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Implementation strategies used to implement nursing guidelines in daily practice: A systematic review

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ABSTRACT

Objectives: Research specifically addressing implementation strategies regarding nursing guidelines is limited. The objective of this review was to provide an overview of strategies used to implement nursing guidelines in all nursing fields, as well as the effects of these strategies on patient-related nursing outcomes and guideline adherence. Ideally, the findings would help guideline developers, healthcare professionals and organizations to implement nursing guidelines in practice.

Design: Systematic review. PROSPERO registration number: CRD42018104615.

Data sources: We searched the Embase, Medline, PsycINFO, Web of Science, Cochrane, CINAHL and Google Scholar databases until August 2019 as well as the reference lists of relevant articles.

Review methods: Studies were included that described quantitative data on the effect of implementation strategies and implementation outcomes of any type of a nursing guideline in any setting. No language or date of publication restriction was used. The Cochrane Effective Practice and Organisation of Care taxonomy was used to categorize the implementation strategies. Studies were classified as effective if a significant change in either patient-related nursing outcomes or guideline adherence was described. Strength of the evidence was evaluated using the 'Cochrane risk of bias tool' for controlled studies, and the 'Newcastle-Ottawa Quality Assessment form' for cohort studies.

Results: A total of 54 articles regarding 53 different guideline implementation studies were included. Fifteen were (cluster) Randomized Controlled Trials or controlled before-after studies and 38 studies had a before-after design. The topics of the implemented guidelines were diverse, mostly concerning skin care ($n = 9$) and infection prevention ($n = 7$). Studies were predominantly performed in hospitals ($n = 34$) and nursing homes ($n = 11$). Thirty studies showed a positive significant effect in either patient-related nursing outcomes or guideline adherence (68%, $n = 36$). The median number of implementation strategies used was 6 (IQR 4–8) per study. Educational strategies were used in nearly all studies (98.1%, $n = 52$), followed by deployment of local opinion leaders (54.7%, $n = 29$) and audit and feedback (41.5%, $n = 22$). Twenty-three (43.4%) studies performed a barrier assessment, nineteen used tailored strategies.

Conclusions: A wide variety of implementation strategies are used to implement nursing guidelines. Not one single strategy, or combination of strategies, can be linked directly to successful implementation of nursing guidelines. Overall, thirty-six studies (68%) reported a positive significant effect of the implementation of guidelines on patient-related nursing outcomes or guideline adherence. Future studies should use a standardized reporting checklist to ensure a detailed description of the used implementation strategies to increase reproducibility and understanding of outcomes.

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What is already known about the topic?

- Effective implementation strategies are required to successfully introduce the increasing number of available (inter)national nursing guidelines.
- Publishing or disseminating a nursing guideline does not ensure its effective use in practice.

What this paper adds

- Besides education, a wide range of implementation strategies are used to implement nursing guidelines into daily practice.
- The level of evidence for strategies directed at implementing nursing guidelines is limited due to a lack of well-conducted studies.
- Future studies should use a standardized reporting checklist to ensure a detailed description of the used implementation strategies to increase reproducibility and understanding of outcomes.

1. Introduction

Nurses are increasingly expected to provide evidence-based care intended to enhance quality of care (Herron and Strunk, 2019). Therefore, an increasing number of nursing guidelines are being published. A guideline in general contains evidence-based recommendations for health care providers, policy makers, and patients about health interventions intended to optimize patient care. Guidelines are published with the aim of reducing unwarranted variation in healthcare delivery (Grimshaw et al., 1993; Institute of Medicine Committee on Standards for Developing Trustworthy Clinical Practice Guidelines, 2011; World Health Organization, 2012). Still, health care providers' adherence to guideline recommendations has proven suboptimal (Arts et al., 2016; Grimshaw et al., 2006; Grimshaw et al., 2004; Lugtenberg et al., 2009). Publishing or disseminating a guideline alone will not ensure adequate use of a guideline in practice. An essential second step is to apply strategies to effectively implement the guideline (Grol et al., 2001). Using a theory, model or framework, is expected to increase the probability of success of the implementation (Nilsen et al., 2015). This also holds for performing a barrier assessment and tailoring strategies (Geerligs et al., 2018), which are often elements in theories, models or frameworks.

As nursing and medical care, as well as the associated guidelines, differ in nature, other strategies may be needed to anchor nursing guidelines in practice. Previous reviews about nursing guideline implementation considered studies addressing a single implementation strategy, such as education (Häggman-Laitila et al., 2017) or facilitation (Dogherty et al., 2014), or a specific setting, such as nursing homes (Diehl et al., 2016). More and more implementation studies in the field of nursing are being conducted (Sales et al., 2019). However, to the best of our knowledge, the implementation strategies of nursing guidelines, independent of type or setting, have not been systematically reviewed to this date. A systematic review could provide insights useful in all areas of nursing.

The objective of this review was to provide an overview of strategies used to implement nursing guidelines in all nursing fields, as well as the effects of these strategies on patient-related nursing outcomes and guideline adherence. Ideally, the findings would help guideline developers, healthcare professionals and organizations in implementing nursing guidelines in practice.

2. Methods

2.1. Design

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Moher et al., 2010); the research protocol was registered on PROSPERO (registration number: CRD42018104615).

2.2. Search

Relevant studies were searched in the Embase, Medline, PsycINFO, Web of Science, Cochrane, CINAHL and Google Scholar databases until August 2019. Various search terms were purposefully selected to cover all nursing fields and implementation synonyms. A biomedical information specialist of the medical library of the Erasmus MC – University Medical Centre Rotterdam guided the search. The full search strategy is presented in *Supplement 1. Search strategy*. The titles and abstracts of all search results were screened on relevance by DS and EI independently, according to specified eligibility criteria, using Endnote® (Bramer et al., 2017). Next, the full texts of possibly relevant articles were checked for inclusion by DS. Consensus on final inclusion was achieved by discussion (DS, EI). After the initial search, a reference and citation check was performed for all relevant studies (by DS, EI). To ensure having a complete overview of all published studies, several previously published systematic reviews were screened for relevant included studies (Diehl et al., 2016; Dogherty et al., 2014; Häggman-Laitila et al., 2017; Thomas et al., 1999).

2.3. Eligibility criteria

The scope of the review was limited to studies that considered the implementation of a nursing guideline, defined as recommendations about health interventions mainly provided by nurses (>50%), intended to optimize patient care and based on either national or international guidelines. The following inclusion criteria were applied: 1) studies had to describe the implementation strategies and outcomes of the implementation of the nursing guideline; 2) studies had to measure either the effects of the implemented nursing guideline on patient-related nursing outcomes (e.g. pain, falls, pressure ulcers), or adherence to the guideline by the healthcare professionals measured by observation or documentation; 3) studies had to include a reference group (e.g., with and without guideline). Case studies of individual patients, letters and editorials were not eligible. To optimize the objectivity of the included study results, we excluded studies with only survey outcomes. We excluded bundle implementation studies because of their protocol-like characteristics. No search limitations were imposed on language.

2.4. Outcome measures

The primary outcomes were; 1) impact on patient-related nursing outcomes, and 2) adherence to the guideline. Studies were classified with a positive effect when a statistically significant improvement in patient-related nursing outcomes and/or adherence was reported.

