and may also increase challenging behaviour of people with dementia (Bai et al., 2014; Mott, Poole, & Kenrick, 2005). Hence, guidelines recommend avoiding the use of physical restraints in general hospital settings (Lach, Leach, & Butcher, 2016; Registered Nurses' Association of Ontario, 2012).

Two narrative systematic reviews investigated the effects of interventions aimed at reducing the use of physical restraints in acute care setting. Evans et al. (2002) investigated physical restraint reduction programmes in acute and residential care settings and included randomised controlled trials, controlled clinical trials and before-and-after studies. They included only three studies in acute care settings. The review by Bower et al. (2003) provided a broad overview of the prevalence of and reasons for using physical restraints and different intervention approaches in psychiatric and acute care settings, but the review methods and literature search were not clearly reported. Since then, a large number of studies and projects have been published. We currently conduct a Cochrane review to assess the best evidence for the effectiveness and safety of interventions aimed at preventing and reducing physical restraint use of older people in general hospital settings from randomised controlled trials (Möhler, Nürnberger, Abraham, Köpke, & Meyer, 2016). However, the majority of studies or projects did not use a controlled study design, and therefore, a scoping review focussing on the characteristics of all available interventions is required.

What does this paper contribute to the wider global clinical community?

- Physical restraints are applied in general hospital settings despite their lack of effectiveness and safety.
- A wide range of interventions to reduce physical restraints has been developed.
- Multicomponent educational interventions might be used to reduce physical restraints.

1.1 | Aims

The objective of this scoping review was to present an overview of the available studies and quality improvement projects aimed at reducing physical restraints in general hospital settings. The main focus is to describe the characteristics and components of the interventions in detail.

2 | METHODS

2.1 | Design

This scoping review follows the framework proposed by Arksey and O'Malley (2005) including the following steps: identifying relevant studies, study selection, charting the data, collating, summarising and reporting the results. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extensions for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018) Checklist was used for reporting of our scoping review.

2.2 | Study identification

2.2.1 | Inclusion criteria

We included all publications reporting on interventions aimed at reducing physical restraints in general hospital settings that were published in English or German language. General hospital settings cover different acute care settings, including rehabilitation clinics and intensive care units. Emergency departments and psychiatric

units were excluded, because the rationale for and nature of physical restraints in these settings differ.

Different types of interventions were eligible for inclusion: simple educational interventions (comprising only education), multicomponent interventions (comprising different components) and interventions providing alternatives to physical restraints. Interventions comprising pharmacological treatments were excluded.

Since we aimed at describing the available interventions, we included a wide range of study designs, including randomised controlled trials, controlled clinical trials and before-and-after studies, and quality improvement projects. We defined quality improvement projects (hereinafter referred to as projects) based on the Revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) as any systematic effort "[…] to improve the quality, safety, and value of healthcare, and used methods to establish that observed outcomes were due to the intervention(s)" (Ogrinc et al., 2015). For controlled trials, all types of control groups were eligible for inclusion (e.g. usual care or other interventions) with exception of pharmacological treatments.

The main outcome for this scoping review is the characteristics of the interventions (i.e. components, content).

2.2.2 | Search

We conducted an initial electronic search in December 2017, and this search was updated in April 2019 and March 2020. The following databases were included: MEDLINE (via PubMed), CINAHL, and the Cochrane Library. We used relevant text words and database-specific controlled vocabulary, for example MeSH terms (MEDLINE). The complete search strategy for all databases is shown in Tables S1–S4).

We also performed backward and forward citation tracking for all included publications (using Scopus), screened the reference lists of two relevant guidelines (Lach et al., 2016; Universitätsspitäler Basel, Bern & Zürich, 2014) and performed a nonsystematic Web search via Google Scholar with free-text terms screening the first ten pages aimed to identify unpublished studies.

2.2.3 | Study selection

Two reviewers (JH and FK) independently screened all titles and abstracts regarding the inclusion criteria using Rayyan (Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016). We resolved disagreements by discussion, and if no consensus could be reached, we called in a third reviewer (JA).

2.3 | Data extraction and analysis

Data were extracted independently by two researchers (JA and FK) and checked for accuracy. The following data were extracted: characteristics of the intervention (e.g. intervention components and for all components, information about the content, duration and frequency of delivery) and study information (study design, methods of data collection (including types of physical restraints assessed), characteristics of the participants and study results). We expected a wide range of intervention characteristics and components. Therefore, interventions and components were not predefined. Characteristics of the interventions were assessed using an extraction table based on the TIDieR criteria (Hoffmann et al., 2014) independently by two authors (JA and JH). In a first step, the initial analysis of both authors was compared. In the second step, results were summarised at a more abstract level. A third author (RM) was involved in the interpretation and synthesis of the literature.

Since we aimed to provide an overview of available studies and projects without focussing the effectiveness of the interventions and according to the scoping review approach used (Arksey & O'Malley, 2005), we did not perform a critical appraisal of the methodological quality of included studies. Data were analysed in a narrative way because the aim of this review was the description of the interventions' components and effects.

3 | RESULTS

3.1 | Literature search

After deduplication, the search retrieved a total of 3,495 citations. Ninety-five publications were screened in full text, and 31 publications were included in this scoping review (Figure 1).

