

BMJ Open Can SBAR be implemented with high fidelity and does it improve communication between healthcare workers? A systematic review

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ABSTRACT

Objective To characterise the extent to which health professionals perform SBAR (situation, background, assessment, recommendation) as intended (ie, with high fidelity) and the extent to which its use improves communication clarity or other quality measures.

Data sources Medline, Healthstar, PsycINFO, Embase and CINAHL to October 2020 and handsearching selected journals.

Study selection and outcome measures Eligible studies consisted of controlled trials and time series, including simple before-after design, assessing SBAR implementation fidelity or the effects of SBAR on communication clarity or other quality measures (eg, safety climate, patient outcomes).

Data extraction and synthesis Two reviewers independently abstracted data according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses on study features, intervention details and study outcomes. We characterised the magnitude of improvement in outcomes as small (<20% relative increase), moderate (20%–40%) or large (>40%).

Results Twenty-eight studies (3 randomised controlled trials, 6 controlled before-after studies, and 19 uncontrolled before-after studies) met inclusion criteria. Of the nine studies assessing fidelity of SBAR use, four occurred in classroom settings and three of these studies reported large improvements. The five studies assessing fidelity in clinical settings reported small to moderate effects. Among eight studies measuring communication clarity, only three reported large improvements and two of these occurred in classroom settings. Among the 17 studies reporting impacts on quality measures beyond communication, over half reported moderate to large improvements. These improvements tended to involve measures of teamwork and culture. Improvements in patient outcomes occurred only with intensive multifaceted interventions (eg, early warning scores and rapid response systems).

Conclusions High fidelity uptake of SBAR and improvements in communication clarity occurred predominantly in classroom studies. Studies in clinical settings achieving impacts beyond communication typically involved broader, multifaceted interventions. Future efforts to improve communication using SBAR should first confirm high fidelity uptake in clinical settings rather than assuming this has occurred.

Strengths and limitations of this study

- We undertook this systematic review in accordance with the Cochrane Collaboration standards using a validated tool to assess the quality of identified studies.
- We considered SBAR (situation, background, assessment, recommendation) implementation strategies and its potential impact on fidelity to SBAR, clarity of communication and other quality-related measures.
- The included studies were too heterogeneous to test for publication bias or to perform a meta-analysis.

PROSPERO registration number CRD42018111377.

INTRODUCTION

Analyses of adverse events and other critical incidents commonly identify communication failures between healthcare providers as major contributing factors.^{1–4} Standardised, structured communication techniques have emerged as a potential solution to these recurring problems.^{5,6} The mnemonic SBAR (situation, background, assessment, recommendation) constitutes the most well-known such technique.⁷ Borrowed from the US Navy where it was applied as a hierarchy-flattening approach to communicating situation reports, SBAR was initially adopted in healthcare to guide conversations between nurses and physicians about issues that required immediate attention.^{5,8} SBAR has since been widely promoted, by organisations such as the Institute for Healthcare Improvement⁹ and the National Health Service,¹⁰ to enhance communication.

A recent systematic review drew attention to the mixed impacts of SBAR on patient outcomes and patient safety and the lack of high-quality studies.¹¹ This review usefully highlighted the discordance between the limited evidence supporting SBAR and the

widespread recommendations to use it. Yet, the review only included studies reporting impacts on patient outcomes. While patient outcomes represent the bottom line for any improvement intervention, we do not want to dismiss potentially effective interventions just because they have not yet improved patient outcomes. We do not know, for instance, if the mixed results of SBAR on patient outcomes reflect problems with implementation (eg, SBAR as implemented may not reflect the intended approach to communication). Alternatively, even when implemented as intended, SBAR may not improve communication to an extent sufficient to improve patient outcomes.

In undertaking this systematic review, we sought to characterise gaps in the existing literature for SBAR as a strategy for improving communication and patient safety more generally. We sought to determine the extent to which users perform SBAR as intended (ie, with high fidelity) and the extent to which SBAR improves clarity of communication. We also looked for examples of interventions using SBAR showing impacts on other quality-related measures.

METHODS

We registered the study protocol (CRD42018111377 Available from: http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018111377) in November 2018 following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses recommendation.¹²

Search strategy and study selection

Using the search strategy outlined in appendix A, we searched Medline, Healthstar, PsycINFO, Embase and CINAHL databases for studies evaluating SBAR (or variants of the standard mnemonic). The last search date was 23 October 2020.

We applied the following inclusion and exclusion criteria to all original research articles on SBAR.

Inclusion criteria were:

- ▶ SBAR was taught or implemented as the framework to structure verbal communication between healthcare providers or trainees delivering care to any patient population. We allowed studies of SBAR as a standalone intervention as well as those which explicitly identified SBAR as a component of a multifaceted intervention.
- ▶ Study design of a controlled trial (randomised or not) or time series, including simple before–after studies.
- ▶ Study assessed one of the following eligible outcomes: fidelity to SBAR (eg, measures of adherence to the mnemonic during communication), clarity of communication, clinical outcomes, or measures of quality, such as teamwork and patient safety climate assessed by validated instruments.

For measures of fidelity and clarity of communication, we required assessment by two independent observers. We accepted outcomes ascertained by a single reviewer

if the authors confirmed inter-rater agreement of at least moderate reliability (eg, kappa >0.4) on a subset of at least 10% of total observations. We applied this requirement given the subjective judgments underpinning these measures.

Exclusion criteria were:

- ▶ Studies with no control group (eg, studies reporting only postintervention results for a single group and head-to-head trials of different versions of SBAR).
- ▶ Outcomes obtained solely from incident reporting, given that incident reporting reflects reporting behaviour and safety culture far more than the actual frequency of any given adverse event.¹³
- ▶ Studies from the grey literature or published solely as conference abstracts, as they offered too few details about SBAR training and implementation and also omitted key methodological details such as how communication clarity was judged.

Two reviewers (LL, LR) applied the above criteria in two stages: first independently screening abstracts of retrieved articles and then independently reviewing the full text of each potentially eligible article. Independent screenings of title and abstracts for inclusion achieved excellent inter-rater agreement (kappa=0.81, 95% CI 0.77 to 0.86).¹⁴ Agreement about inclusion at the stage of full-text review also achieved substantial inter-rater agreement (kappa=0.76, 95% CI 0.67 to 0.86).

Quality assessment

Two investigators (LL, LR) independently assessed randomised controlled trials (RCTs) using the six domains from the revised Cochrane risk-of-bias tool for randomised trials¹⁵ and non-RCTs using the seven domains from the Cochrane Risk Of Bias In Non-Randomized Studies of Interventions tool.¹⁶ We resolved disagreements through consensus, involving a third investigator (KS) as needed, and excluded studies judged to have ‘critical risk’ of bias, as recommended by the Cochrane Collaboration.¹⁶ Online supplemental appendix B table 1 lists all studies excluded for critical risk of bias as well as a representative list of other excluded articles along with reasons for their exclusions.

Data extraction and synthesis

Two reviewers (LL, LR) independently abstracted data from included studies onto a piloted data collection form and resolved disagreements through arbitration by a third reviewer (KS). We extracted the first author, year of publication, country, participant profession, clinical setting, study design, type of communication for which SBAR was used, details around SBAR implementation and training, study outcomes and study limitations. For studies reporting impact beyond clarity of communication, we also documented the stated study purpose and any proposed mechanism by which SBAR would influence the selected quality measures. For missing or unclear data elements, we emailed corresponding authors for clarification, receiving 5 responses from 10 such queries.

As outlined in the registered protocol for the review, we planned to undertake quantitative synthesis of included studies if they did not exhibit substantial heterogeneity. Once we saw the wide variation in clinical settings, target populations, study designs, complexity of SBAR interventions and measures of impact in the included studies, we realised that the substantial heterogeneity would preclude quantitative synthesis using meta-analysis. We thus undertook a more qualitative approach to data synthesis. Yet, we still sought to characterise the impact of SBAR interventions more concretely, so defined categories conveying the magnitude of effect reported for each included outcome. We defined relative improvements <20% as 'small', relative improvements in the range of 20%–40% as 'moderate' in size, and improvements >40% as 'large'. For implementation fidelity, we also noted whether the improvement achieved an absolute fidelity threshold of at least 80%. While no well-established threshold for fidelity exists, the potential effect size from any intervention decreases with lower levels of fidelity.¹⁷

RESULTS

The database search retrieved 642 unique citations. After screening titles and abstracts, we reviewed 340 full-text articles, 34 of which met inclusion criteria. We excluded 6

articles judged to have critical risk of bias^{18–23} (see online supplemental appendix B table 1), leaving a total of 28 articles reporting 27 studies (figure 1). These included 3 RCTs,^{24–26} 6 controlled before–after studies,^{27–32} and 19 uncontrolled before-and-after comparisons^{33–51} (table 1). Online supplemental appendix B table 2 presents an overview of the 28 articles, including details of the study purpose and intervention, and outcomes included in the review. For these 28 studies, 5 (18%) had low risk of bias; 1 scored as 'some concerns'; 17 (60%) exhibited moderate risk; and, 5 (18%) had serious risk of bias (online supplemental appendix B figure 1A,B).