The secondary outcomes were the number and types of implementation strategies per study. The different strategies used were categorized according to the Cochrane Effective Practice and Organisation of Care taxonomy (Effective Practice and Organisation of Care, 2016). The Effective Practice and Organisation of Care taxonomy includes four domains of interventions: Implementation strategies, Delivery arrangements, Financial arrangements and Governance arrangements.

2.5. Data extraction

Relevant information from the included articles was extracted in a data abstraction form. This form was piloted for the first five studies and finalized after discussion (DS, TR, EI). Data included country of origin, setting, type of guideline, participants, implementation strategies, barrier assessment, use of implementation theory or framework, and outcomes. Depending on the measurements performed in the included studies, both or either of the primary outcomes (i.e. patient-related nursing outcomes or adherence to the guideline) were collected. All data abstraction forms were initially completed by DS and checked by either TR or EI. Differences were discussed when necessary.

2.6. Risk of bias assessment

The risk of bias of the included studies was assessed with two tools. The Cochrane risk of bias tool was used for the controlled studies (Cochrane and Effective Practice and Organisation of Care, 2017). This tool consists of nine items, of which each is scored high, low or unclear risk of bias. The 'Newcastle-Ottawa Quality Assessment form for Cohort studies' was used for cohort before-after studies (Wells et al., 2000). The Newcastle-Ottawa Quality Assessment consists of three parts; selection, comparison and outcome. For each part a number of stars can be assigned, resulting in an overall score (good, fair or poor). Both risk of bias tools were included in the data abstraction form, initially completed by DS and checked by either TR or EI. Discrepancies were resolved by discussion.

The Newcastle-Ottawa Quality Assessment form for Cohort Studies contains a question on whether the follow-up was long enough for the outcome to appear (Wells et al., 2000). In line with recommendations of the World Health Organisation (WHO) on implementation research, we took it that a period of at least of 3 months, for baseline and after measurement each, was sufficient (World Health Organization, 2014). After discussion DS, TR, and EI jointly decided that a three-month period was sufficient. Regarding the before-after studies, a follow-up period less than three months therefore resulted in poor scores on the outcome part of the Newcastle-Ottawa Quality Assessment form for Cohort Studies. The Cochrane tool does not contain such a parameter.

2.7. Analysis and synthesis

Meta-analysis was precluded due to heterogeneity across studies. This heterogeneity concerned differences in guidelines, implementation strategies, outcome measures, timing of follow-up measurements, and the level of detail of the used strategies. Instead we provided a descriptive and narrative synthesis of the primary outcomes guideline adherence and patient-related nursing outcomes of the individual implementation studies. We provided a summary table with all crucial elements of the implementation processes (duration, used implementation strategies, barrier assessment, use of implementation framework, used implementation outcomes *Supplement 2.*

Description of included studies). The number of implementation strategies were categorized into the four EPOC categories (Delivery, Financial, Government and Implementation strategies). The total number of implementation strategies that were used in the implementation studies were summarized as median with IQR. The median number of used implementation strategies was provided for all studies, per EPOC category (Delivery, Financial, Government and Implementation strategies), for the studies that presented a positive significant change on one or more of their primary outcomes, and for the studies who reported no significant change.

Further, the relative change percentage was calculated for the studies providing patient-related nursing outcomes. Calculating a relative change of guideline adherence before the (re)implementation of a guideline is expected to be of low value, because the adherence rate to a not yet implemented guideline will always be low at baseline. Moreover, not all studies measured adherence at baseline. Therefore, we chose not to calculate the relative change of our other primary outcome 'adherence'. For the before-after studies, the relative change was computed by dividing the absolute outcome by the baseline level, preferably for the primary outcome of that individual study. However, in some studies the patient-related nursing outcome was a secondary outcome. For controlled studies, we first computed the relative change separately for the intervention group and the control group. Subsequently, the calculated relative change percentage in the intervention group was divided by the calculated relative change in the control group (Mölenberg et al., 2019). *Supplement 3* provide an example of how the relative changes were calculated for both study groups. Of note is that the relative change for the before-after studies could have been overestimated due to the lack of a control group.

The association between the relative change and the total number of EPOC strategies used in the included studies was visualized in a scatterplot, for the controlled studies and the before-after studies separately. The difference between the median relative change for studies using only strategies from the EPOC category Implementation strategies or using a combination of strategies from different EPOC categories was assessed using the Mann-Whitney U test. For comparable groups of similar guidelines with similar outcomes (at least 3 studies), the median relative change was assessed and related to the use of EPOC category implementation strategies alone or to the use of a combination of strategies from different EPOC categories.

3. Results

3.1. Study selection

The initial search strategy and the cross-reference check yielded a total of 17,058 records. After 8539 duplicates were removed, 8519 abstracts were assessed for eligibility. Two-hundred-and-five full-text records remained and were assessed for eligibility, after which eventually 54 records, regarding 53 unique studies, were included for the synthesis' (Fig. 1 Flow diagram for identification, screening and eligibility according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol).

3.2. Study characteristics

3.2.1. Study design, setting and guideline topic

The 54 papers described 53 unique implementation studies on 21 guideline topics. Fifteen had a controlled before-after, randomized controlled trial or cluster randomized controlled trial design; 38 studies (71.7%) had a before-after design. Most studies were conducted in western countries (USA $n = 10$, Netherlands $n = 9$, Australia $n = 8$). Half of the studies were performed in a single centre ($n = 27$, 50.9%). Most of the guidelines regarded skin care ($n = 9$) and infection prevention ($n = 7$). Two studies addressed the implementation of a combination of several guidelines, respectively six (Edwards et al., 2007) and three (van Gaal et al. (a), 2011; van Gaal et al. (b), 2011). The most studied setting was a hospital ($n = 34$, 64.2%), followed by a nursing home ($n = 11$), general practice ($n = 5$), home care ($n = 2$), and inpatient rehabilitation centre ($n = 1$). Table 1 Study characteristics broken down by guideline topic shows the study characteristics of the included studies,