3.2 | Characteristics of included studies and quality improvement projects

Sixteen publications reported on intervention studies (Amato, Salter, & Mion, 2006; Antonelli, 2008; Beaulieu et al., 2008; Enns, Rhemtulla, Ewa, Fruetel, & Holroyd-Leduc, 2014; Eskandari, Abdullah, Zainal, & Wong, 2018; Hanger, Ball, & Wood, 1999; Hevener, Rickabaugh, & Marsh, 2016; Johnson et al., 2016; Kwok, Mok, Chien, & Tam, 2006; Lai, Chow, Suen, & Wong, 2011, 2013; Lever, Molloy, Bedard, & Eagle, 1995; Lin, Liao, Yu, Chu, & Ho, 2018; Özdemir & Karabulut, 2009; Powell, Mitchell-Pedersen, Fingerote, & Edmund, 1989; Smith, Timms, Parker, Reimels, & Hamlin, 2003) and 15 publications on projects (Cosper, Morelock, & Provine, 2015; Hall et al., 2018; Hancock et al., 2001; Jensen et al., 1998; Johnson & Beneda, 1999; Kirk, McGlinsey, Beckett, Rudd, & Arbour, 2015; Köbke & Brase, 2017; Markwell, 2005; Mion et al., 2001; Missildine & Harvey, 2000; Mitchell, Panchisin, & Seckel, 2018; Morrison et al., 2000; Rieth & Bennett, 1998; Swauger & Tomlin, 2000; Zoellner-Hunter, Goetz, & Czurylo, 2000) (see Tables 1 and 2). Articles were published between 1989 and 2018. Most of the studies and projects (n = 20) were conducted in

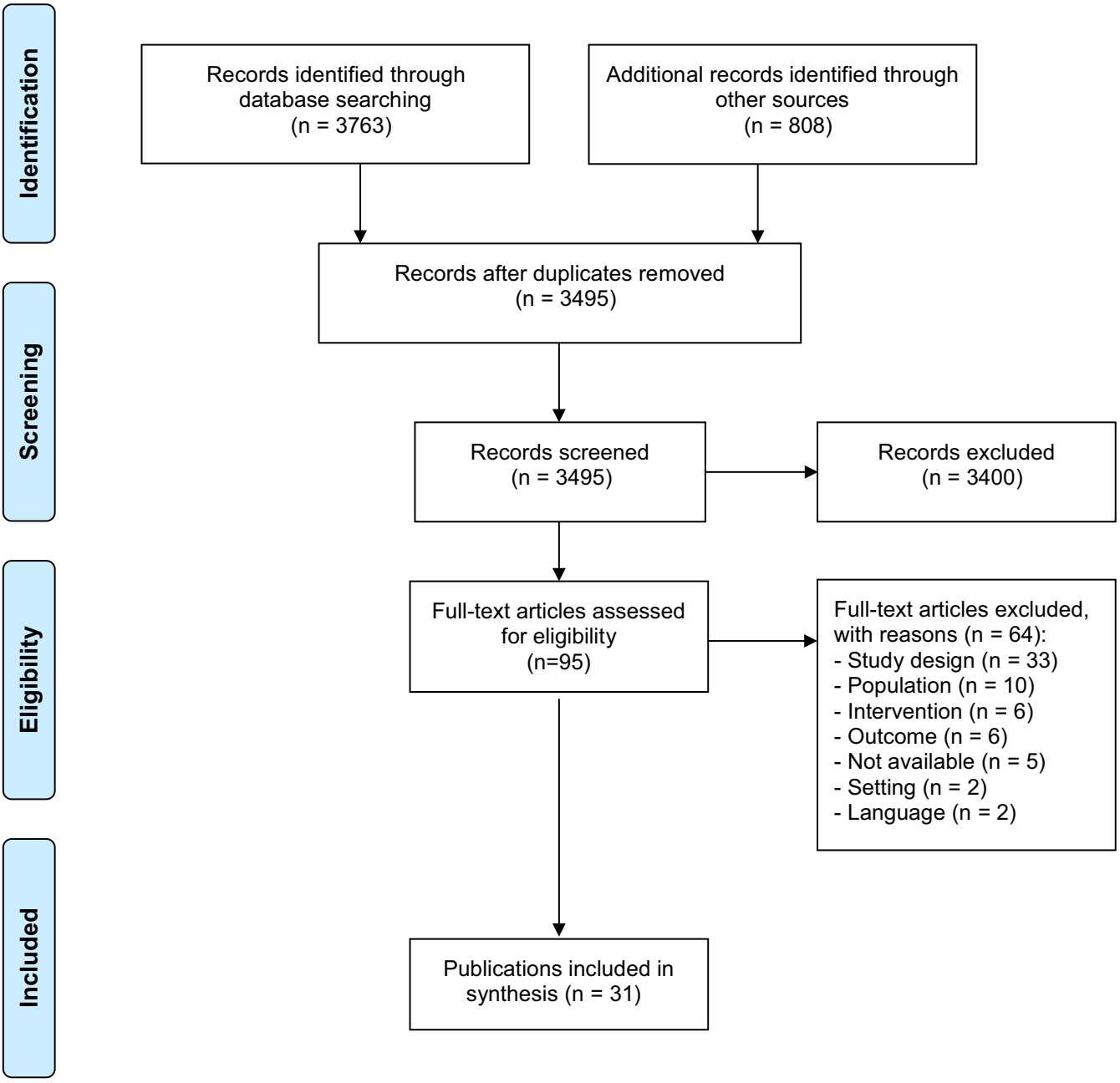

FIGURE 1 Search and study selection process [Colour figure can be viewed at wileyonlinelibrary.com]

