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Co-design and implementation of nursing handover improvement tool in Kenyan newborn units: a pilot study

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Abstract

Background Transfer of care and responsibility for patients from one healthcare provider to another during hospitalisation is critical to them receiving the right interventions and overall quality and safety of care, and is dependent on the accurate transfer of patient information. Sick newborns are particularly dependent on health workers being able to meet their needs, but previous work suggests that nursing handovers in newborn units (NBUs) may be poor in Kenya. Initiatives aimed at improving nursing handovers have mainly been tested and implemented in High-Income Countries (HICs), with very little happening in Low- and Middle-Income Countries (LMICs), especially in the context of sick and hospitalised newborn nursing care. In this study, we sought to co-design, implement, and assess a nursing handover tool's effect on the communication of patient information, teamwork, and coordination of care among nurses in selected newborn units.

Methods We adopted a co-design approach where nurses were involved in the design of a nursing handover improvement tool, i.e., the ESBAR tool. To pilot and assess the effects of this tool, a prospective before-and-after study was conducted in three county referral hospitals in Kenya. We utilised both in-depth qualitative interviews (pre = 15, post = 22), observation of nursing handover sessions (pre = 48 sessions, post = 48 sessions) and a survey using a structured self-administered questionnaire (pre = 43, post = 37). The study participants were all nurses working in selected NBUs. The qualitative data were thematically coded in NVivo, and for the quantitative data, descriptive statistics and paired t-tests analysis were conducted in STATA 15.

Results Our qualitative findings showed a positive influence of ESBAR on nursing handovers, i.e., completeness of information, improvements in the handover process and nursing team interactions. However, quantitatively, we observed no differences in means for all three indicators before and after the use of ESBAR. Implementation challenges included: a lack of interest among staff to adopt new changes and high patient-to-staff ratios. Enabling factors were user involvement in tool design, teamwork, and support of champions.

Conclusions Standardised handover tools can improve information exchange during handovers in low-resource settings; however, due to contextual challenges, there is potential to integrate these tools more as a communication

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guide. We recommend adopting a co-design approach with healthcare workers to ensure such initiatives meet their needs and to encourage adoption.

Keywords Nursing, Handover, Improvement, Information, SBAR, ESBAR

Background

Clinical handover of patient care from one health professional to another requires accurate information sharing to facilitate safe and effective care coordination [1, 2]. Unstructured handover processes [3], misunderstandings over what has been done and what needs to be done for the patient, and poor or incomplete documentation [4, 5] are common challenges. These can lead to medical errors, including incorrect treatment, delays in care, misdiagnosis, and other adverse events [6]. Therefore, improving communication processes during shift-to-shift handovers, especially in acute care settings where mortality is high, can contribute to improved patient outcomes [7].

Improving handover communication has been identified as a priority by organisations such as the World Health Organization (WHO) [8] and the Australian Commission for Safety and Quality in Health Care (ACSQHC) [9]. Proposed recommendations for improving handover content and process include integrating standardised tools such as SBAR (Situation, Background, Assessment, and Recommendation) and its derivatives to provide a communication framework that limits information exchange to only necessary patient information during the handover process [8]. Furthermore, developing guides to help with the introduction and adoption of a standardised approach to handovers in healthcare settings is necessary [9]. Interventions like the integration of handover tools such as SBAR and its variants into practice can increase nurse satisfaction with the handover process [10, 11], reduce workload and time spent in handovers [12] and increase patient safety outcomes, e.g., decrease adverse events and complications [11, 13, 14].

Handover improvement interventions have mainly been tested and implemented in High-Income Countries (HICs), with very little happening in Low- and Middle-Income Countries (LMICs), especially in the context of sick and hospitalised newborn nursing care. Yet, globally, nurses have a central role as coordinators of care providing patient information across all health professionals [15]. Additionally, in many healthcare settings including in LMICs, nursing handovers happen frequently [16] with formal shift-to-shift handovers typically occurring 3 times in 24 h in newborn units. Therefore, the probability of errors cumulating over time potentially increases for small and sick newborns who are receiving multiple interventions during longer hospital stays.