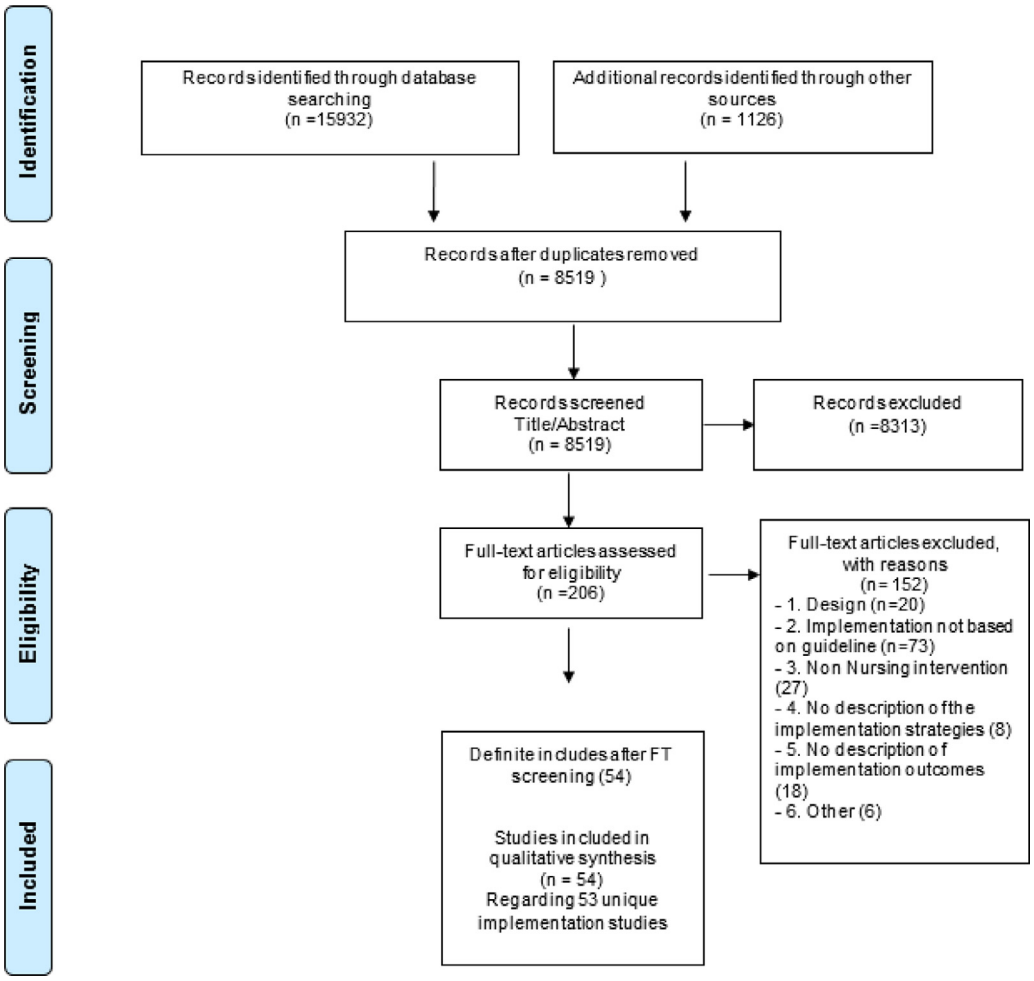

Fig. 1. Flow diagram for identification, screening and eligibility according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol (Moher et al., 2010). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Supplement 2 provides a more detailed description of the included studies.

3.2.2. Participants

Twenty-seven studies provided no description of the targeted professionals other than 'nurses'. In some studies, nurse aids, student nurses or nurse practitioners were (part of) the target group, few studies targeted multiple professionals (physicians, physical therapists, etc.). The median number of involved caregivers per study ($n = 27$) was 118 (IQR 34 – 238); twenty-six studies did not provide the number of involved caregivers.

Sixteen studies did not describe any details of the targeted patients; the other studies described basic characteristics regarding age and gender. Several studies described baseline characteristics related to the guideline of interest. Regarding 35 of all included studies, the median sample size of included patients was 373 (IQR 140 – 1577); seventeen studies did not report the sample size. Also shown in *Supplement 2*.

3.2.3. Risk of bias assessment

Nine controlled studies scored low risk of bias on most items (seven or more out of the nine items), as shown in *Supplement 4 Cochrane risk of bias for controlled studies*. The remaining six studies scored unclear or high risk of bias on three or more out of nine items. Thirty-two of the 38 before-after studies scored poor, assessed with the Newcastle-Ottawa Quality Assessment form for Cohort Studies (*Supplement*). Thirty of these 32 studies scored poor on the comparability part. These studies did not control for age, sex, or other factors, or did not correct for confounding when comparing the before and after groups. Four before-after studies were assessed as good; two as fair.

3.3. Implementation outcomes

All studies used a variety of implementation strategies, which were rarely comparable and with variable outcomes. The duration of the measurements, the intensity and the degree of details of the used strategies varied across studies. Twenty-one studies measured both patient-related nursing outcomes and guideline adherence. Eleven of these studies found a significant improvement on both outcomes. Overall, thirty-six studies (68%) measured a significant positive change on either patient-related nursing outcome measure(s) or guideline adherence.

3.3.1. Patient-related nursing outcomes

Patient-related nursing outcomes were measured in 30 studies. Twenty-one (70%) measured a significant positive change, seven measured no change, and two studies did not perform statistical tests. All studies reported findings indicating a positive change or no change. However, one study (Törma et al. 2014) reported

Table 1
Study characteristics broken down by guideline topic.

Author, Year	Country	Design	Setting, Single/Multi centre	Guideline topic
van den Boogaard et al., 2009	Netherlands	Before-After	Hospital - Intensive Care Unit (PICU and Intensive Care Unit) in a tertiary hospital, Single centre	Agitation - Delirium
Trogrlic et al., 2019	Netherlands	Before-After	Hospital - Intensive Care Units in 1University Medical Centre and five community hospitals, Multi centre	Agitation - Delirium
Pun et al., 2005	USA	Before-After	Hospital - Intensive Care Unit wards of the Van der Bilt University Medical Centre in Nashville and the Veterans Administration Tennessee Valley Healthcare System-York Campus, Multi centre	Agitation - Delirium and sedation
Edwards et al., 2007	Canada	Before-After	Hospital and nursing homes - 7 hospitals + 2 home visiting nursing service organisations and one public health unit, Multi centre	Combination of multiple guidelines - Asthma, breastfeeding, delirium-dementia-depression, smoking cessation, venous leg ulcers, diabetes
van Gaal (a et al., 2011; van Gaal (b) et al., 2011)	Netherlands	Cluster Randomized Controlled Trial	Hospital and nursing homes - 1 university hospital. 2 large teaching hospitals, one small hospital and 6 nursing homes. 10 hospital wards + 10 Nursing home wards, Multi centre	Combination of multiple guidelines - Pressure ulcer, urinary tract infection and falls
Seto et al., 1991	China	Before-After	Hospital - 6 wards, 3 male, 3 female, Single centre	Infection prevention - Catheter associated urinary tract infections
Huis et al., 2013	Netherlands	Cluster Randomized Controlled Trial	Hospital - 3 hospitals in the Netherlands, Multi centre	Infection prevention - hand hygiene
Gopal Rao et al., 2009	United Kingdom	Cluster Randomized Controlled Trial	Nursing home - 12 nursing homes in and surrounding south London, Multi centre	Infection prevention - Hand hygiene, environmental and disposal hygiene.
Zhu et al., 2018	China	Before-After	Hospital - Shanghai Public Health Clinical Centre, Single centre	Infection prevention - Non-pharmacological fever management in HIV patients
Cabilan et al., 2014	Australia	Before-After	Hospital, Single centre	Infection prevention - Peripheral cannula infections
Frigerio et al., 2012	Italy	Before-After	Hospital - 6 Orthopaedic Surgery, 2 Traumatology, 1 Neurosurgery, 1 Neurology, 1 General Surgery, 2 General Medicine, Single centre	Infection prevention - Peripheral venous catheter management
Gomarverdi et al., 2019	Iran	Cluster Randomized Controlled Trial	Hospital -Intensive Care Unit wards in two different hospitals, Multi centre	Infection prevention - Standard precautions in Intensive Care Units
Abraham et al., 2019	Germany	Cluster Randomized Controlled Trial	Nursing home - 120 nursing homes, Multi centre	Mobility - physical restraint use
Ward et al., 2010	Australia	Cluster Randomized Controlled Trial	Nursing home - residential aged care facilities with at least 20 beds, 88 facilities included, Multi centre	Mobility - Preventing falls
Köpke et al., 2012	Germany	Cluster Randomized Controlled Trial	Nursing homes, 36 in total, Multi centre	Mobility - Use of physical restraints
Lockwood and Hunter, 2018	Australia	Before-After	Hospital - Two private hospitals in a regional area, Multi centre	Mobility - Venous - thromboembolism prevention programme
Törmä et al., 2014	Sweden	Controlled Before-After	Nursing homes - 4, Multi centre	Nutritional
Cahill et al., 2014	Canada / USA	Before-After	Hospital - 5 participating Intensive Care Unit's (one divided in 3 units) in Canada and the USA. In non- and teaching hospitals, Multi centre	Nutritional - Enteral nutrition in the Intensive Care Unit
Johnson et al., 2017	United Kingdom	Before-After	Hospital - tertiary neonatal intensive care unit, Single centre	Nutritional - improve nutrition and growth of preterm infants in neonatal intensive care.
Giugliani et al., 2010	Angola	Before-After	Hospital - Therapeutic feeding centre, consists of a separate ward for severely malnourished children only, Single centre	Nutritional - Malnutrition care in rural Africa
Lopez et al., 2004	China	Before-After	Hospital - Tertiary care teaching hospital, Single centre	Nutritional - nutrition support in mechanically ventilated, critically ill adult patients.
Ames et al., 2011	USA	Before-After	Hospital - 4 different critical care units, Multi centre	Oral Care - Prevention of VAP
De Visschere, 2012	Belgium	Cluster Randomized Controlled Trial	Nursing homes - In Flanders Belgium, Multi centre	Oral care
Van der Putten, 2013	Netherlands	Cluster Randomized Controlled Trial	Nursing homes - Within 100 km radius of the centre of the Netherlands, Multi centre	Oral care
Lozano et al., 2004	USA	Cluster Randomized Controlled Trial	Primary care paediatric practices, Multi centre	Other - Asthma treatment
Clark and Rawlinson, 2001	United Kingdom	Before-After	Hospital - a large teaching hospital, Single centre	Other - Blood transfusion
Tian et al., 2017	Belgium	Before-After	Hospital, Single centre	Other - Cancer related fatigue
van Lieshout et al., 2016	Netherlands	Cluster Randomized Controlled Trial	General Practices, Multi centre	Other - Cardiovascular risk management in general practices