the USA (Amato et al., 2006; Antonelli, 2008; Beaulieu et al., 2008; Cosper et al., 2015; Hall, 2018; Hancock et al., 2001; Hevener et al., 2016; Jensen et al., 1998; Johnson & Beneda, 1999; Johnson et al., 2016; Kirk et al., 2015; Markwell, 2005; Mion et al., 2001; Missildine & Harvey, 2000; Mitchell et al., 2018; Morrison et al., 2000; Rieth & Bennett, 1998; Smith et al., 2003; Swauger & Tomlin, 2000; Zoellner-Hunter et al., 2000), three in Hong Kong (Kwok et al., 2006; Lai, Chow, Suen, & Wong, 2011, 2013) and Canada (Enns et al., 2014; Lever et al., 1995; Powell et al., 1989), respectively, and one study or project was conducted in Germany (Köbke & Brase, 2017), New Zealand (Hanger et al., 1999), Malaysia (Eskandari et al., 2018), Taiwan (Lin et al., 2018) and Turkey (Özdemir & Karabulut, 2009).

Five studies used a controlled study design: two studies were randomised controlled trials (one used a parallel-group design (Kwok et al., 2006) and one a stepped-wedge design (Enns et al., 2014)), two studies were nonrandomised controlled clinical trials (Lai et al., 2011, 2013), and one study used a nonrandomised crossover design (Lever et al., 1995). We also found 11 pre–post studies (Amato et al., 2006; Antonelli, 2008; Beaulieu et al., 2008; Eskandari et al., 2018; Hanger et al., 1999; Hevener et al., 2016; Johnson et al., 2016; Köbke & Brase, 2017; Lin et al., 2018; Mion et al., 2001; Özdemir & Karabulut, 2009; Powell et al., 1989; Smith et al., 2003). All quality improvement projects used pre–post designs for evaluation, but the majority of publications did not provide detailed information about the study design.

TABLE 1 Characteristics of the included intervention studies (n = 16)

Reference, Country	Design	Setting Characteristics of participants Number of participants	Interventions	Data collection methods Follow-up period Types of physical restraints	Summary of results
Amato et al. (2006) USA	Pre–post study	2 wards in an acute care hospital (stroke and traumatic brain injury) No information on characteristics of the participants and sample size	Administrative support Education for nursing staff Consultation (support in clinical practice by a clinical nurse specialist) Feedback (nurses' adherence to the care plan was monitored and reviewed during the consultation, monthly information about fall rates and physical restraint use on each unit) (Adapted programme from Evans et al., 1997)	Routine documentation 12 months Mitts, belts (wrist, waist, pelvic), bedrails	Reduction of physical restraints[c] Adverse events: reduction in number of falls[c]
Antonelli (2008), USA	Pre–post study	3 wards in an acute care hospital (general medicine, neurology and orthopaedics) No information on characteristics of the participants and sample size	Information on alternatives to physical restraints Nursing rounds (regularly, led by geriatric nurse practitioners, which provided clinical review and consultation for patients with physical restraints and directly observes patients at high risk of falling or with behaviour management issues) Additional personnel resources for activity of selected patients (activity assistants) Education for nurses	Unclear information on data collection method 10 weeks Any physical restraint (not specified) and bedrails	Reduction of physical restraints[c] Adverse events: no information reported
Beaulieu et al. (2008), USA	Pre–post study	1 department in a rehabilitation clinic (brain injury) Mean age = 49.8 years 39% women n = 74	Education for different healthcare professionals (excluding physicians; 6–8 hr per group)	Routine documentation 10 months Belts, vests/jackets, mitts, other physical restraints	Increase of physical restraints[c] Adverse events: no information reported
Enns et al. (2014), Canada	Stepped-wedge study	4 wards in an acute care hospital (medical) No information on characteristics of the participants and sample size	Multipliers (among nursing leaders) Education for physicians and unit nurses "Least restraint rounds" (regularly, quality improvement team and staff on the units identified patients at risk for being physically restrained and developed an appropriate least restraint care plan)	Direct observation 4 months Belts (wrist, ankle, waist), vests/jackets, belts in chair, (wheel) chairs with fixed tables (with the exception of their use to help serve food), bedrails, other physical restraints	Reduction of physical restraints[b] Adverse events: no difference in number of falls
Eskandari et al. (2018), Malaysia	Pre–post study	12 wards in an acute care hospital (ICU, cardiac/critical care unit, medical–surgical, neurology–neurosurgery, geriatric/rehabilitation) Mean age = 60.0 years 24.2% women n = 338	Education for nursing staff	Routine documentation 6 months Leg and wrist restraint, belts, vests, constricting chair and mitten (bedrails were excluded)	Reduction of physical restraints[b] Adverse events: no information reported

(Continues)

TABLE 1 (Continued)