Twenty-four studies evaluated the impact of SBAR and/or the fidelity of its implementation in the clinical setting^{24,28–43,45–51} and four in classroom settings.^{25–27,44} Most studies in the clinical setting (20/24; 83%) took place in hospitals, including medical and surgical wards^{27,35,40–42,49,52} and post-anaesthesia care units.^{28,29,33} As shown in table 1, 13 studies used SBAR to improve communications related to changes in patient status or obtaining immediate help with patients.^{24–27,32,38–40,42,44,46,50,51} Other applications included communication during multidisciplinary rounds, handovers between wards, shift change and patient transfers.^{28–30,33–37,41–43,45,47–49} Four targeted more than one type of communication.^{32,41,42,46}

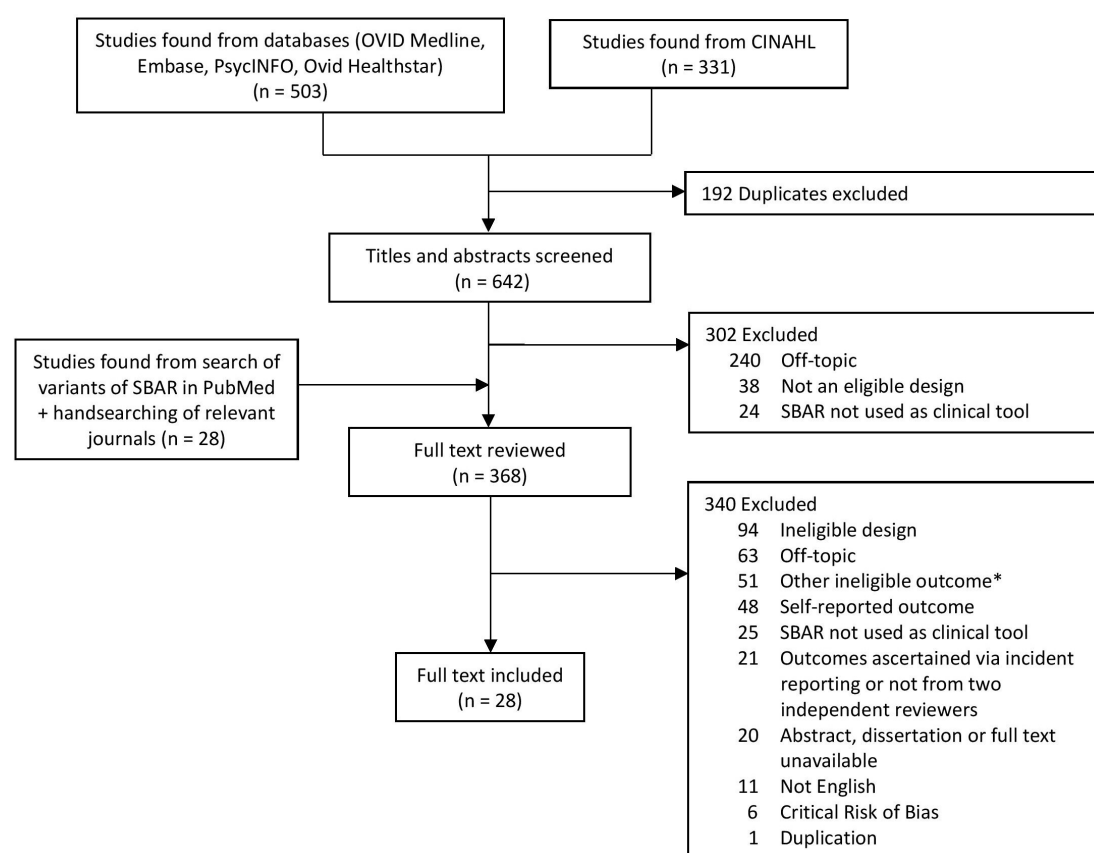


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram of included studies depicting steps of identification, screening, eligibility and inclusion. *Outcomes not of interest, in unreportable format, cannot be disentangle, or no reported outcomes at all. SBAR, situation, background, assessment, recommendation.

Table 1 Characteristics of 28 included articles

Characteristics	N (%)
Country	
USA	9 (32)
Europe	6 (21)
Australia	5 (18)
Canada	4 (14)
Other	4 (14)
Study design	
Randomised controlled trial	3 (11)
Controlled before-and-after	6 (21)
Uncontrolled before-and-after	19 (68)
Type of communication SBAR was applied to improve	
Handover between wards, handover at shift change and patient transfers	16 (57)
Changes in patient status or obtaining immediate help with patients	13 (46)
Other (general communication, multidisciplinary rounds)	3 (11)
Disciplines involved in the communication	
Interdisciplinary	15 (54)
Nurse to physician	12 (80)
Other	3 (20)
Intradisciplinary	15 (54)
Nurse to nurse	9 (60)
Physician to physician	6 (40)
Type of outcomes reported	
Fidelity of SBAR use	9 (32)
In classroom setting	4 (44)
Clarity of communication	8 (28)
In class room setting	3 (38)
Impact beyond communication	17 (61)

Most studies in clinical settings (17/24; 71%) focused on communication involving nurses, including nurse-to-physician,^{24 38–40 42 47 50 51} nurse-to-nurse^{27 33 34 41 42 46 48 49} and nurse-to-allied health communications.⁴¹ Two studies targeted physician-to-physician communication,^{35 45} though four studies in classroom settings aimed to improve communication between trainees and more senior physicians.^{25 26 30 44}

Fidelity to SBAR technique

Nine studies^{25–27 35–37 44 45 47} assessed the degree to which participants used SBAR as intended, including four studies in classrooms and five in clinical settings (table 2). Investigators typically operationalised fidelity as a composite score based on adherence to predetermined elements of the SBAR mnemonic as assessed by two observers. Studies assessing fidelity varied in the time allotted for SBAR training, from as little as 10 min²⁵ to a

full-day session,³⁷ but typically reported training sessions of 30–60 min. Most studies^{25 26 35–37 45} employed reminder aids, such as pocket cards or posters, to facilitate SBAR uptake. All studies in classroom settings^{25–27 44} and three of five in clinical settings^{35 45 47} assessed fidelity to SBAR immediately after training. For the remaining two in clinical settings, one³⁶ assessed fidelity 2 months and another³⁷ 2 years after training. In the clinical setting, the data collection period ranged from 4 weeks to a year.

Three of the four studies of SBAR implementation in classroom settings demonstrated large improvements in fidelity to SBAR,^{26 27 44} whereas all five studies in clinical settings reported small to moderate improvements in fidelity (table 2). Only three studies^{26 37 47} achieved fidelity of at least 80%. One of these studies reported a baseline of 78% fidelity³⁷ so the post-intervention fidelity of 83% constituted a marginal improvement. Only two studies reported large relative improvements in fidelity and also achieved an absolute fidelity of at least 80%.^{26 37} These studies both used role-playing in addition to didactic methods for their SBAR training. Two other studies using role-playing fell short of 80% fidelity but both did report large effect sizes.^{27 44}

Clarity of communication

Eight studies^{25–27 29 35 37 47 51} evaluated the clarity of communication using SBAR (table 3). Half of these studies used implicit assessments^{25 35 37 47} or global ratings of communication. The others judged clarity of communication using explicit criteria, such as conveying specific elements of information^{26 27 37} or recall of information by receivers of communication.^{29 51}

Studies assessing clarity of communication varied in the time allotted for SBAR training, from as little as 10 min²⁵ to a full-day session,³⁷ with most reporting role-playing as part of the training.^{26 27 29 37 51} Most studies employed reminder aids, such as pocket cards or posters, to facilitate SBAR uptake^{25 26 29 35 37 47 51}—one also had the SBAR template clinically embedded in the workflow.³⁵

Six studies assessed both clarity of communication and fidelity to SBAR.^{25–27 35 37 47} The studies in the classroom setting^{25–27} demonstrated moderate to large improvements in clarity of communication, with the level of fidelity reached ranging from 71% to 87%. In contrast, studies in clinical settings^{35 37 47} demonstrated no improvement to moderate improvements in clarity, with fidelity ranging from 53% to 83%.

Impacts beyond communication

Seventeen studies^{24 28 30–34 38–43 46 48–50} reported the impact of SBAR on quality measures beyond clarity of communication (see online supplemental appendix B table 3). Unfortunately, none of these studies also assessed communication clarity or fidelity.