(*Continued on next page*)

Table 1 (*Continued*).

Author, Year	Country	Design	Setting, Single/Multi centre	Guideline topic
Downey and Kirsa, 2015	Australia	Before-After	Hospital - A 18 bed Head, neck and lung medical oncology ward, Single centre	Other - Crushing medication in case of Tube feeding only
Sipila et al., 2008	Finland	Before-After	General practices - 31 in total, Multi centre	Other - Early detection, prevention and treatment of CVD (Cardiovascular disease)
Snelgrove-Clarke et al., 2015	Canada	RCT	Hospital - University affiliated teaching hospital in Atlantic, Single centre	Other - Foetal Health Surveillance
Featherston and Gilder, 2018	USA	Before-After	Community mental health centre, Single centre	Other - Paediatric mental health care
Jagt-van Kampen et al., 2015	Netherlands	Before-After	Hospital - Academic children's hospital, Single centre	Other - Paediatric palliative care
Duff et al., 2013	Australia	Before-After	Hospital - a 250-bed magnet designated private hospital, Single centre	Other - Prevention of venous thromboembolism
Vander Weg et al., 2017	USA	Before-After	Hospital - General medical units of four US Department of Veterans Affairs hospitals, Multi centre	Other - Smoking cessation
Reynolds et al., 2016	USA	Before-After	Hospital - Neuro critical care unit, Single centre	Other - Stroke care
Cheater et al., 2006	United Kingdom	Cluster Randomized Controlled Trial	Family practice, Multi centre	Other - Urinary incontinence
Savvas et al., 2014	Australia	Before-After	Nursing home - Residential aged care facilities across three Australian states, Multi centre	Pain - Australian Pain Society
Dulko et al., 2010	USA	Before-After	Hospital, Single centre	Pain - Cancer related
Choi et al., 2014	South-Korea	Before-After	Hospital - A university affiliated tertiary hospital, Single centre	Pain - Cancer related
Kingsnorth et al., 2015	Canada	Before-After	Hospital - a large academic paediatric rehabilitation hospital, Single centre	Pain - Paediatric pain
Habich et al., 2012	USA	Before-After	Hospital - Paediatric Intensive Care Unit at a community hospital located in a suburb of Chicago, IL, Single centre	Pain - Paediatric pain assessment and management guidelines
Bale et al., 2004	USA	Before-After	Nursing homes - 6, Multi centre	Skin care
Harrison et al., 2005	Canada	Before-After	Home care - The Ottawa Community Care Access Centre, an eastern Ontario home care-authority, Multi centre	Skin care - Leg ulcers
De Laat, 2006	Netherlands	Before-After	University hospital, Single centre	Skin care - pressure ulcer
Paquay et al., 2010	Belgium	Before-After	Home care - 5 participating home nursing agencies, Multi centre	Skin care - pressure ulcer
De Laat, 2007	Netherlands	Before-After	Hospital - Critical care unit in an academic hospital, Single centre	Skin care - pressure ulcer
Beeckman et al., 2013	Belgium	Cluster Randomized Controlled Trial	Nursing home - 11 wards, Multi centre	Skin care - pressure ulcer care
Koh et al., 2018	Singapore	Before-After	Hospital - Two orthopaedic wards, Single centre	Skin care - pressure ulcer prevention
Rosen et al., 2006	USA	Before-After	Nursing home, Single centre	Skin care - pressure ulcer prevention
Lopez et al., 2011	Australia	Before-After	Hospital - Australian Capital Territory hospitals, Single centre	Skin care - Skin tears
Jolliffe et al., 2019	Australia	Before-After	Other - Inpatient Rehabilitation setting, Single centre	Stroke care
Bjartmarz et al., 2017	Iceland	Before-After	Hospital - Neurology and rehabilitation ward in university hospital, Single centre	Stroke care

a significant negative effect on one of the patient-related nursing outcome measures that were addressed. Törmä et al. (2014) compared two implementation strategies (external facilitation and education outreach visits) in order to introduce nutritional guidelines. Besides no differences in nutritional parameters after 18 months, they found significant deteriorations for functional and cognitive status, as well as for the EQ-5D index (quality of life questionnaire), ($p<0.05$) in the intervention group that received educational outreach visits.

Ten of the controlled studies ($n = 15$) measured patient-related nursing outcomes. Six found a significant positive effect; four found no effect. Twenty-two of the before-after studies ($n = 37$) measured patient-related nursing outcomes. Thirteen found a significant positive effect, seven found no significant effect ($n = 7$), and two performed no statistical tests ($n = 2$). When comparing the controlled and before-after studies, we found no significant difference between these groups on reported significant change in patient-related nursing outcomes ($p \geq 0.05$).

3.3.1.1. Relative change percentage on the patient-related nursing outcomes. All relative change are shown in *Supplement 6 and Supplement 7*. The median relative change measuring patient-related nursing outcomes was 2.7% (IQR 1.0– 40.6) for the controlled studies ($n = 10$), and 22.1% (IQR 8.7 – 81.4) for the before-after studies ($n = 19$). This differed significantly between the controlled and before-after groups ($p = 0.009$).