Reference, Country	Design	Setting Characteristics of participants Number of participants	Interventions	Data collection methods Follow-up period Types of physical restraints	Summary of results
Hanger et al. (1999) New Zealand	Pre–post study	1 ward in an acute care hospital (rehabilitation) No information on characteristics of the participants *n* = 1968	Policy change (aimed at reducing the use of bedrails) Education	Unclear information on data collection method 12 months Bedrails	Reduction of physical restraints[a] Adverse events: increase in number of falls[b]; reduction of serious injuries[a]; increase in minor injuries[c]
Hevener et al. (2016), USA	Pre–post study	1 ward in an acute care hospital (medical–surgical ICU) No information on characteristics of the participants and sample size	Education (online instructions about the use of the Restraint Decision Wheel and face-to-face discussion with investigator) Decision support tool (Restraint Decision Wheel)	Routine documentation 4 months No information on types of physical restraints	Reduction of physical restraints[a] Adverse events: no information reported
Johnson et al. (2016) USA	Pre–post study	1 ward in a trauma hospital (traumatology ICU) No information on characteristics of the participants and sample size	Education Information on alternatives to physical restraints	Routine documentation 12 months postintervention No information on types of physical restraints	Reduction of physical restraints[a] Adverse events: no information reported
Kwok et al. (2006), Hong Kong	RCT	2 wards in a rehabilitation clinic (stroke unit) IG: Mean age = 76.6 years 43.3% women *n* = 90 CG: Mean age = 76.7 years 55.6% women *n* = 90	IG: use of pressure sensors for bed and chair by nurses CG: usual care	Direct observation, routine documentation and survey of nursing staff 10 months Belts (trunk), bedrails, (wheel) chairs with fixed tables	No difference in physical restraint use between groups Adverse events: no difference in number of falls
Lai et al. (2013) Hong Kong	CCT	2 acute care hospitals No information on characteristics of the participants and sample size	IG: education (3 sessions) Committee Case conferences (weekly meetings) Information materials for family members Information sessions with family members Provision of alternatives to physical restraints, for example to prevent falls out of bed CG: No information on control condition	Unclear information on data collection method 7 months No information on types of physical restraints	No difference in physical restraint use Adverse events: no information reported

(Continues)

TABLE 1 (Continued)

Reference, Country	Design	Setting Characteristics of participants Number of participants	Interventions	Data collection methods Follow-up period Types of physical restraints	Summary of results
Lai et al. (2011), Hong Kong	CCT	2 rehabilitation clinics[d] IG: Mean age = 75.4 years No gender information No information on sample size CG: Mean age = 59.1 years No gender information No information on sample size	IG: education for different healthcare professionals (12 1-hr sessions) Multidisciplinary committee aimed at changing the behaviours of nursing staff towards physical restraint use (by reviewing patients with physical restraints, weekly meetings and further in-service sessions for reinforcement or for orientation of new staff) Consultation (by a nurse specialist) Provision of alternatives to physical restraints CG: usual care	Direct observation 5 months Bedrails, belts (waist), vests/jackets, (wheel)chairs with fixed tables	Increase of physical restraints in both the intervention group[b] and the control group[a] Adverse events: no difference in use of psychotropic medications
Lever et al. (1995), Canada	Crossover study	2 wards in an acute care hospital (general medicine) No information on characteristics of the participants and sample size	Multidisciplinary committee Policy change Education Case conferences (staff reviewed the reasons for physical restraint use and developed a care plan to remove physical restraints)	Standardised documentation, direct observations 52 weeks (1 ward closed after 26 weeks) Bedrails, vests/jackets, (wheel) chairs with fixed tables, belts (wrist, ankle, chest), belts in chair, other physical restraints	Increase of physical restraints after 12 months[c] Adverse events: no difference in number of falls
Lin et al. (2018) Taiwan	Pre–post study	3 wards in an acute care hospital (neurological ICU) No information on characteristics of the participants and sample size	Multidisciplinary committee Development of decision support tool	Routine documentation 6 months No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no difference in self-extubation rates[c]
Özdemir and Karabulut (2009), Turkey	Pre–post study	1 ward in an acute care hospital (cardiological ICU) No information on characteristics of the participants *n* = 40	Education for nurses (2-day training programme)	Written survey of nurses 71 days No information on types of physical restraints	Reduction of physical restraints[a] Adverse events: no information reported
Powell et al. (1989) Canada	Pre–post study	1 department in an acute care hospital (geriatrics) No information on characteristics of the participants and sample size	Committee Development of four patient stereotypes Definition of alternatives Policy change Development of guidelines for the use of restraints	Unclear information on data collection method Unclear information on follow-up period Belts (limb, wrist, ankle), mitts, vests/jackets, (wheel)chairs with fixed tables (excluded bedrails, geriatric chairs and mechanical aids intended to enhance a patient's independence and safe mobility)	Reduction of physical restraints[c] Adverse events: no difference in number of falls)[b]; reduction in use of sedative psychotropic medications[c]

(Continues)

TABLE 1 (Continued)

Reference, Country	Design	Setting Characteristics of participants Number of participants	Interventions	Data collection methods Follow-up period Types of physical restraints	Summary of results
Smith et al. (2003), USA	Pre–post study	11 wards in an acute care hospital No information on characteristics of the participants $n = 397$	Education for nurses (23 sessions and a self-study module)	Routine documentation 3 months No information on types of physical restraints	Reduction of physical restraints[b] Adverse events: no information reported

Abbreviations: CCT, controlled clinical trial; CG, control group; ICU, intensive care unit; IG, intervention group; RCT, randomised controlled trial; *SD* = standard deviation.

[a]Statistically significant.