Ten studies reported on patient outcomes,^{24 30 38–43 48 50} including mortality,^{39 40 42} unplanned ICU admissions,^{40 42} cardiac arrests,^{40 43} adverse events,^{24 30} hospital readmission,⁴¹ urinary catheter

Table 2 Studies evaluating fidelity of SBAR uptake

Author, year	Main intervention	Fidelity measure	Time of fidelity assessment post training	Reported results	Magnitude of improvement (qualitative size)	Fidelity reached 80%?
Classroom-based studies						
Cunningham <i>et al</i> 2012 ²⁵	10-min 1-on-1 didactic SBAR training for 69 junior physicians on medical/surgical wards and emergency departments for physician-physician telephone referral	Total item score of SBAR elements from 66 audio recordings	Immediately after training	SBAR exposure: 8.5 versus control: 8.0 on 12-point scale, p=0.051	6% (Small)	No (71%)
Marshall <i>et al</i> 2009 ²⁶	40-min ISBAR training (including role playing) for 17 teams of medical students for physician-physician telephone referral	Total item score of ISBAR elements from 17 video and audio recordings	Immediately after training	SBAR exposure: 17.4 versus control: 10.2 on 20-point scale, p=0.001	71% (Large)	Yes (87%)
McCrony <i>et al</i> 2012 ⁴⁴	45-min didactic ABC-SBAR training for 26 paediatric interns for physician-physician communication for immediate help for patient	Total item score of ABC-SBAR elements and format from 52 video recordings	Immediately after training	3.1 to 7.8 on 10-point scale, p<0.001	152% (Large)	No (78%)
Uhm <i>et al</i> 2019 ²⁷	4-hour SBAR training (including role-playing) embedded in 1-week practicum for 81 nursing students for nurse-physician communication for help for patient	Total item score of SBAR elements from 81 audio recordings	Immediately after training	SBAR exposure: 17.6 versus control: 9.0 on 24-point scale, p<0.001	96% (Large)	No (74%)
Studies in clinical setting						
Shahid <i>et al</i> 2020 ⁴⁷	Implementation of a modified SBAR tool and didactic training with videos for 10 nurses over 1 month for nurse-physician communication during interfacility neonatal transports	Total item score of SBAR elements from 165 audio recordings	Assessment began immediately after training but was ongoing over 1 year period	21.7 to 30.2 on 38-point scale, p<0.001	39% (Moderate)	Yes (80%)
Smith <i>et al</i> 2018 ³⁵	SBAR-DR implementation, electronic handover template, and 30min didactic training with videos and demonstrations for 68 physicians in emergency department for physician-physician telephone communication at admission handover	Total item score of SBAR-DR elements and format from 220 audio recordings	Assessment began immediately after training but was ongoing over 60-day period	7.6 to 8.4 on 16-point scale, p=0.009	12% (Small)	No (53%)
Thompson <i>et al</i> 2011 ⁴⁵	ISBAR implementation and 1-hour training held at 4 separate times for 44 junior medical officers over 4 weeks for physician-physician at after-hour handover on in-patient ward	Total item score of ISBAR elements from 63 audio recordings	Assessment began immediately after training but was ongoing over 4 week period	9.2 to 10.4 on a 19-point scale, p=0.004	13% (Small)	No (55%)
Uhm <i>et al</i> 2018 ³⁶	SBAR implementation and didactic training (duration not reported) for 102 nurses for nurse-nurse handover from paediatric cardiac ICU to cardiac ward	Total item score of SBAR elements from 59 audio recordings	Assessment began 2 months after training but was ongoing over 40-day period	2.3 to 2.9 on 4-point scale, p<0.001	25% (Moderate)	No (73%)
Wilson <i>et al</i> 2017 ³⁷	SBAR implementation and full day training (including role playing) over 1 month for nurses-physician-respiratory therapist communication during interfacility neonatal and paediatric transports	Total item score of SBAR elements from 187 audio recordings	Assessment began 2 years after training but was ongoing over 7 month period	7.0 to 8.3 on 10-point scale, p<0.001	19% (Small)	Yes (83%)

ABC-SBAR, airway, breathing, circulation followed by SBAR; ICU, Intensive Care Unit; ISBAR, Identification of self followed by standard SBAR; SBAR, situation, background, assessment, recommendation; SBAR-DR, Situation, Background, Assessment, Responsibilities & Risk, Discussion & Disposition, Read-back & Record.

Table 3 Effect of SBAR on clarity of communication

Author, year	Study design	SBAR training	Objective of communication	Measure of quality of communication	Reported results	Relative improvement (qualitative size)
Classroom-based studies						
Cunningham <i>et al</i> 2012 ²⁵	RCT	10-min didactic session explaining the SBAR method of clinical handover and its application in telephone referrals immediately prior to test scenario	Contacting senior member of staff via telephone (medical or surgical registrar) to refer a medical patient with chest pain or surgical patient with abdominal pain	Implicit assessment: ability 'to get the message across' as measured by 4-point scale for poor, fair, good or excellent as judged by a senior clinician reviewing 66 audio recordings, with a second clinician independently reviewing 30%	SBAR exposure: 3.0 versus control: 2.0 on 4-point scale, p=0.003	50% (Large)
Marshall <i>et al</i> 2009 ²⁶	RCT	40-min ISBAR training (including role-playing) for 17 teams of medical students learning how to communicate in telephone referrals to more senior physicians	Contacting senior colleague via telephone for assistance with management of an unstable trauma patient in high fidelity simulation centre	Explicit assessment: clarity and delivery of communication as measured by rating referral according to the presence of elements of quality (eg, coherence, conciseness, etc) as judged by senior clinician reviewing 17 video and audio recordings (a second clinician reviewed first half to ensure adequate agreement)	SBAR exposure group had higher score on 5-point scale for clarity as measured by Spearman rank correlation ($r=0.903$), p=0.001	N/A (large based on r statistic >0.5)
Uhm <i>et al</i> 2019 ²⁷	Controlled before–after	4-hour SBAR training (including role-playing) embedded in 1-week practicum for nursing students for various nurse–physician communications	Notifying physician about patient's status of bronchiolitis with desaturation or acute gastroenteritis with severe dehydration	Explicit assessment: clarity of communication according to presence of elements of quality (eg, coherence, conciseness, etc) as judged by two investigators independently reviewing 81 audio recordings	SBAR exposure: 29.9 versus control: 22.4 on 40-point scale, p<0.001	33% (Moderate)
Studies in clinical setting						
Randmaa <i>et al</i> 2016 ²⁸	Controlled before–after	SBAR Implementation and 2.5-hour training (including role-playing) for nurses and physicians for nurse–nurse communication at rounds or shift change and nurse–physician communication at rounds or handover	Nurse–nurse communication at rounds or shift change and nurse–physician communication at rounds or handover	Explicit assessment: percentage of recalled information sequences by receivers as measured by counting identified sequences from 164 audio recordings and observations	SBAR exposure: 43.4% to 52.6% - (\uparrow 9.2%) Control: 51.3% to 52.6% - (\uparrow 1.3%) Not significant (p value not reported)	18% (Small)
Shahid <i>et al</i> 2020 ²⁷	Uncontrolled before–after	Implementation of a modified SBAR tool and didactic training with videos for 10 nurses for nurse–physician communication during interfacility neonatal transports	Neonatal transport cases	Implicit assessment: global rating score as measured by rating the quality of the handover using 165 audio recordings	3.0 to 3.9 on 5-point scale, p<0.001	30% (Moderate)
Smith <i>et al</i> 2018 ³⁵	Uncontrolled before–after	SBAR-DR implementation and 30-min didactic training with videos and demonstrations for 68 physicians in emergency department for physician–physician telephone communication at admission handover	Physician–physician telephone communication at admission handover	Implicit assessment: global rating score as measured by rating on an anchored scale using 220 audio recordings	2.9 to 3.1 on 5-point scale, p=0.236	5% (Small)

Continued

Table 3 Continued

Author, year	Study design	SBAR training	Objective of communication	Measure of quality of communication	Reported results	Relative improvement (qualitative size)
Viltos and Kamara 2016 ⁵¹	Uncontrolled before-after	Implementation of a modified SBAR tool and training (including role-play) for nurses for nurse-physician communication between ward staff and physicians on duty	Contacting physician on duty via telephone for triaging cases	Explicit assessment: percentage of physicians given adequate information to safely triage cases measured using 103 audited calls	58% to 84%, p value not reported	45% (Large)
Wilson et al 2017 ³⁷	Uncontrolled before-after	SBAR implementation with reminder tools and full-day training (including role-playing) for nurses-physician-respiratory therapist communication during interfacility neonatal and paediatric transports	Paediatric transport cases	Explicit assessment: integration of content as measured by scoring on tool for related items using 187 audio recordings Implicit assessment: global rating score as measured by rating the handover using 187 audio recordings	7.3 to 8.4 on 10-point scale, p<0.001 3.4 to 3.9 on 5-point scale, p<0.001	16% (Small) 15% (Small)

ISBAR, identification of self followed by SBAR; RCT, randomised controlled trial; SBAR, situation, background, assessment, recommendation; SBAR-DR, Situation, Background, Assessment, Responsibilities & Risk, Discussion & Disposition, Read-back & Record.

removal⁴¹ and patient satisfaction,^{41 48} among others. Of these 10 studies, 7 reported moderate or large improvements for at least one outcome.^{39–43 48 50} In five of these studies, SBAR constituted just one facet of broader, intensive initiatives that included a structured process to assess patient status, such as an early warning system protocol^{39 40 42 43} or readmission risk assessment and daily interdisciplinary rounds⁴¹ that may in itself have greater power to influence such patient outcomes.