The scatterplots for the controlled (Fig. 2) and before-after (Fig. 3) studies show that there was no association between the total number of used strategies and the relative change on the patient-related nursing outcomes. For the controlled studies the slope suggests that using more strategies, will result in a lower relative change. However, the sample is too small to conclude this ($n = 10$).

The median relative change for studies that used strategies from the EPOC category implementation strategies alone was 13.8% (IQR 3.6–81.9). For the studies that used a combination of strategies from the EPOC categories the median was 20.1% (IQR 3.2–67.3), however this was not statistically different ($p = 0.95$).

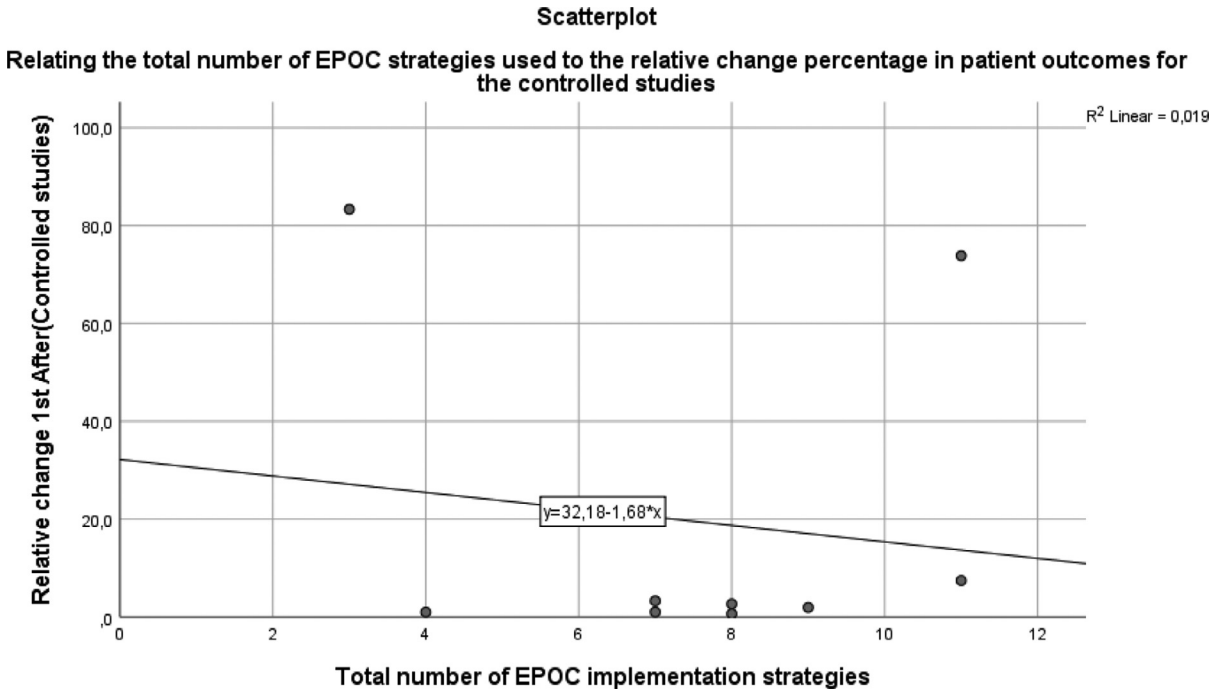

Fig. 2. Scatterplot relating the total number of EPOC implementation strategies used to the relative change percentage in patient-related nursing outcomes for the controlled studies.

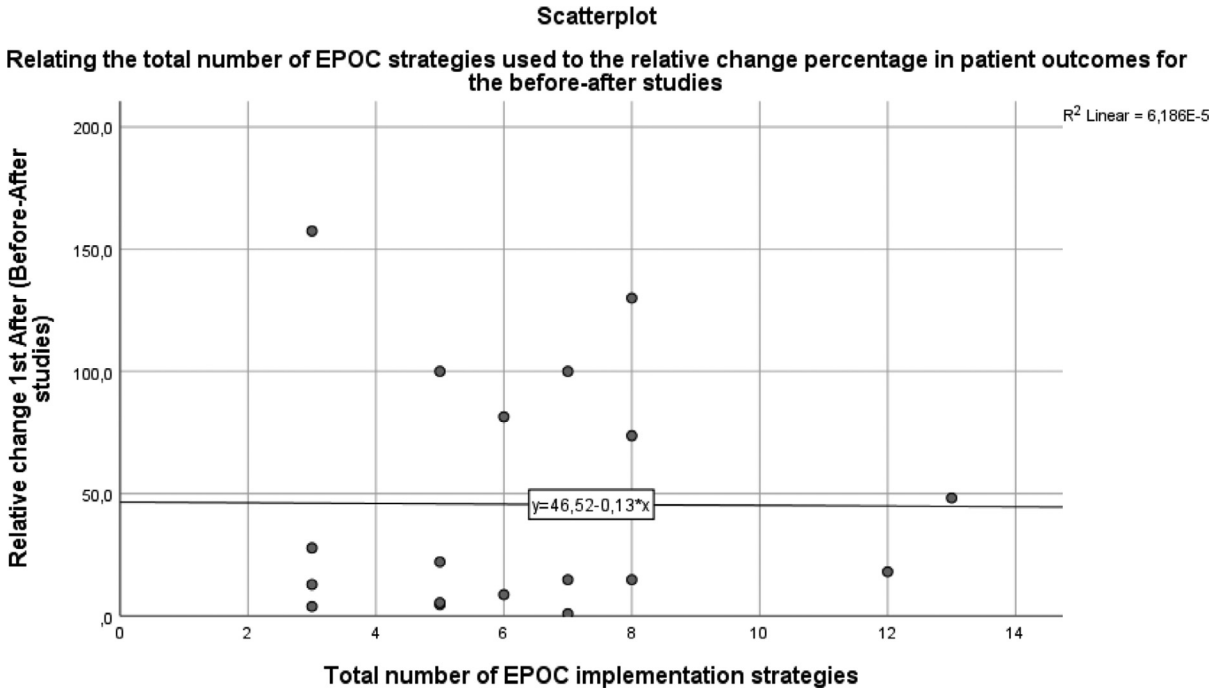

Fig. 3. Scatterplot relating the total number of EPOC implementation strategies used to the relative change percentage in patient-related nursing outcomes for the before-after studies.

We created three groups of studies with comparable patient-related nursing outcomes regarding comparable nursing guidelines. One group consisted of five studies (Beeckman et al., 2013; De Laat et al. 2006; De Laat et al. 2007; Rosen et al., 2006; Koh et al., 2018) regarding pressure ulcers. The median relative change percentage for these studies was 27.8 (IQR 11.1 – 58.3). The outcomes were comparable between these studies, but not exactly derived in the same way. For example, Koh et al., 2018 reported that they measured the incidence of pressure ulcers on the heel only. The other four studies provided no details about the location of pressure ulcers. The second group consisted of four studies (Törma et al. 2014, Giugliani et al., 2010, Johnson et al.2015, Cahil et al. 2014) regarding nutritional intake. The median relative change percentage for these studies was 3.3 (IQR 0.9 – 11.0). The third group consisted of three studies (De Visschere et al. 2012; van der Putten et al. 2013, Ames et al. 2011)

regarding oral care, with a median relative change percentage of 3.3.