[b]Not statistically significant.

[c]No information on significance.

[d]No detailed information is provided.

Most studies and projects were conducted in acute care wards (e.g. general medicine or intensive care units) (n = 26), three studies/projects in rehabilitation settings (Beaulieu et al., 2008; Kwok et al., 2006; Lai et al., 2011), one in a special trauma hospital (Johnson et al., 2016) and one in a hospital for orthopaedics, neurology, internal medicine and geriatric rehabilitation (Köbke & Brase, 2017).

Some studies and projects included selected populations with a higher risk for being restrained. Two studies included only patients aged 65 and older (Enns et al., 2014; Lever et al., 1995). Kwok et al. (2006) included patients who were perceived by nurses to be at risk of falls. Özdemir and Karabulut (2009) focussed on agitated patients, and Smith et al. (2003) included a convenience sample of patients with current restrained use. Two studies included patients with diagnosis of neurological diseases (e.g. brain tumour, epilepsy or brain injury; Beaulieu et al., 2008; Lin et al., 2018). However, most studies and projects did not report any inclusion or exclusion criteria, just three further studies and projects reported that all patients were included (Hanger et al., 1999; Köbke & Brase, 2017; Lai et al., 2011). However, detailed information about the study characteristics (e.g. sample size, characteristics of the participants) was only described in a few publications.

More than half of the included publications (n = 18) did not report the measures that were defined as physical restraints. Seven studies included a wide range of measures, including bedrails, belts and fixed tables; five studies also included these measures but excluded bedrails, and one study counted only bedrails.

A detailed overview about the characteristics of the studies and projects is presented in Tables 1 and 2.

3.3 | Characteristics of the interventions

Most interventions comprised more than one component, only five were single-component interventions. Four of these single-component interventions offered education: Özdemir and Karabulut (2009), Smith et al. (2003) and Eskandari et al. (2018) addressed only nursing staff, and Beaulieu et al. (2008) addressed different healthcare professionals. Kwok et al. (2006) used pressure sensors in bed and chair as alternatives to physical restraints.

The majority of the multicomponent interventions also included an educational component. In four studies and projects, education was offered to solely nursing staff (Amato et al., 2006; Antonelli, 2008; Hancock et al., 2001; Zoellner-Hunter et al., 2000), and in six studies to different healthcare professionals (Cosper et al., 2015; Enns et al., 2014; Kirk et al., 2015; Lai et al., 2011; Mion et al., 2001; Missildine & Harvey, 2000). In 13 studies and projects, the target group of the education was not described.

In 12 studies and projects, multidisciplinary committees or committees without further description were established to support the implementation of restraint reduction strategies.

TABLE 2 Characteristics of included quality improvement projects (n = 15)

Reference	Setting Characteristics of participants Sample size	Intervention	Data collection method Follow-up period Types of physical restraints	Summary of the results
Cosper et al. (2015), USA	4 acute care hospitals No information on characteristics of the participants and sample size	Administrative support Multidisciplinary rounds (focussing on assessment of each restrained patient, effectiveness of medication regimen, identification of delirium and use of restraint alternatives) Information on and provision of alternatives to physical restraints (e.g. to prevent pulling tubes) Multipliers (among nursing staff) Education for nurses and healthcare providers Delirium screening Monitoring of physical restraint use (regularly)	No information on data collection method Unclear information on follow-up period No information on types of physical restraints	Reduction of physical restraints[b] Adverse events: no difference in number of falls[c]; no difference in self-extubation rates (results only available from the two largest institutions)
Hall et al.(2018), USA	1 ward in an acute care hospital (ICU) Mean age = 63.9 years 47.3% women n = 1,339	Audit Education Monitoring of physical restraint use (regularly) One-to-one observations at bedside	Routine documentation Unclear information on follow-up period No information on types of physical restraints	Reduction of physical restraints[b] Adverse events: no difference in self-extubation rates; no difference in number of falls
Hancock et al. (2001), USA	1 ward in an acute care hospital (transitional care) No information on characteristics of the participants and sample size	Education for nurses in informal meetings Multidisciplinary rounds (weekly, discussions about alternative strategies for physical restraint use and a review of the effectiveness) Monitoring of physical restraint use (monthly)	Routine documentation 6 months No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no difference in number of falls[c]
Jensen et al. (1998) USA	Acute care hospital[d] No information on characteristics of the participants and sample size	Multidisciplinary committee Monitoring of physical restraint use (regularly) Adaption of documentation Education Algorithm (decision tree for bedrail use) Adjustment of regulations	Unclear information on data collection method 3 months No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no information reported
Johnson and Beneda (1999), USA	Acute care hospital[a] No information on characteristics of the participants and sample size	Multidisciplinary committee Assessment tool (to determine the reason for patient's behaviour) Education Audits (regularly)	No information on data collection method 13 months No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no information reported

(Continues)

TABLE 2 (Continued)