Two studies reported on changes in provider behaviours, including small relative improvements in duplicated, cancelled and wrong patient order entries,³⁰ and a large relative improvement (8.3% to 16.7%, p<0.001) in the recognition of adverse events by nurses in postanaesthesia care units.³³ Two studies measured organisational efficiency, reporting large relative improvements (though without testing for significance) in some measures of bed assignment and patient turnover.^{34 49}

Five studies reported on teamwork,^{38 46} safety climate^{28 38 46} and patient safety culture.^{31 32} Two studies^{28 38} reported a small significant improvement in safety climate and moderate significant improvement in teamwork. Two studies found small to moderate significant improvements in patient safety culture dimensions of organisational learning, feedback and communication about error, and teamwork across hospital units.^{31 32}

DISCUSSION

Overall, we found that teaching SBAR technique to healthcare providers can promote high fidelity uptake. Importantly, however, studies of SBAR implementation reporting large improvements in fidelity^{26 27 44} all occurred in classroom settings. Conversely, the five studies assessing SBAR fidelity in clinical settings reported small to moderate improvements. Only two studies,^{26 37} both in the classroom setting, reported large relative improvements in fidelity and also achieved an absolute fidelity of at least 80%, a minimum fidelity suggested for intervention impact.⁵³

Additionally, we found that teaching the SBAR technique to healthcare providers can improve clarity of communication, in both classroom and clinical settings. Most of the studies in the classroom setting demonstrated large improvements in clarity, whereas four of the five studies in the clinical setting reported only small to moderate improvements.^{29 35 37 47} These findings suggest greater challenges of improving clarity of communication in the clinical setting compared with the classroom, potentially related to increased distractions and competing priorities inherent in clinical practice. The better results from classroom-based studies may also indicate a recency effect. Classroom studies assessed outcomes immediately after training. Studies in clinical settings necessarily measured outcomes, including fidelity of uptake and clarity of communication, over weeks to months. It is also possible that a greater Hawthorne effect occurred in classroom-based evaluations compared with studies in clinical settings.

Six of the included studies measured both fidelity to SBAR and clarity of communication, and their results again highlighted the difference between studies in classrooms versus clinical settings. Classroom-based studies achieved levels of fidelity ranging from 71% to 87% and reported moderate to large improvements in clarity of communication. Again, this difference may reflect the immediacy of the fidelity assessments following training in the classroom-based studies and/or a greater Hawthorne effect. The studies in clinical settings^{35 37 47} demonstrated no improvement to moderate improvements in clarity, with fidelity ranging from 53% to 83%.

The lesser improvements in communication clarity seen in studies from clinical settings suggest the need for establishing higher levels of fidelity to SBAR as intended. Proceeding directly to implementation without confirming fidelity, or exposing clinicians to SBAR solely in classroom settings, seems unlikely to produce the intended improvements in communication. None of the SBAR interventions included in this review incorporated audits or other monitoring of SBAR use, potentially limiting impact of SBAR on both communication and quality of care.⁵⁴

The challenges of achieving clinically impactful improvements in clarity of communication may, in part, explain our findings and others¹¹ that there are mixed impacts of SBAR on outcomes beyond communication. SBAR education and implementation positively enhanced safety culture and teamwork,^{28 31 32 38} while the relationship with other clinical outcomes was less straightforward. Studies that embedded SBAR as a component of a larger initiative, such as an early warning system protocol^{39 40 42 43} or readmission risk assessment and daily interdisciplinary rounds,⁴¹ demonstrated larger impacts on patient outcomes, compared with those that implemented SBAR on its own. Unfortunately, none of the studies aimed at outcomes beyond communication^{24 28 30–34 38–43 46 48 49} assessed SBAR fidelity or clarity of communication. Thus, we cannot know if the multifaceted interventions achieved their impacts because they implemented SBAR successfully or because of the other components of these interventions, such as early warning scores and rapid response systems.

Limitations

A limitation of this study is the variable quality of research in this domain. One frequently cited study¹⁸ lacked basic information about the basis for choosing the outcomes reported and how relevant data were obtained. Even after excluding that study and five others with critical risk of bias, 60% of included studies exhibited moderate risk of bias and 18% had high risk. Another limitation of the study is the heterogeneity in the types of communication activities targeted, compounded by variation in the interventions—from SBAR on its own to SBAR as just one part of an intensive multifaceted initiative. A final limitation is the likelihood of publication bias, such that additional studies reporting poor fidelity or no improvements in communication clarity may have gone unpublished.

CONCLUSION

Our study adds to the growing consensus that the impact of SBAR is variable. We provide a more nuanced analysis of reasons for these findings by showing that uptake of SBAR with high fidelity cannot be taken for granted. Fidelity appears reasonably easy to achieve in classroom settings. But, studies in clinical contexts either did not achieve sufficient improvements in fidelity or they simply skipped assessing it. Organisations have promoted the use of SBAR for a range of communication and nurses are often told to use it in all clinical communications. If organisations want to achieve the intended impact of SBAR, they need to attend to its implementation and ongoing monitoring. As with any improvement intervention, one cannot assume that uptake will occur smoothly or as intended.

Contributors LL: provided the conception and design of the study, supplied the acquisition of data, provided analysis and interpretation of data, drafted the article, revised it critically for important intellectual content, and gave final approval of the version to be submitted; LR: provided analysis and interpretation of data, drafted the article, revised it critically for important intellectual content, and gave final approval of the version to be submitted; KS: provided analysis and interpretation of data, revised it critically for important intellectual content, and gave final approval of the version to be submitted. LL is the guarantor.

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Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

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Supplementary Materials

Appendix A. Full search strategy (completed on October 23, 2020)

1) Database

Ovid MEDLINE: Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE® 1946-Present, **Embase Classic+Embase** 1947 to 2020 October 22, **PsycINFO** 1806 to October Week 2 2020, **Ovid Healthstar** 1966 to August 2020

	Searches	Results
1	sbar.mp.	798
2	(situation adj4 background adj4 assess* adj4 recommend*).mp.	640
3	1 or 2	965
4	remove duplicates from 3	503

CINAHL

	Searches	Results
S1	(MH "SBAR Technique")	142
S2	TX sbar	389
S3	TX (situation N4 background N4 assess* N4 recommend*)	219
S4	S1 OR S2 OR S3	432
	Limited to Academic Journals	331

2) Hand search:

Variants of SBAR (ISBAR, ISBARR, ISoBAR, ISBARQ, SBARR) were hand searched as keywords within Pubmed, retrieving 48 results (25 after dedup).

Relevant journals in quality improvement and patient safety (BMJ Quality and Safety, Journal of Patient Safety, International Journal for Quality in Health Care, American Journal of Medical Quality, Journal for Healthcare Quality, and The Joint Commission Journal of Quality and Patient Safety) searched for SBAR as keyword, retrieving 3 results not found from database searches.

Appendix B: Supplementary Tables and Figures

Supplementary Table 1 Representative excluded studies and reasons for exclusion

Study	Reason for Exclusion
Campbell D, Dontje K. Implementing Bedside Handoff in the Emergency Department: A Practice Improvement Project. <i>J Emerg Nurs</i> . 2019;45(2):149-154.	Critical risk of bias
Christie P, Robinson H. Using a communication framework at handover to boost patient outcomes. <i>Nurs Times</i> . 2009;105(47):13-15.	Critical risk of bias
Freitag M, Carroll VS. Handoff communication: using failure modes and effects analysis to improve the transition in care process. <i>Qual Manag Health Care</i> . 2011;20(2):103-109.	Critical risk of bias
Haig KM, Sutton S, Whittington J. SBAR: a shared mental model for improving communication between clinicians. <i>Jt Comm J Qual Patient Saf</i> . 2006;32(3):167-175	Critical risk of bias
Hamilton P, Gemeinhardt G, Mancuso P, et al. SBAR and nurse-physician communication: Pilot testing an educational intervention. <i>Nurs Adm Q</i> . 2006;30(3):295-299.	Critical risk of bias
Martin HA, Ciurzynski SM. Situation, background, assessment, and recommendation—Guided huddles improve communication and teamwork in the emergency department. <i>J Emerg Nurs</i> . 2015;41(6):484-488.	Critical risk of bias
Ashcraft AS, Owen DC. Comparison of standardized and customized SBAR communication tools to prevent nursing home resident transfer. <i>Appl Nurs Res</i> . 2017;38:64-69.	Ineligible design (head-to-head comparison with no control)
Compton J, Copeland K, Flanders S, et al. Implementing SBAR across a large multihospital health system. <i>Jt Comm J Qual Patient Saf</i> . 2012;38(6):261-268.	Ineligible design (post-intervention data with no control)