3.3.2. Guideline adherence

Guideline adherence was measured in 44 studies, of which 26 (59,1%) showed a significant improvement, fourteen measured no change, and four did not perform statistical tests. Due to the heterogeneity in measuring adherence across all studies, we cannot draw an overall conclusion on the change in adherence rates. For example, several studies measured adherence rates regarding pain management (assessment and/or treatment). Kingsnorth et al. (2015) found a significant and clinically relevant improvement in the documentation of pain scores, from 9% adherence rate at baseline to 100% adherence rate two years later. Dulko et al. (2010) showed an increase in adherence rate for initial comprehensive pain assessment from 1% to 43% ($p = 0.008$).

Twelve of the controlled studies ($n = 15$) measured adherence. In six studies a significant positive effect on adherence was found ($n = 6$); six found no effect ($n = 6$). Thirty-two of the before-after studies ($n = 32$) measured adherence. Twenty studies found a significant positive effect on adherence ($n = 20$), eight found no effect ($n = 8$), and four performed no statistical tests ($n = 4$). When comparing the controlled and before-after studies, we found no significant difference between these groups on effect on adherence (Pearson Chi-Square 0.564, $p>0.05$).

3.3.3. Implementation strategies

Description of the details of the implementation strategies varied widely between studies. Some provided a detailed process description, others just mentioned the type of strategy (e.g., audit and feedback).

Table 2 provides an overview of applied strategies categorized according to the Cochrane Effective Practice and Organisation of Care taxonomy and Supplement 2 provides a detailed description of the implementation strategies. Each study used more than one strategy, with a median of 6 (IQR 4–8). Apart from one study (Dulko et al., 2010), studies applied at least one educational strategy; e.g., educational material ($n = 38$, 71.7%), meeting ($n = 43$, 81.1%), outreach ($n = 10$, 18.9%) or inter-professional education ($n = 14$,26.4%). Next to educational strategies, the use of local opinion leaders ($n = 29$, 54.7%), and audit and feedback ($n = 22$, 41.5%) were regularly applied. Only one study, Rosen et al. (2006) described a governance arrangement, in this case; formal reprimands and subject to termination in case of failing to complete training.

For all studies, the median number of used strategies was 6 (IQR 4 – 8), with a median of 0 for the EPOC category delivery (IQR 0 – 1), and 0 for the EPOC category financial (IQR 0 – 0), and 0 for the EPOC category government arrangements (IQR 0 – 0), and a median of 6 (IQR 4 – 7) for the EPOC category implementation strategies. The median number of strategies in studies measuring patient-related nursing outcomes was 7.0 (IQR 5–8, $n = 21$) for studies which reported a significant improvement, and was 6.0 (IQR 4.5–8.5, $n = 9$) for studies which reported no change. The median number of strategies in studies measuring adherence was 6.0 (IQR 4.8–8, $n = 26$) for studies that reported a significant improvement, and was 6.0 (IQR 4–7, $n = 18$) for studies that reported no change.

Most studies did not apply strategies in the control group, or did not provide a description of usual care. Eight studies (Abraham et al., 2019; Beeckman et al., 2013; Cheateret al., 2006; Köpke et al., 2012; Lockwoodet al., 2018; Lozano et al., 2004; van der Puttenet al., 2013; Ward et al., 2010) applied strategies in the control group, in most cases printed study material or availability of products e.g. providing pH-strips.

3.3.4. Effects of implementation strategies

Fifteen cluster randomized controlled trials studied the effects of specific implementation strategies. The individual strategies and the combinations of strategies applied in these trials varied (Abraham et al., 2019; Beeckman et al., 2013; Cheater et al., 2006; De Visschere et al. 2012, Gomarverdi et al. 2019, Huis et al. 2013, Kopke et al. 2012, Lazano et al. 2004, Rao et al. 2009, Snelgrove-Clarke et al. 2015 Torma et al. 2014, Van der Putten et al. 2013, Van Gaal(a,b) et al. 2011, Van Lieshout et al. 2016, Ward et al., 2010).

For example, two cluster randomized controlled trials, by De Visschere et al. (2012), and van der Putten et al. (2010), described a supervised implementation strategy for an oral hygiene guideline. Both found a decrease of denture plaque after a 6-month follow-up (respectively; $p<0.01$ and $p<0.0001$). Other randomized controlled trials did not use a supervised implementation strategy, which limited the ability to conclude effectiveness of this specific implementation strategy.

Lozano et al. (2004) created three groups to implement an asthma treatment guideline. One group received a peer leader intervention, one received a planned care intervention, and one served as a control group, receiving care as usual. They only found an effect on patient-related nursing outcomes in the planned care intervention group; i.e., a decrease in asthma symptom days per year compared to usual care ($p = 0.02$). We could not compare these outcomes with those of another cluster randomized controlled trial, because no similar implementation strategies were used in other randomized controlled trials.

3.3.5. Barrier assessment

A barrier assessment was performed in twenty-three (43%) studies. 'Nineteen studies explicitly used the outcomes of the barrier assessment to select tailored implementation strategies. Lack of knowledge was the most common found barrier, described by eleven studies (48%). Other barriers were accessibility of products ($n = 6$%), time limitations ($n = 4$%), and lack of leadership/motivation ($n = 4$%). There was no difference in studies who described a positive significant effect on patient-related nursing outcomes or guideline adherence between studies that did or did not perform a barrier assessment. From the studies which measured patient-related nursing outcomes, eleven studies performed a barrier assessment, of which seven reported a positive significant effect on patient-related nursing outcomes, and four did not report a change (Pearson Chi-Square 0.335, df 1, $p = 0.56$). From the studies which measured adherence, nineteen studies performed a barrier assessment, of which twelve showed a positive significant effect on adherence (Pearson Chi-Square 0.229, df 1, $p = 0.63$).

3.3.6. Use of implementation theory, models or frameworks

Seventeen (31%) studies used a theory, model or framework. The Johanna Briggs Institute Getting Research in to Practice model was used in six studies, the Implementation Model of Change by Grol and Wensing in four, and the Promoting Action on Research Implementation in Health Services in two. The Normalisation Process Theory, Knowledge to action model, Theory of Change, AIM model, and Awareness Desire Knowledge Ability Reinforcement (ADKAR) Change management model were used once. Nine of the studies which measured patient-related nursing outcomes used a theory, model or framework, of which six reported a positive significant effect on patient-related nursing outcomes (Pearson Chi-Square 0.68, $p = 0.79$). Sixteen of the studies which measured adherence used a theory, model or framework, of which eight reported a positive significant effect on adherence (Pearson Chi-Square 0. 860, $p = 0.35$).

Table 2
Applied strategies per study categorized with the Cochrane Effective Practice and Organisation of Care taxonomy, reported effect on adherence and patient related nursing outcomes.