Reference	Setting Characteristics of participants Sample size	Intervention	Data collection method Follow-up period Types of physical restraints	Summary of the results
Kirk et al. (2015), USA	2 wards in an acute care hospital (surgical step-down unit and surgical intensive care unit) No information on characteristics of the participants and sample size	Phase 1: • Monitoring of physical restraint use • Consultation with a doctor Phase 2: • Evaluation of less restrictive measures Phase 3: • Multipliers • Multidisciplinary rounds • Education for APN, doctors and multipliers	No information on collection method Unclear information on follow-up period No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no difference in removal of medical devices
Köbke et al. (2017), Germany	Hospital for orthopaedics, neurology, internal medicine and geriatric rehabilitation[a] Mean age = 66.7 years Unclear gender information *n* = 205	Training for nominated nurses Consultation for nurses and relatives Case conferences Information to physicians Information flyer Education for nursing staff De-escalation management Monitoring of physical restraint use (regularly)	Direct observation 12 months Bedrails, belts (wrist, ankle, trunk), (wheel)chairs with fixed tables, fixed wheelchair, other physical restraints	Reduction of physical restraints[b] Adverse events: no information reported
Markwell (2005) USA	Acute care hospital[a] No information on characteristics of the participants and sample size	Multidisciplinary committee "Restraint reduction kit" (materials for activity for patients, list of alternative measures) Information on and provision of alternatives to restraints (e.g. bed exit alarms) Education Case conferences	No information on data collection method 4 years No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no information reported
Mion et al. (2001), USA	14 wards in 2 acute care hospitals (intensive and general) No information on characteristics of the participants *n* = 2,772	Administrative support Education for physicians and nursing staff Consultation Multidisciplinary rounds (discussing cases of patient with physical restraints and strategies to reduce physical restraints) (Adapted programme from Evans et al., 1997)	Routine documentation Unclear information on follow-up period Mitts, belts (wrist, ankle, chest, waist), vests/jackets, (wheel) chairs with fixed tables Bedrails were not classified as physical restraints	Reduction of physical restraints[c] Adverse events: reduction in number of falls[c]; reduction in treatment interruptions[c]

(Continues)

TABLE 2 (Continued)

Reference	Setting Characteristics of participants Sample size	Intervention	Data collection method Follow-up period Types of physical restraints	Summary of the results
Mitchell et al. (2018) USA	5 wards in 2 acute care hospital (ICU) No information on characteristics of the participants and sample size	Committee Education Information flyer Poster Educational presentations Provision of alternatives to physical restraints (mitts) Monitoring of physical restraint use (regularly)	Routine documentation Unclear information on follow-up period No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no difference in self-extubation rates[c]
Missildine and Harvey (2000) USA	Acute care hospital[a] No information on characteristics of the participants and sample size	Education for all clinical staff (2-hr session) Orientation and distractive devices (clocks, marker board, rocking chairs, items for "confusion box") Information materials for family members	No information on data collection method 8 months No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no information reported
Morrison et al. (2000), USA	1 ward in an acute care hospital (neurology/ neurosurgery) No information on characteristics of the participants and sample size	Multidisciplinary committee Interdisciplinary restraint reduction rounds (once per week patients with physical restraints were discussed). Education	Direct observation, routine data 6 months No information on types of physical restraints	Reduction of physical restraint use[c] Adverse events: no information reported
Rieth and Bennett (1998) USA	3 wards in an acute care hospital (orthopaedics, neurology and ICU) No information on characteristics of the participants and sample size	Committee Assessment process tools (e.g. protocol for intubated patients) Case conferences (monitoring all patient with physical restraints)	No information on data collection method Unclear information on follow-up period No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no information reported
Swauger and Tomlin (2000) USA	Acute care hospital[a] No information on characteristics of the participants and sample size	Multidisciplinary committee Training for multipliers Education Assessment tool	No information on data collection method 6 months No information on types of physical restraints	Reduction of physical restraints[c] Adverse events: no information reported
Zoellner-Hunter et al. (2000) USA	1 ward in an acute care hospital (orthopaedics) No information on characteristics of the participants and sample size	Adjustment of regulations Adjustment of documentation Education for nurses	No information on data collection method 6 months Belts (limb, waist), vests/ jackets, (wheel)chair with fixed table	Reduction of physical restraints[c] Adverse events: no information reported

Abbreviations: APN = advanced practice nurse; ICU = intensive care unit.

[a]Statistically significant.

[b]Not statistically significant.

[c]No information on significance.

[d]No detailed information is provided.

TABLE 3 Components of multicomponent interventions (*n* = 26 studies and projects)

	Education	Audit	Committee	Alternatives to restraints	Monitoring	Case conferences	Multipliers	Information
Amato et al. (2006)	X							
Antonelli (2008)	X	X		X				
Cosper et al. (2015)	X	X		X	X		X	
Enns et al. (2014)	X	X					X	
Hall (2018)	X	X			X			
Hancock et al. (2001)	X	X			X			
Hanger et al. (1999)	X							
Hevener et al. (2016)	X							
Jensen et al. (1998)	X		X		X			
Johnson et al. (2016)	X			X				
Johnson and Beneda (1999)	X	X	X					
Kirk et al. (2015)	X	X			X		X	
Köbke & Brase (2017)	X				X	X	X	X
Lai et al. (2013)	X		X	X		X		X
Lai et al. (2011)	X		X	X				
Lever et al. (1995)	X		X			X		
Lin et al. (2018)			X					
Markwell (2005)	X		X	X		X		
Mion et al. (2001)	X	X						
Missildine and Harvey (2000)	X							X
Mitchell et al. (2018)	X		X	X	X			X
Morrison et al. (2000)	X		X			X		
Powell et al. (1989)			X	X				
Rieth and Bennett (1998)			X			X		
Swauger and Tomlin (2000)	X		X				X	
Zoellner-Hunter et al. (2000)	X							

Eight multicomponent interventions comprised multidisciplinary rounds, nursing rounds or audits (no further information described). Likewise, information on or the provision of alternatives to physical restraints was included in eight multicomponent interventions.