Context of nursing handovers in Kenya

In most public hospitals in Kenya, including our study sites, nursing handovers are mostly in person and happen at the bedside [17–19]. Information exchange during handover is verbal, with the rare and ad-hoc use of formal reference documents such as patient files, Kardex, a newly introduced comprehensive monitoring tool [20] and handover books. Additionally, nurses extensively use informal/unstructured personal pieces of paper, diaries, and notebooks to hand over and receive information.

The content of patient information exchanged is often unstructured and therefore varies within teams and across shifts. For instance, morning shift (7:30 am – 12:30 pm) handovers are attended by both frontline nurses and the nurse managers and are slightly detailed and more organised (i.e., consistently attended by all nurses on shift), compared to other shifts. Evening shift (6:30 pm – 7:30 am) handovers on the contrary, are characterized by sub-optimal participation i.e., fewer nursing staff are present compared to morning shifts due to staff lateness, and are often rushed and, therefore, brief, as such, the content handover is often very limited. Also, when nurses are in a rush to exit their shift, information exchange during handovers is only focused on the "special report," which is the handover of only the critically ill patients, while for the more stable patients, an overall statement, i.e., "continue management", is provided. Such information is incomplete as it excludes vital information on the details of care provided during the shift, updates on the status of the patient, and any pending tasks. These shortcomings are further complicated by common interruptions and distractions in this setting, e.g., emergencies, as well as non-handover-related conversations that happen during nurses' end-of-shift handovers.

Given these challenges, the lack of a standardised handover structure directly enabled a culture of brevity and inconsistency, where rushed and incomplete information became the norm. Introducing a structured handoff tool such as ESBAR was therefore seen as a practical way to address not only the variability in the content of handovers but also the tendency for superficial or minimal communication. By requiring a systematic and thorough presentation of information for all patients, the tool aimed to improve the quality, completeness, and reliability of information transfer during nursing handovers.

Study objectives

This study focused on improving nursing handover content and processes in newborn units by co-designing a

nursing handover improvement tool with nurses and pilot testing its use. The study assessed the effects of the developed tool on two health worker-related aspects of an effective handover: (a) content; completeness of information, and (b) process; staff perspectives on whether a structured approach improves the handover process, including general effects on communication and teamwork.

What the intervention was anticipated to improve

This study aimed at incorporating ESBAR into nursing handover practices as a means of implementing a standardised approach to nursing shift-to-shift handovers and therefore promoting standardised communication patterns. The use of ESBAR was anticipated to support information exchange between nurses and more broadly within healthcare teams in the newborn units, therefore improving continuity of care. ESBAR was intended to support information exchange in the following ways:

- Structure the handover process, therefore, improves the content, i.e., completeness and accuracy of information exchanged across shifts [21, 22]. Therefore, decreasing the omission of critical patient information and enabling timely and optimal care provision [23].
- A structured approach would also improve recall of relevant patient information, especially where documentation gaps exist, therefore minimising risks to patient safety [24].
- Reduce inefficiencies due to repeated tasks, as a result of inadequate information, hence increasing staff satisfaction [25].
- Improve participation in handovers by the nursing teams, hence, reducing time spent in addressing issues arising from incomplete communication at handover [26].
- Encourage team interactions, as it provides opportunities to debrief, therefore, fostering a positive team climate [27].

Table 1 Study hospitals' characteristics

Characteristics	Description		
Hospital code	**1**	**2**	**3**
Type and level of hospital	A rural county referral hospital	A semi-urban county referral hospital	A large urban level 5 maternity hospital
NBU bed capacity and no of admissions	7 incubators, 3 resuscitators & 14 cots. Average of 456 admissions annually	7 incubators, 4 resuscitators & 47 cots. Average of 550 admissions annually	22 incubators, 5 resuscitators & 48 cots. Average of 1080 admissions annually
No of nurses per shift (including the nurse manager)	1 nurse	3–4 nurses	4–6 nurses
Handover style	Nursing station & walk-through bedside Verbal	Bedside Verbal	Bedside Verbal
Frequency of handovers	Thrice in 24 h	Thrice in 24 h	Twice in 24 h

Methods

Study design

This was a prospective before-and-after study design utilising both qualitative methods (interviews and non-participant observations) and a structured questionnaire-based survey.