Author	Year	Implementation strategies[1]																				Effect	
		Organisational Change	Audit and Feedback	Clinical incident reporting	Monitoring	Communities of practice	Educational materials	Educational meetings	Educational outreach	Inter-professional Education	Local Consensus Process	Local Opinion leaders	Managerial supervision	Patient mediated intervention	Reminders	Routine PROMS	Tailored	Delivery Arrangements	Financial Arrangements	Governance Arrangements	Total number of EPOC implementation strategies	Adherence	Patient-related nursing outcomes
(Cluster) Randomized Controlled Trials																							
Abraham	2019																						
Updated version		1					1	1			1	1			1		1	1 α			9	NC	NC
Concise version		1					1					1			1		1	1 α			7	NC	NC
Control							1														1	NC	NC
Beeckman	2013																						
Intervention (Intrinsic-motivation orientated strategies)			1		1		1	1		1		1			1		1	2¥,α			11	P	P
Control							1	1													2	NC	NC
Cheater	2006																						
Audit and feedback (AF)			1				1														2	NC	NC
Educational outreach (EO)			1				1	1	1								1				6	NC	NC
AF + EO			1				1	1	1								1				5	NC	NC
Control							1														1	NC	NC
De Visschere	2012																						
Intervention (supervised implementation)					1		1	1		1		1		1				1 α			8	–	P
Control																					0	–	NC
Gomarverdi	2019																						
Intervention (multi-component educatio-l)							1	1							1			1 α			5	P	–
Control																					0	NC	–
Huis	2013																						
Team and leaders-directed		1	1		1		1	1			1	1	1		1		1	1 α			11	P	NC
State of the art		1	1				1	1							1			1 α			6	P	NC
Köpke	2012																						
Intervention (guideline-and theory-based multicomponent intervention)		1		1	1		1	1			1	1		1	1		1				11	P	P
Control							1	1													2	NC	NC
Lazano	2004																						
Peerleader intervention							1	1		1				1	1		1	1 α			9		NC
Planned care intervention							1		1			1			1						5		P
Control							1														2		NC
Rao	2009																						
Intervention (infection control team)			1			1		1		1								1 α			6	NC	–
Control																					0	NC	–
Snelgrove-Clarke	2015																						
Intervention (Action learning)								1									1		1 €		4	NC	–
Control																					0	NC	–
Törmä	2014																						
External Facilitator Strategy			1						1									1			4	–	NC
Educational Outreach Visits									1												1	–	NC
Van der Putten	2013																						
Intervention (supervised implementation)					1		1	1				1		1				1 α			7	–	P
Control																		1 α			1	–	NC
Van Gaal(a) & Van Gaal(b)	2011																						
Intervention (education, patient involvement, feedback)			1				1	1				1	1	1			1				8	NC	P
Control																					0	NC	NC
Van Lieshout	2016																						
Intervention (tailored improvement programme)			1				1	1						1			1	1β			7	NC	P
Control																					0	NC	NC

(*Continued on next page*)

Table 2 (*Continued*).

Author	Year	Implementation strategies[1]																			Effect	
		Organisational Change	Audit and Feedback	Clinical incident reporting	Monitoring	Communities of practice	Educational materials	Educational meetings	Educational outreach	Inter-professional Education	Local Consensus Process	Local Opinion leaders	Managerial supervision	Patient mediated intervention	Reminders	Routine PROMS	Tailored	Delivery Arrangements	Financial Arrangements	Governance Arrangements	Total number of EPOC implementation strategies	Adherence	Patient-related nursing outcomes
Ward	2010																						
Intervention (full-time project nurse)								1				1									3	NC	NC
Control															1						1	NC	NC
Before after																							
Seto	1991																						
Opinion leader									1			1					1				4	P	–
Lecture (control)								1													1	NC	–
Opinion leader & Lecture								1	1			1									3	P	–
Ames	2011						1	1						1				1 α			5	–	P
Bale	2004						1	1		1	1			1							6	–	P
Bjartmaz	2017						1	1				1			1						5	P	–
Cabilan	2014		1					1			1	1			1		1				7	NC	–
Cahill	2014		1						1			1					1				5	NC	NC
Choi	2014		1				1	1					1		1		1	1¥			8	P	–
Clark	2001						1	1		1		1									5	P	–
De Laat	2006									1		1						1 α			7	P	P
De Laat	2007						1	1		1		1			1						3	P	P
Downey	2015		1			1		1		1					1						6	NC	–
Duff	2013						1		1		1	1									5	–	NC
Dulko	2010		1					1													3	P	P
Edwards	2007	1						1									1				3	NC	–
Featherston	2018					1	1	1										1 δ			5	P	–
Frigerio	2012						1	1				1									4	P	–
Giugliani	2010							1					1								3	–	P
Habich	2012						1											1¥			3	P	–
Harrison	2005	1						1				1						1			3	–	P
Jagt-van Kampen	2015						1	1													3	NC	–
Johnson	2017	1					1			1	1	1						1 α			7	P	P
Joliffe	2019		1				1	1							1			1 α			6	P	P
Kingsnorth	2015		1				1	1		1		1		1	1						8	P	P
Koh	2018		1				1					1	1		1		1	1			8	P	NC
Lockwood	2018						1	1			1							1 δ			5	P	NC
Lopez	2004						1	1							1						7	–	NC
Lopez	2011		1				1	1				1	1		1			1 α			5	P	P
Paquay	2010		1				1	1				1				1					6	P	P
Pun	2005						1	1							1						4	NC	NC
Reynolds	2016						1		1			1									4	NC	–
Rosen	2006				1		1	1					1		1				1$	1!	8	–	P
Sawas	2014							1				1									3	NC	–
Sipila	2008		1		1		1	1		1	1	1							1£		9	NC	–
Tian	2017	1	1				1	1									1				6	NC	–
Troglic	2019		1		1		1	1	1	1	1	1		1	1		1	1			13	P	P
Van den Boogaard	2009		1				1		1			1			1		1	1 γ			8	P	P
Vander Weg	2017		1				1	1	1			1	1	1	1			2*,γ	1฿		12	–	NC
Zhu	2018						1	1					1	1			1	1 α			7	P	–

Implementation strategies: 1All Cochrane Effective Practice and Organisation of Care taxonomy implementation strategies except: clinical practice guideline (applied in all studies), educational games and continuous quality improvement (applied in none of the studies). Delivery Arrangements: *Self-management support. ¥ - Health information systems. α - Procurement and distribution of supplies. βDisease management. γ - The use of information and communication technology. δ - Care pathway. Financial Arrangements: €Nurses received $50,- per meeting to acknowledge their effort in off-duty meeting. $$75,- for each staff member if the desired reduction in Pressure Ulcer incidence was achieved. $10 for attending training session. £Facilitators per site were motivated by a small financial increment on their monthly salary. ฿For the patients, first $10,- then $20,-. Governance arrangements: !Professional competence. NA Not applicable; NC no change; P positive.

3.3.7. Study duration

The duration of the implementation studies varied widely, from a few weeks up to several years. Some studies used point prevalence measures, others used continuous data. Several studies did not describe the duration and/or interval of the measurements performed. Seventeen studies did not mention the duration of the baseline measurements, twenty-four the implementation phase, and eleven the post-implementation phase.

Overall, amongst the studies providing the respective information, baseline measurements were collected over a median period of three months (IQR 1–6), and the implementation phase lasted a median of three months (IQR 2–9.5). The post-implementation phase had a median duration of 3.5 months (IQR 1.75–6.0). Fourteen studies performed a second post-implementation measurement, with a median duration of 6 months (IQR 3.8–12.8). One study performed a third post-implementation measurement lasting 16 months.