Further components were monitoring of patients with physical restraints (*n* = 7), case conferences (*n* = 6), training multipliers (*n* = 5), offering general information for specific groups such as family members or physicians (*n* = 4), implementation of a policy change (*n* = 3), consultation in general (*n* = 5) and consultation for nurses and relatives with a physician (*n* = 2), establishing a specialised team for reducing physical restraints (task force) (*n* = 3), assessment tool (*n* = 3), administrative support (*n* = 3), adaption of documentation (*n* = 2), delivery of activity or orientation programmes (*n* = 3), provision of decision support tools (*n* = 3) and adaption of regulations (*n* = 2). Other components occurred only once, such as de-escalation management, delirium screening, guideline development, and feedback or observation at bedside. A detailed description of the components (if available) is presented in Tables 1 and 2, and an overview of the multicomponent interventions is presented in Table 3.

3.3.1 | Contents of educational components

The educational components addressed the following topics (see also Table 4):

- information about alternatives to physical restraints (*n* = 21)
- safe application of physical restraints (*n* = 12)
- information on physical restraint use, for example lack of effectiveness, adverse effects (*n* = 10)
- management of challenging behaviour and de-escalation strategies (*n* = 9)
- legal and ethical aspects (*n* = 6)
- information on strategies to prevent falls (*n* = 5)
- discussions based on case vignettes or single cases (*n* = 5)
- use of decision aids or algorithms to prevent the use of physical restraints (*n* = 3)

Four articles did not report any details about the contents of their educational programmes (Hancock et al., 2001; Hevener et al., 2016; Köbke & Brase, 2017; Mitchell et al., 2018).

Policy change	Consultation	Assessment tool	Administrative support	Adjust documentation	Activity/ orientation	Decision support tool	Adjust regulations	Other
	X		X					X
					X			
			X					X
								X
X								
						X		
				X		X	X	
		X						
	X							X
	X							X
	X							
X								
						X		
					X			
	X		X					
					X			
X								X
		X						X
		X						
				X			X	

3.4 | Results of the studies and quality improvement projects

Based on the expected heterogeneity of the interventions, the study designs and the quality of reporting, we did not perform an in-depth analysis of the intervention effects but summarised the results descriptively. In 27 studies and projects investigating educational approaches (single-component interventions and multicomponent interventions including education), the use of physical restraints decreased. Of these, Lai et al. (2011) did not report any prevalence data but described a statistically significant increase in the control group and no difference in the intervention group.

Three studies found no reduction in physical restraint use. Enns et al. (2014) and Lai et al. (2013) investigated a multicomponent educational intervention, and Kwok et al. (2006) investigated the use of pressure sensors for beds and chairs as alternatives to physical restraints.

Beaulieu et al. (2008) found an increase in physical restraint use (pre–post study), and this study investigated a single-component education intervention for different healthcare professionals.

However, many studies and projects have reported insufficient information about the prevalence rates and changes in physical restraint rates (Tables 2 and 3).

Fourteen studies and projects assessed adverse events and reported that no adverse events occurred (Amato et al., 2006; Cosper et al., 2015; Enns et al., 2014; Hall, 2018; Hancock et al., 2001; Hanger et al., 1999; Kirk et al., 2015; Kwok et al., 2006; Lai et al., 2011; Lever et al., 1995; Lin et al., 2018; Mion et al., 2001; Mitchell et al., 2018; Powell et al., 1989). No changes in the number of falls or fall-related injuries were found in seven studies or projects (Cosper et al., 2015; Enns et al., 2014; Hall, 2018; Hancock et al., 2001; Kwok et al., 2006; Lever et al., 1995; Mion et al., 2001; Powell et al., 1989). Amato et al. (2006) and Mion et al. (2001) described a reduction in the number of falls, and Hanger et al. (1999) found a reduced number of fall-related injuries. Two studies investigated the number of patients with prescriptions of psychotropic medications: Lai et al. (2011) found no differences in the prescription of psychotropic medications between groups, and Powell et al. (1989) reported a reduction. There was also no increase in treatment interruption (Kirk et al., 2015; Mion et al., 2001) or self-extubation rates (Cosper et al., 2015; Hall, 2018; Lin et al., 2018; Mitchell et al., 2018).

TABLE 4 Contents of education programmes (n = 27 studies and projects)

	Alternatives to physical restraints	Use and/or application of physical restraints	Information on physical restraint (e.g. lack of effectiveness)	De-escalation and/or management of challenging behaviour	Law, ethics, autonomy	Strategies for fall prevention	Work with case studies	Algorithms and guidelines
Amato et al. (2006)	X					X		
Antonelli (2008)		X		X				
Beaulieu et al. (2008)	X			X				
Cosper et al. (2015)	X	X	X	X	X			X
Enns et al. (2014)	X	X	X					
Eskandari et al. (2018)	X	X	X				X	
Hall et al. (2018)	X	X					X	
Hancock et al. (2001)[a]								
Hanger et al. (1999)	X		X					
Hevener et al. (2016)								
Jensen et al. (1998)	X	X					X	X
Johnson et al. (2016)	X							
Johnson and Beneda (1999)	X							X
Kirk et al. (2015)	X	X						
Köbke and Brase (2017)[a]								
Lai et al. (2013)	X							
Lai et al. (2011)	X		X	X	X	X		
Lever et al. (1995)	X	X						
Markwell (2005)	X	X	X					
Mion et al. (2001)	X	X		X		X		
Missildine and Harvey (2000)	X		X	X				
Mitchell et al. (2018)[a]								
Morrison et al. (2000)	X	X	X		X	X	X	
Özdemir and Karabulut (2009)	X	X	X	X	X			
Smith et al. (2003)	X			X	X		X	
Swauger and Tomlin (2000)			X	X	X	X		
Zoellner-Hunter et al. (2000)	X							

[a]No information provided.