Fabila TS, Hee HI, Sultana R, Assam PN, Kiew A, Chan YH. Improving postoperative handover from anaesthetists to non-anaesthetists in a children's intensive care unit: the receiver's perception. <i>Singapore Med J.</i> 2016;57(5):242-253.	Ineligible design (head-to-head comparison of SBAR techniques with no control)
Vardaman JM, Cornell P, Gondo MB, Amis JM, Townsend-Gervis M, Thetford C. Beyond communication: the role of standardized protocols in a changing health care environment. <i>Health Care Manage Rev.</i> 2012;37(1):88-97.	Ineligible design (qualitative)
van der Wulp I, Poot EP, Nanayakkara PWB, Loer SA, Wagner C. Handover Structure and Quality in the Acute Medical Assessment Unit: A Prospective Observational Study. <i>J Patient Saf.</i> 2019;15(3):224-229.	Ineligible design (post-intervention data with no control)
Zabar S, Adams J, Kurland S, et al. Charting a Key Competency Domain: Understanding Resident Physician Interprofessional Collaboration (IPC) Skills. <i>J Gen Intern Med.</i> 2016;31(8):846-853.	Ineligible design (post-intervention data with no control)
Blyth C, Bost N, Shiels S. Impact of an education session on clinical handover between medical shifts in an emergency department: A pilot study. <i>Emerg Med Australas.</i> 2017;29(3):336-341.	No eligible outcome (only one observer judged fidelity to SBAR)
Bowling AM. The effect of simulation on skill performance: a need for change in pediatric nursing education. <i>J Pediatr Nurs.</i> 2015;30(3):439-446.	No eligible outcome (only one observer judged fidelity to SBAR)
Brust-Sisti LA, Sturgill M, Volino LR. Situation, background, assessment, recommendation (SBAR) technique education enhances pharmacy student communication ability and confidence. <i>Curr Pharm Teach Learn.</i> 2019;11(4):409-416.	No eligible outcome (only one observer judged clarity of communication)
Cornell P, Gervis MT, Yates L, Vardaman JM. Improving shift report focus and consistency with the situation, background, assessment, recommendation protocol. <i>J Nurs Adm.</i> 2013;43(7-8):422-428.	No eligible outcome (focused on average time for shift reports)

Eberhardt S. Improve handoff communication with SBAR. <i>Nursing</i> . 2014;44(11):17-20.	No eligible outcome (focused on compliance with documentation)
Fahim Yegane SA, Shahrami A, Hatamabadi HR, Hosseini-Zijoud SM. Clinical Information Transfer between EMS Staff and Emergency Medicine Assistants during Handover of Trauma Patients. <i>Prehosp Disaster Med</i> . 2017;32(5):541-547.	No eligible outcome (only one observer judged fidelity to SBAR)
Halterman RS, Gaber M, Janjua MST, Hogan GT, Cartwright SMI. Use of a Checklist for the Postanesthesia Care Unit Patient Handoff. <i>J Perianesth Nurs</i> . 2019;34(4):834-841.	No eligible outcome (only one observer judged fidelity and communication outcomes)
Joffe E, Turley JP, Hwang KO, Johnson TR, Johnson CW, Bernstam EV. Evaluation of a problem-specific SBAR tool to improve after-hours nurse-physician phone communication: a randomized trial. <i>Jt Comm J Qual Patient Saf</i> . 2013;39(11):495-501.	No eligible outcome (only one observer judged fidelity to SBAR)
Kitney P, Tam R, Bennett P, Buttigieg D, Bramley D, Wang W. Handover between anaesthetists and post-anaesthetic care unit nursing staff using ISBAR principles: A quality improvement study. <i>Journal of Perioperative Nursing in Australia</i> . 2017;35(1):13-18.	No eligible outcome (only one observer judged communication outcomes)
Lautz AJ, Martin KC, Nishisaki A, et al. Focused Training for the Handover of Critical Patient Information During Simulated Pediatric Emergencies. <i>Hosp Pediatr</i> . 2018;8(4):227-231.	No eligible outcome (only one observer judged clarity of communication)
Moseley BD, Smith JH, Diaz-Medina GE, et al. Standardized sign-out improves completeness and perceived accuracy of inpatient neurology handoffs. <i>Neurology</i> . 2012;79(10):1060-1064.	No eligible outcome (self-reported knowledge and attitudes to SBAR)

Panesar RS, Albert B, Messina C, Parker M. The Effect of an Electronic SBAR Communication Tool on Documentation of Acute Events in the Pediatric Intensive Care Unit. <i>Am J Med Qual.</i> 2016;31(1):64-68.	No eligible outcome (focused on documentation quality for event notes)
Ramasubbu B, Stewart E, Spiritoso R. Introduction of the identification, situation, background, assessment, recommendations tool to improve the quality of information transfer during medical handover in intensive care. <i>J Intensive Care Soc.</i> 2017;18(1):17-23.	No eligible outcome (focused on documentation compliance and quality)
Raymond M, Harrison MC. The structured communication tool SBAR (Situation, Background, Assessment and Recommendation) improves communication in neonatology. <i>S Afr Med J.</i> 2014;104(12):850-852.	No eligible outcome (only one observer judged fidelity to SBAR)
Stevens N, McNiesh S, Goyal D. Utilizing an SBAR Workshop With Baccalaureate Nursing Students to Improve Communication Skills. <i>Nurs Educ Perspect.</i> 2020;41(2):117-118.	No eligible outcome (self-reported knowledge and attitudes to SBAR)
Toru V, Anggorowati, Santoso A. Effects of SBAR communication through telephone on the improvement of effective communication in implementing the patient safety program. <i>Pakistan Journal of Medical & Health Sciences</i> 2018;12(3):1334-1339.	No eligible outcome (only one observer judged communication outcomes)
Woodhall LJ, Vertacnik L, McLaughlin M. Implementation of the SBAR communication technique in a tertiary center. <i>J Emerg Nurs.</i> 2008;34(4):314-317.	No eligible outcome (self-reported knowledge and attitudes to SBAR)
Yu M, Kang KJ. Effectiveness of a role-play simulation program involving the sbar technique: A quasi-experimental study. <i>Nurse Educ Today.</i> 2017;53:41-47.	No eligible outcome (only one observer judged SBAR fidelity and clarity communication)

Supplementary Table 2. Study characteristics and outcomes

Author, Year	Study design	Setting	Study purpose and intervention	Type of communication	Outcome(s) included in review
<i>Classroom-based studies*</i>					
Cunningham, 2012 ²⁵	RCT	University-affiliated hospital in Australia (Classroom)	To determine if teaching SBAR to junior doctors improves the quality of telephone referrals to more senior consulting physicians	Intradisciplinary (physician-physician) communication over telephone for help with patient	Fidelity of SBAR use Clarity of Communication
Marshall, 2009 ²⁶	RCT	Medical school in Australia (Classroom)	Teach ISBAR to final year medical students to improve how they communicate key clinical information in telephone referrals to consultant physicians	Intradisciplinary (physician-physician) telephone communication from students seeking help with patient management from supervising physicians	Fidelity of SBAR use Clarity of Communication
McCrory, 2012 ⁴⁴	Uncontrolled before-after	Academic medical centre in US (Classroom)	To improve communication between pediatric residents about deteriorating patients by teaching them a modified version of SBAR	Intradisciplinary (physician-physician) communication between pediatric residents calling rapid response team	Fidelity of SBAR use
Uhm, 2019 ²⁷	Controlled before-after	Nursing school and hospital in South Korea (Classroom)	To use experiential learning focused on SBAR to improve communication clarity and effectiveness for final-year nursing students concerning changes in patient status to physicians	Interdisciplinary (nurse-physician) for communicating potentially concerning changes in patient status	Fidelity of SBAR use Clarity of Communication
<i>Studies in clinical setting</i>					
Abbaszade, 2020 ⁴⁸	Uncontrolled before-after	Coronary care units at 2 public hospitals in Iran	To improve quality of nursing care by implementing SBAR at bedside nursing shift change	Intra disciplinary (nurse-nurse) communication for bedside shift change	Impact beyond communication • patient satisfaction
Andreoli, 2010 ³¹	Controlled before-after	Two clinical units in a rehabilitation hospital at an academic medical center in Canada	To use SBAR to improve team communication related to falls risk assessment, prevention and management	Intradisciplinary and interdisciplinary - communication within clinical team (nurses, physicians, allied health professionals, unit managers, and non-clinical support staff) around fall prevention	Impact beyond communication • teamwork & patient safety climate
Beckett, 2013 ⁴³	Uncontrolled before-after	Large regional hospital in Scotland	To reduce unexpected cardiac arrests on hospital wards through a multifaceted intervention including an early warning system, other safety initiatives, and use of SBAR for communication during nursing handover	Intradisciplinary (nurse-nurse) communication during handover at change of shift	Impact beyond communication • cardiac arrest rate • cardiac arrest calls to team • 30-day mortality