4. Discussion

To our knowledge, this is the first systematic review on the effects of implementation of nursing guidelines in all fields of practice and the used implementation strategies. The broad view across the field of implementation science regarding nursing guidelines identified a diverse range of implementation strategies, combinations of different strategies, guidelines, outcome measures and settings. These findings provide a good reflection of current practices and considerations. We presented the findings as a descriptive and narrative synthesis because a meta-analysis was not possible in view of the heterogeneity of guidelines, implementation and clinical outcomes, the variety of used (combinations of) strategies and the varying timing in follow-up measurements amongst the included studies.

More than half of the studies showed a significant positive effect of the implementation of nursing guidelines on patient-related nursing outcomes and/or adherence to the guideline(s). There was no association between relative change on patient-related nursing outcomes and the number of implementation strategies in total or the use of combined strategies from the different EPOC categories. There was a significant difference in the relative change in favour of the before-after studies, however this seems to be related to the study design. There is not one strategy, or combination of strategies, which can be linked directly to successful implementation. We could not assess whether implementation success was related to the use of a theory, model or framework, performing a barrier assessment or using tailored strategies, due to the small number of studies describing this.

In line with findings from previous reviews (Häggman-Laitila et al., 2017; Thompson et al., 2007), we found that education was the most used strategy to implement evidence-based nursing, and noted that education is less to moderate effective on its own (Forsetlund et al., 2009; Giuere et al., 2012). However, somewhat less than half of the studies that performed a barrier assessment found a lack of knowledge as a barrier. In contrast to other medical professions, nurses are not always –differs per country– required to take continuing education courses to keep their licensing (World Health Organisation, 2019). Taken that into account, it makes sense to apply at least an educational strategy for the implementation of nursing guidelines.

In this review, it was identified that most strategies were quite traditional, such as using posters and written material, instead of apps, screensavers, or educational games. Several studies recommend investing in online and social media, which can substantially advance implementation science (Gatewood et al., 2019; Glasgow et al., 2012; Graham et al., 2019).

The scope of this review was to get a complete overview of strategies used to implement nursing guidelines, and subsequently get insights in the effects of implementation strategies across all settings and guideline topics. We were able to gain insight in the strategies used on a regular basis. Nevertheless, because of the varying strengths and limitations of the included studies, we could not identify a single or combination of implementation strategies that is most effective in getting nursing guidelines into practice. We think that narrowing the scope of settings and guideline topics will not result in better understanding of the effectiveness of implementation strategies. Only a comparison of studies with detailed descriptions of the delivered strategies and the same timeline might achieve this.

4.1. Strength and limitations

This review has several strengths and limitations. First, we are confident that we present a complete overview of implementation studies regarding nursing guidelines. Most studies were found with the initial search strategy. Second, due to the collaboration in data extraction between TR, EI and DS we warranted that the collected data from the individual studies are reliable. Repeated discussion about several implementation strategies led to a better understanding of the individual data, and resulted in a consistent reliable assessment of each included study. Third, for the interpretation of the effectiveness of the implementation strategies the outcomes where dichotomized into effect or no effect for patient-related nursing outcomes or guideline adherence. Using these two primary outcomes to assess the impact of the implementation studies is consistent with Curran et al. (2012). These authors suggest that a dual focus in assessing clinical effectiveness and implementation could speed the translation of research findings in routine practice.

A limitation is the quality of the before-after studies, which resulted in an overall low evidence base, precluding drawing conclusions. Which caused a high risk of bias across all studies, so caution is needed in drawing conclusions.

A second limitation is the probable publication bias, in that studies achieving negative results tend to go unpublished. Still, nearly half of the published studies showed no change.

A third limitation regards the wide variety in degree of details of the used strategies. All described implementation strategies classified according the EPOC taxonomy independent to the provided description and operationalisation of the strategy were considered equally in this study. It can be questioned, however, whether the described implementation strategies were comparable for all studies that used the same type of strategies. The potential lack of comparability may have affected the interpretation of the effects of the implementation strategies. Strategies were poorly described and operationalized; for example, only the type of strategy was provided, such as audit and feedback. We propose that strategies must be precise enough to enable measurement and reproducibility, following the recommendation of Proctor et al. (2013) or using The Standards for Reporting Implementation Studies (StaRI) Statement (Pinnock et al., 2017). These checklists could help standardize the way these studies are described. To fully understand the effect of a strategy such as audit and feedback, information on the extent, the number of audits and the fraction of the participants in the target group must be available.

Fourth, calculating the relative change for controlled studies and before-after studies separately might lead to an overestimation for the before-after studies, and an underestimation for the controlled studies. In some controlled studies there were signs of contamination between groups, what could have caused an effect in the control group, thus leading to an underestimation of the relative change.

Lastly, we found a wide variety in the duration and interval of measurements, and many studies did not provide an indication of their baseline, implementation and/or post-implementation phase, or provided a 'short' follow-up. An adequate follow-up time provides information about the sustainability; i.e., whether the guideline is maintained or institutionalized within a service setting's ongoing, stable operations (Proctor et al., 2011). The problem is of course that research projects are sponsored for a limited period and evaluating the long-term effects are often not feasible.

4.2. Recommendations

We recommend well-designed studies to test the effectiveness of implementation strategies. In future research the implementation details should ideally be reported according to standardized formats, for example as suggested by Proctor et al. (2013) or Pinnock et al. (2017). A more detailed description of the implementation process makes it easier to understand the change mechanism. Abraham et al. (2019) provided a detailed supplemental file containing the components, description and actual dose delivered of their intervention components. This inventory is helpful for future research, but also for clinical practice.

We recommend guideline developers to think about audit criteria while developing a nursing guideline. Most studies described developing an audit criteria checklist as one of their preparations. A predefined audit criteria checklist could help healthcare professionals and organizations in the execution, goal-setting and evaluation of the implementation of nursing guidelines. We noted a lack of goal-setting in most studies. The study of Jolliffe et al. (2019) was one of the exceptions: the goal was for staff to adhere to minimally 75% of applicable guideline indicators per patient prior to commencing the study. When pre-defined audit criteria are available it might be possible to set goals and evaluate the implementation of guidelines without extensive preparations.

Less than half of the studies included in this review performed a barrier assessment, and most were poorly described. Further, we could not relate performing a barrier assessment to a positive effect on the primary outcomes. Four studies that performed a barrier assessment did not state that the identified barriers were used to select the implementation strategies. In line with other reviews, we think that tailoring strategies based on a barrier assessment is important (Baker et al., 2010; Diehl et al., 2016). A barrier assessments can provide crucial information about the context where the implementation will take place. Finding and describing barriers and facilitators in detail can help in choosing adequate implementation strategies, this may increase the effectiveness of the implementation of nursing guidelines.

5. Conclusion

This systematic review provides an extensive, up-to-date review of the implementation of nursing guidelines and the used implementation strategies. More than half of the studies showed a positive significant effect of the implementation of guidelines on patient-related nursing outcomes or guideline adherence. A wide variety of implementation strategies were identified in implementing nursing guidelines. Education is the most frequently used strategy to implement nursing guidelines in practice. Not one single strategy, or combination of strategies, can be linked directly to successful implementation of nursing guidelines. Consistency in reporting of the used implementation strategies and the duration of measurement of the impact of the strategy should be improved in future studies.

Conflict of Interest

None declared.

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Ethical Approval

None declared.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijnurstu.2020.103748.

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