4 | DISCUSSION

This scoping review aimed at describing the components and effects of interventions for reducing physical restraints in general hospital settings. We included 31 articles published between 1989 and 2018. Fifteen publications reported on quality improvement projects and 16 on intervention studies. Only five studies used a controlled design. We included quality improvement projects in addition to intervention studies since the main focus of this scoping review was the description of the available interventions and their components.

We identified various approaches for reducing physical restraints in general hospital settings. Most studies and projects investigated multicomponent interventions and included education for nursing staff or different groups of healthcare professionals as a core component. The topics most commonly addressed in the educational sessions were information about alternatives to physical restraints, management of challenging behaviour and information on physical restraint use, such as the lack of effectiveness or legal and ethical aspects. Furthermore, the multicomponent interventions comprised a wide range of additional components. Some of these components aimed to achieve changes on the organisational level (such as changes in the policy towards least physical restraint use), while other components addressed local ward structures (e.g. audits or case conferences) and the individual level (e.g. consultation or information about alternatives to physical restraints). Only four studies examined simple educational programmes without further components (Beaulieu et al., 2008; Eskandari et al., 2018; Özdemir & Karabulut, 2009; Smith et al., 2003), and one study investigated the provision of pressure sensors in beds and chairs as alternatives for physical restraints (Kwok et al., 2006).

The majority of the studies included found that multicomponent interventions reduced physical restraint prevalence, and this reduction was not associated with an increase in adverse events, for example falls or fall-related injuries, higher prescription rates of psychotropic medications or an increase in treatment interruptions.

Addressing nurses' knowledge and attitudes to change the practice of physical restraint use can be a promising approach because the reasons for using physical restraints are often mainly based on safety issues together with a lack of knowledge or myths about the potential effects of physical restraints (e.g. as a measure to prevent falls or fall-related injuries; Bower et al., 2003; Möhler & Meyer, 2014). In long-term care settings, multicomponent educational interventions offering education and additional components aimed at changing the practice or culture of care towards a least restraint policy were effective in reducing physical restraints (Gulpers et al., 2011; Köpke et al., 2012; Möhler, Richter, Köpke, & Meyer, 2012). Two evidence-based practice guidelines reflect this approach by recommending education for nursing staff to increase knowledge and improve decision-making about physical restraints (Lach et al., 2016; Universitätsspitäler Basel, Bern & Zürich, 2014). Models that aim to understand the nature of behaviour change and support the development of appropriate interventions also emphasise that single-component interventions are often less effective to change specific behaviours compared with multicomponent interventions (Michie, van Stralen, & West, 2011). However, the majority of studies and projects included in this review used study designs that are generally prone to bias (i.e. uncontrolled studies), and the results about the effects of the interventions should be interpreted with caution.

Further research can build on the available evidence described in this scoping review, for example by adapting any intervention, and proceed with studies investigating the feasibility of such approaches and evaluating the effects of successfully piloted interventions using rigorous study designs (Craig et al., 2013). However, future studies should also adhere to adequate reporting guidelines, such as TIDieR (Hoffmann et al., 2014) or CReDECI 2 (Möhler, Köpke, & Meyer, 2015).

This scoping review has several strengths and limitations. To identify the relevant studies, we performed a comprehensive search that included the major databases, and we used supplementary search techniques (e.g. backward/ forward citation tracking) (Cooper et al., 2018). By including both evaluation studies and quality improvement projects, this review provides a broad overview of the components and contents of a large number of interventions. We included only articles written in English or German; therefore, articles published in other languages were not considered in this review. Following the recommendations by Levac, Colquhoun, and O'Brien (2010), we did not perform a critical appraisal for the included studies, and therefore, no conclusions about the methodological quality of the body of evidence can be drawn.

5 | CONCLUSION

A large number of multicomponent interventions for preventing and reducing physical restraints in general hospital settings have been developed, and the majority use education as a core component. Studies investigating the effectiveness of the interventions are limited.

6 | RELEVANCE TO CLINICAL PRACTICE

Offering education and other components to implement a least restraint policy in clinical practice might be one approach for reducing the use of physical restraints. However, there is insufficient information about the effects of these interventions. If such an intervention will be implemented, the cost and benefits should be monitored and weighed carefully.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

AUTHORS' CONTRIBUTIONS

Study design and concept: JA, JH and RM; literature search, study selection and data extraction: JA, JH and FK; analysis and interpretation of the data: JA, JH and RM; drafting and critical revision of the manuscript for important intellectual content: JA, JH and RM. All authors commented on the manuscript drafts and read and approved the final manuscript.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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