Beckett, 2009 ⁴⁶	Uncontrolled before-after	5 pediatric and perinatal services units at community hospital in US	To improve communication, teamwork, staff satisfaction, and improved patient quality and safety by teaching SBAR to nurses and physicians from 5 units in pediatric/perinatal services department for handover	Interdisciplinary (nurse-physician) communication over telephone about urgent patient issues and intradisciplinary (nurse-nurse) during in-person for handover at shift change	Impact beyond communication <ul style="list-style-type: none"> • teamwork & safety climate
De Meester, 2013 ⁴²	Uncontrolled before-after	16 medical and surgical wards at a tertiary hospital in Belgium	To use SBAR to improve communication during nurse handover as well as calls to physicians about deteriorating patients as the second phase in an initiative that first implemented a rapid response team and modified early warning score	Intradisciplinary (nurse-nurse) and interdisciplinary (nurse-physician) communication during handover at nursing change of shift and telephone calls to physicians about potentially deteriorating patients	Impact beyond communication <ul style="list-style-type: none"> • unplanned ICU admissions • unexpected deaths
Field, 2011 ²⁴	RCT	26 Nursing homes in US	To improve anticoagulation management of nursing home residents by implementing a protocol involving SBAR to facilitate structured telephone communication between nurses and physicians	Interdisciplinary (nurse-physician) telephone communication over possible changes to warfarin dosing given current laboratory results and relevant clinical details	Impact beyond communication <ul style="list-style-type: none"> • quality of anticoagulation management
Leonard, 2019 ⁵⁰	Uncontrolled before-after	Privately owned Medicaid licensed home care agency in US	To improve management of care for heart failure patients by implementing modified SBAR communication tool	Interdisciplinary (nurse-physician) communication between home health nurse and physician	Impact beyond communication <ul style="list-style-type: none"> • referrals to ED • acute HF admissions
Ludikhuizen, 2015 ⁴⁰	Uncontrolled before-after	Medical and surgical units at 12 university and non-teaching hospitals in The Netherlands	To improve timely recognition and management of deteriorating ward patients by implementing rapid response team, modified early warning score, and structured communication using SBAR	Interdisciplinary (nurse-physician) communication ward nurses requesting help for patients with concerning early warning scores and physicians on medical emergency team	Impact beyond communication <ul style="list-style-type: none"> • composite of cardiopulmonary arrest, unplanned ICU admission, or death • cardiopulmonary arrest • unplanned ICU admission • death
Mullany, 2016 ³⁹	Uncontrolled before-after	University-affiliated tertiary Hospital in Australia	To improve recognition and management of deteriorating ward patients by implementing a rapid response system including a medical emergency team, use of a modified early warning score and ISBAR tool for communication	Interdisciplinary (nurse-physician) communication between ward nurse requesting help and physician on medical emergency team	Impact beyond communication <ul style="list-style-type: none"> • hospital mortality • in-hospital cardiac arrest • emergency ICU admissions

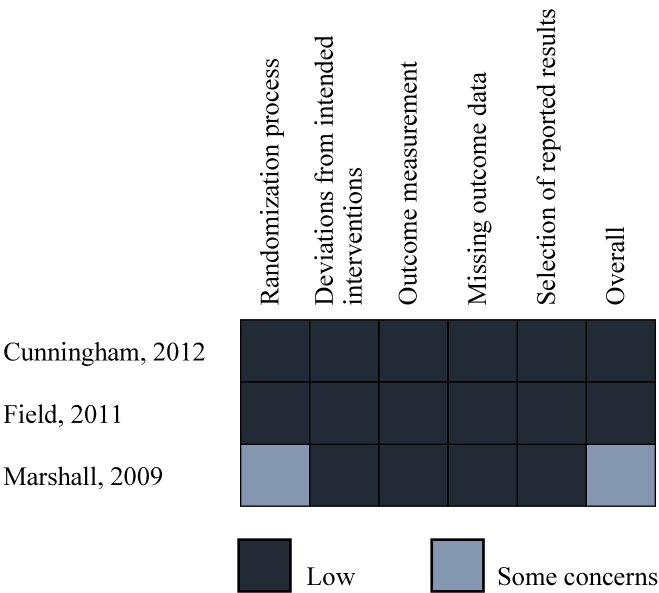
Potts, 2018 ³⁴	Uncontrolled before-after	Academic medical centre in US	To improve handover from the ED to medical units receiving newly admitted patient by changing from unstructured verbal handover to structured tool informed by SBAR and embedded in electronic medical record	Intradisciplinary (nurse-nurse) communication between ED nurse and nurse on medical ward	Impact beyond communication • efficiency of patient flow
Randmaa, 2014 ²⁸ & 2016 ²⁹	Controlled before-after	2 Hospitals in Sweden	To evaluate the effects of structured communication using SBAR on post-operative handover	Interdisciplinary handover communication from operating room personnel (nurses or physicians) to nurses in post-anaesthesia care unit	Clarity of Communication Impact beyond communication • teamwork & safety climate • incident reports involving communication errors
Sermersheim, 2020 ⁴⁹	Uncontrolled before-after	Academic medical centre in US	To improve handover of patients moving to lateral or lower levels of care units by implementing SBAR-based handover tool embedded in electronic medical record	Intradisciplinary (nurse-nurse) communication between ED nurse and nurse on medical ward	Impact beyond communication • efficiency of patient flow (patient throughput, aka assign-to-occupy time)
Shahid, 2020 ⁴⁷	Uncontrolled before-after	Paediatric referral hospital in Canada	To improve communication between neonatal transport team members and physicians about patients in need of urgent transportation from referring hospital by implementing modified SBAR	Interdisciplinary (nurse-physician) communication over telephone between neonatal transport team members or nurses operating from remote sites and physicians providing decision-making support at receiving care facilities	Fidelity of SBAR use Clarity of Communication
Smith, 2018 ³⁵	Uncontrolled before-after	University hospital in US	To use structured communication based on a modified version of SBAR to improve at handover from ED to medical unit for newly admitted patients	Intradisciplinary (physician-physician) telephone communication between ED physician and physician on medical unit	Fidelity of SBAR use Quality of Communication
Street, 2018 ³³	Uncontrolled before-after	Post-anaesthesia care units at 3 affiliated hospitals in Australia	To use a structured communication tool (ISOBAR) to improve handover for post-operative patients	Intradisciplinary (nurse-nurse) communication between post-anaesthetic care unit and ward receiving patient	Impact beyond communication • nurses' recognition of and responsiveness to common postoperative complications • adverse events • length of stay
Telem, 2011 ³⁰	Controlled before-after	Academic medical centre in US	To improve daily handoffs among surgical residents by incorporating SBAR	Intradisciplinary (physician-physician) communication about patient status at end-of- shift handover	Impact beyond communication • sentinel events • physician order entry errors

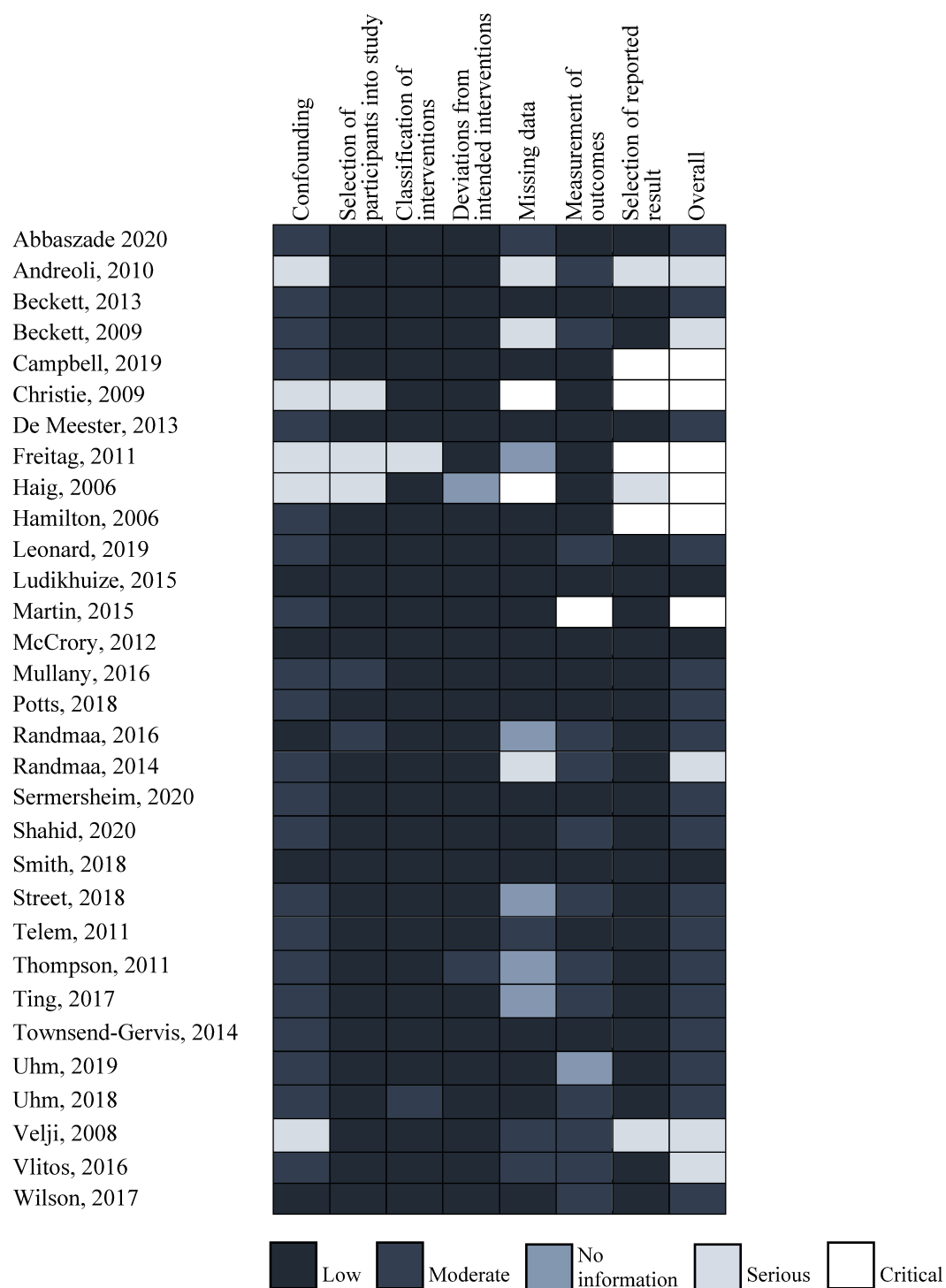
Thompson, 2011 ⁴⁵	Uncontrolled before-after	Tertiary teaching hospital in Australia	To improve communication between medical trainees at end of shift handover by teaching them ISBAR	Intradisciplinary (physician-physician) communication between junior doctor finishing shift and incoming colleague	Fidelity of SBAR use
Ting, 2017 ³⁸	Uncontrolled before-after	Obstetrics department in hospital in Taiwan	To evaluate the effects of implementing SBAR when nurses communicate abnormal fetal heart tracings to obstetricians	Interdisciplinary (nurse-physician) telephone communication between nurse in labour and delivery unit and covering obstetrician	Impact beyond communication <ul style="list-style-type: none"> • teamwork & safety climate • Apgar scores
Townsend-Gervis, 2014 ⁴¹	Uncontrolled before-after	3 medical/surgical units at an acute care hospital in US	To improve patient outcomes through structured communication using SBAR in daily interdisciplinary rounds	Intradisciplinary (nurse-nurse) communication for shift reports Interdisciplinary (nurse-allied health) communication during rounds	Impact beyond communication <ul style="list-style-type: none"> • patient satisfaction • appropriate removal of urinary catheters • 30-day readmission
Uhm, 2018 ³⁶	Uncontrolled before-after	Paediatric hospital in South Korea	To improve communication about patients being transferred from intensive care to general ward by using structured handover tool based on SBAR	Intradisciplinary (nurse-nurse) communication between intensive care nurse and nurse receiving patient on ward	Fidelity of SBAR use
Velji, 2008 ³²	Controlled before-after	Stroke unit at an academic rehabilitation hospital in Canada	To use SBAR to improve communication among team members regarding both urgent and non-urgent patient safety issues	Intradisciplinary and interdisciplinary - team general communication (e.g., change in patient care plan, discharge planning, specific safety issues)	Impact beyond communication <ul style="list-style-type: none"> • team communication and patient safety climate
Vlitos, 2016 ⁵¹	Uncontrolled before-after	2 adult mental health units in Scotland	To improve communication between multidisciplinary team members by implementing modified SBAR communication tool	Interdisciplinary (nurse-physician) communication between ward staff and physician on duty	Clarity of Communication
Wilson, 2017 ³⁷	Uncontrolled before-after	Paediatric referral hospital in Canada	To improve quality of communication about patients in need of urgent transportation from referring hospitals by implementing SBAR	Interdisciplinary (nurse-physician-respiratory therapist) communication over telephone between inter-hospital transport team and receiving hospital	Fidelity of SBAR use Clarity of Communication

RCT – Randomized controlled trial; SBAR – Situation, Background, Assessment, Recommendation; ISBAR – Identification of self followed by standard SBAR; ISOBAR – Introduction/Identification, Situation, Observation, Background, Assessment, Request (for action to be performed by recipient of handover); ED – Emergency Department; US – United States

* The setting is characterised as in classroom when the outcomes were measured in a simulation centre or classroom setting. Some studies taught participants how to perform SBAR using simulation but then measured use of SBAR in clinical practice. Such studies were not considered to take place in the classroom.

Supplementary Figure 1a. Risk of Bias Assessment of Included Studies using ROB 2.0



Supplementary Figure 1b. Risk of Bias Assessment of Included Studies using ROBINS-I tool

Supplementary Table 3. Effect of SBAR on impacts beyond communication

Author, Year	SBAR intervention	SBAR training modality, duration and intensity	Intervention components other than SBAR	Outcome Measures	Reported Results	Relative improvement
Abbaszade, 2020 ⁴⁸	SBAR training and implementation for nurses for nurse-nurse communication at shift change in coronary care units	Didactic for 1 hr (offered 5 times)	None	Patient Satisfaction (Quality Patient Care Scale)	Psychosocial Dimension: 55.34 ± 12.27 (pre) to 67.70 ± 7.26 (post), $p < 0.001$ Physical Dimension: 48.86 ± 15.90 (pre) to 60.18 ± 7.82 (post), $p < 0.001$ Communicative Dimension: 23.86 ± 7.57 (pre) to 30.09 ± 4.61 (post), $p < 0.001$	Moderate (22%) Moderate (23%) Moderate (26%)
Andreoli, 2010 ³¹	SBAR implementation and training for nurses, physicians, other health disciplines, support staff, unit leaders in geriatric and the musculoskeletal rehabilitation units for communication for falls prevention and management	Didactic and role-playing for 4h	None	Patient safety culture (AHRQ Hospital Survey on Patient Safety Culture)	Between the study units and rest of the hospital, 2 of the 12 dimensions (organizational learning, and teamwork across hospital units), significant based on critical ratio test	Small* (10% - 18%)
Beckett, 2013 ⁴³	SBAR implementation and training for nursing handover in acute admissions unit	Not reported	Early warning system and other larger safety initiatives targeting cardiac arrest rate	Cardiac arrests / 1000 admissions Cardiac arrest calls from AAU to team / 1000 admissions 30-day mortality of patients admitted to AAU	2.8 (pre) to 0.8 (post), significant (p-value unreported) 4.9 (pre) to 1.3 (post), significant (p-value unreported) 6.3% (pre) to 4.8% (post), significant (p-value unreported)	Large (71%) Large (73%) Moderate (24%)
Beckett, 2009 ⁴⁶	SBAR training for nurses and physicians (though none attended) in pediatric / perinatal services department for nurse-physician communication for multiple purposes, including patient status	Didactic, role-playing and video vignettes for 1h (offered over 16 sessions)	None	Safety climate (Teamwork and Safety Climate Survey) Teamwork (Teamwork and Safety Climate Survey)	6 of 14 items showed statistically significant changes 6 of 13 items with statistically significant changes	Small to Moderate* (9% - 21%) Small to Moderate* (7% - 20%)
De Meester, 2013 ⁴²	SBAR training for nurses for nurse-nurse communication at rounds or shift change handover and nurse-physician communication about deteriorating patient on medical/surgical wards	Didactic and role-playing for 2d on SBAR for reference nurses, for 2h on SBAR for other nurses, and 4h on early detection	Efferent Rapid Response System (included modified early warning system, emphasis on patient assessment, policy to communicate with providers of efferent limb of RRS)	Unplanned ICU admissions / 1000 admissions Unexpected deaths / 1000 admissions Mortality / 1000 admissions	13.1 (pre) to 14.8 (post), $p = 0.001$ 1.0 (pre) to 0.3 (post), $p < 0.001$ 10.3 (pre) to 10.6 (post), not significant	Small (13%) <i>intended direction</i> Large (66%) Small (3%)

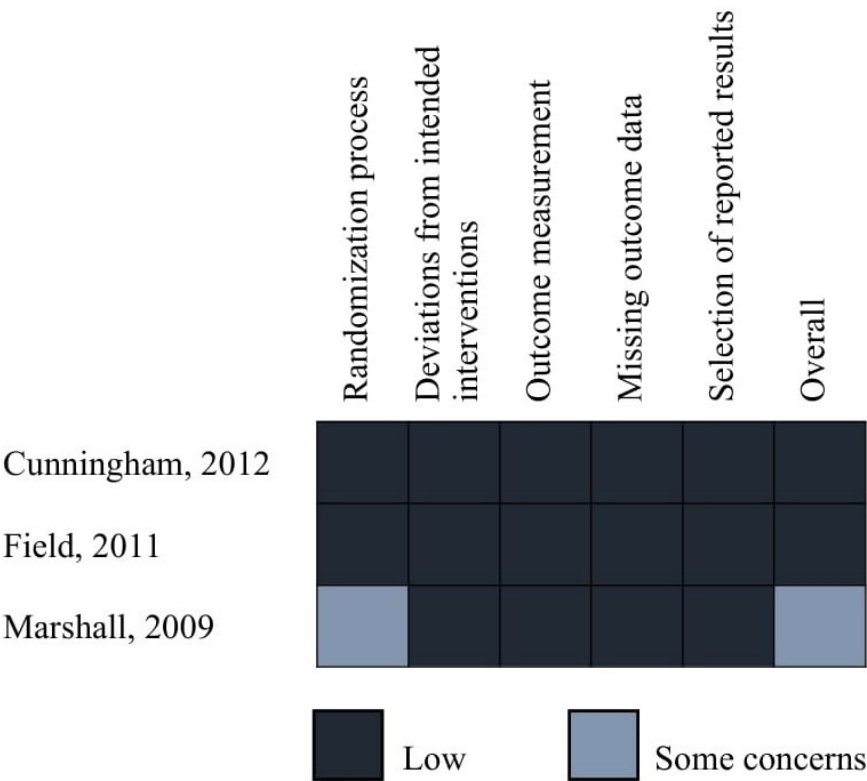
Field, 2011 ²⁴	Implementation of clinically-embedded paper SBAR template (with prompts) and SBAR training to standardize nurse-physician telephone communication about residents on warfarin in nursing homes	Not reported	Warfarin protocol, (includes methods to identify and highlight residents on warfarin, procedures for tracking and communicating INR results)	Time INR values in therapeutic range INR ≥ 4.5 obtaining follow-up INR within 3 days Preventable adverse warfarin-related events / 100 resident months	SBAR exposure: 53.1% vs Control: 50.0%, significant (p-value unreported) SBAR exposure: 64.6% vs Control: 71.7%, not significant SBAR exposure: 2.3 vs Control: 2.4, not significant	Small (6%) Small (10%) Small (5%)
Leonard, 2019 ⁵⁰	SBAR implementation and training for nurses for nurse-physician communication for immediate help with patient	Didactic	None	Referrals to ED Acute HF admissions	0/10 (pre) to 0/11 (post) 5/10 (pre) to 0/11 (post)	No effect Large (100%)
Ludikhuizen, 2015 ⁴⁰	SBAR implementation and training for nurses and physicians for nurse-physician communications of modified early warning score ≥ 3 for immediate assessment of patient in medical/surgical wards	Not reported	Rapid Response System (includes modified early warning system)	Cardiopulmonary arrest, unplanned ICU admission, or death / 1000 admissions Cardiopulmonary arrests / 1000 admissions In-hospital mortality / 1000 admissions Unplanned ICU admission / 1000 admissions	37.1 (pre) to 32.9 (post), p=0.04 1.9 (pre) to 1.2 (post), p=0.02 20.4 (pre) to 17.7 (post), p=0.05 19.8 (pre) to 17.7 (post), not significant	Small (11%) Moderate (37%) Small (13%) Small (11%)
Mullany, 2016 ³⁹	ISBAR training for nurses and physician for escalation of patient status in teaching hospital	Role-playing for 2h in single session	Rapid Response System (includes medical emergency team and modified early warning system)	MET calls / 1000 separations Cardiac arrest calls / 1000 separations	8.2 (pre) to 9.5 (post), significance unreported 5.5 (pre) to 3.3 (post), p < 0.001	Small (16%) Moderate (40%)
Potts, 2018 ³⁴	Implementation of clinically-embedded SBAR for nursing handover from ED to medical unit	Didactic for 1h on 3 shifts of work day	None	RTM-to-occupied times	83.6 min (pre) to 49 min (3 weeks post), significance not reported 83.6 min (pre) to 47 min (10 months post), significance not reported	Large (41%) Large (44%)
Randmaa, 2014 ²⁸	SBAR implementation and training for nurses and physicians in anaesthetic clinic for nurse-nurse communication and nurse-physician communication for multiple purposes, including handoffs	Didactic and role-playing for 2.5h	None	Safety climate (Safety Attitudes Questionnaire)	63.1 \pm 15.8 (pre) to 66.4 \pm 16.2 (post), p=0.011	Small (5%)
Sermersheim, 2020 ⁴⁹	Implementation of clinically-embedded electronic SBAR tool for nursing handover between units (e.g., ED to general medical unit)	Didactic	None	Assign-to-occupied times	97 min (pre) to 55 min (1 week post), significance not reported 97 min (pre) to 60 min (2.5 years post), significance not reported	Large (43%) Moderate (38%)

Street, 2018 ³³	Implementation of iSoBAR (with prompts) within post-anaesthetic care tool (PACT) and training (targeting nurses) for nurse-nurse handover on discharge in three PACUs	Not reported	Other parts of PACT: e.g., additional assessment criteria for patient readiness for discharge from PACU	Recognition of Adverse events in PACU	8.3% (pre) to 16.7% (post), p<0.001	Large (101%)
				LOS in PACU for all patients in mins	45 (pre) to 53 (post), p<0.001	Small (18%)
				LOS in PACU for patients with PACU adverse event in mins	100 (pre) to 84 (post), p=0.027	Small (16%)
				LOS in hospital for all PACU patients in days	0.5 (pre) to 1.0 (post), p=0.026	Large (100%)
Telem, 2011 ³⁰	SBAR training for general surgery interns for nurse-physician communication for immediate help with patient and physician-physician communication about patient status at handover	Video scenario discussions and role-playing for 2.5h in single session	None	Duplicated, cancelled, and wrong patient order entries	SBAR exposure: 14.5% (pre) to 12.2% (post), p=0.003	Small (16%)
Ting, 2017 ³⁸	SBAR Implementation and training for nurses to support nurse-physician communication when abnormal fetal heart beat tracings occurred in obstetrics department	Didactic and video demonstrations for 15 mins	None	Safety climate (Safety Attitudes Questionnaire)	61.1 ± 10.9 (pre) to 71.0 ± 15.5 (2nd post), p=0.0007	Small (16%)
				Teamwork (Safety Attitudes Questionnaire)	58.6 ± 11.2 (pre) to 70.8 ± 15.1 (2nd post), p=0.006	Moderate (21%)
				Number of neonates with <7 5-minute scores	4.3% (pre) to 5% (post), p=0.49	Small (16%)
Townsend-Gervis, 2014 ⁴¹	SBAR implementation and training (targeting nurses) for nurse-nurse and nurse-allied health communications in daily interdisciplinary rounds on medical/surgical units	Didactic and role-playing	Re-admission risk assessment (efforts to highlight risk factors in structured manner)	Foley catheter removal	78% (pre) to 94% (post), p<0.001	Moderate (20%)
				Re-admission rate	14.5% (pre) to 5.2% (post), p<0.001	Large (64%)
				Patient satisfaction	69% (pre) to 74% (post), not significant	Small (7%)
Velji, 2008 ³²	SBAR implementation and training for nurses, physicians, other health disciplines, support staff and unit leaders for nurse-nurse communication at rounds or shift change and nurse-physician communication for immediate help with patient	Didactic and role-playing for 4h	None	Patient safety culture (AHRQ Hospital Survey on Patient Safety Culture)	Between the study unit and rest of the hospital, 2 of the 12 dimensions (organizational learning, and feedback and communication about error), significant based on critical ratio test	Moderate* (25% - 42%)

SBAR – Situation, Background, Assessment, Recommendation; ISBAR – Identification of self followed by SBAR; iSoBAR – Identification of self and patient, Situation, Observations, Background, Agreed plan, Read back

*refers only to items that are statistically significant

Supplementary Figure 1a. Risk of Bias Assessment of Included Studies using ROB 2.0



Supplementary Figure 1b. Risk of Bias Assessment of Included Studies using ROBINS-I tool