Study setting

The study leveraged on an established Clinical Information Network – Neonatal (CIN-N) that comprises 20 county referral hospitals located in Nairobi, Western, Eastern, and Central parts of Kenya [28, 29]. The senior nurses who participated in the co-design phase of the study were drawn from nine hospitals within the Central, Nairobi & Eastern sites. The pilot phase of the study was conducted in three public county referral hospitals providing inpatient neonatal care. These hospitals were purposively selected to achieve diversity in three main characteristics: context, i.e., situated in the rural vs. semi-urban vs. urban setting, the level of neonatal services, i.e., differences in volume of in-patient admissions and the frequency of nursing shift-to-shift handover. Across the sites, nursing shift-to-shift handovers ranged from twice to thrice within 24 h. Table 1 below provides a summary of the study hospitals' characteristics.

Study phases

The study had two primary phases: the co-design & piloting phase. We started by working with nine senior nurses to co-design a nursing handover tool aimed at standardising the handover process. This tool was then pilot tested in three study hospitals, and its effects on nursing handover indicators were assessed. Figure 1 below provides a summary of the study activities.

Phase One: Co-designing the intervention

In the co-design phase, we conducted a series of six meetings with nurses (5 meetings with nurse managers and 1 with frontline nurses). These meetings were facilitated by JJ & JN. The initial meeting focused on nurses' reflections on their current practices and identification of gaps in their handover process, consequently, there was a consensus on the need for improvement i.e., a

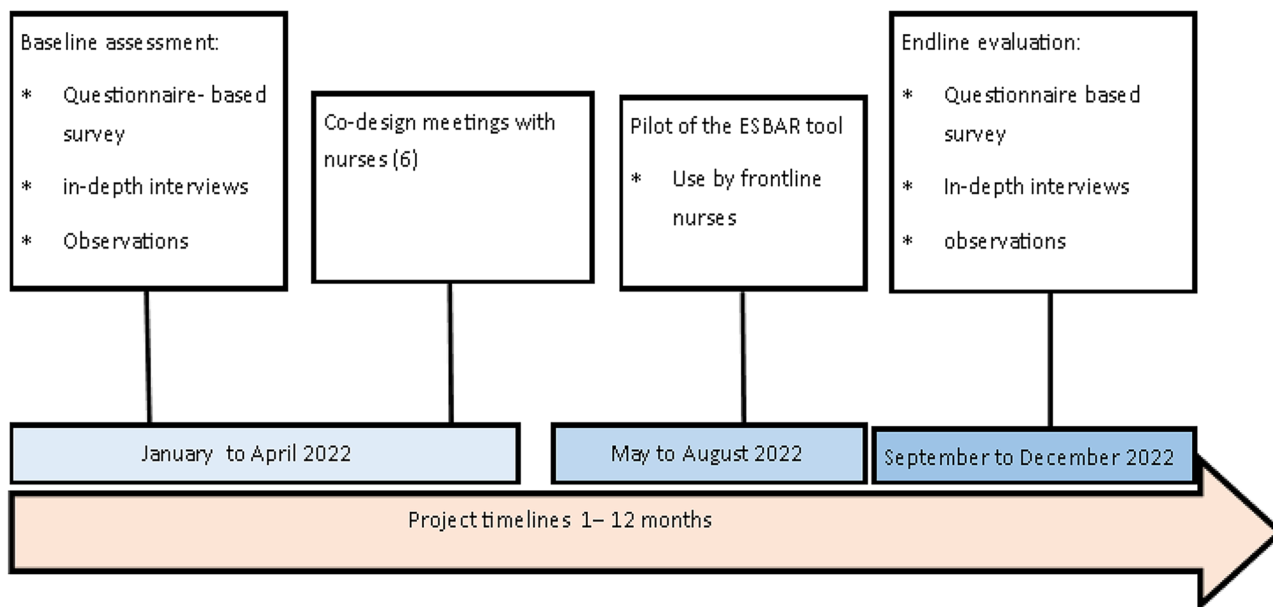

Fig. 1 Baseline, co-design, pilot and endline evaluation timelines

Table 2 A summary of co-design workshop activities and outcomes

Workshop	Participants	Workshop activity/outcomes
Workshop 1	7 nurse managers	• Reflections on current practices. • Identifying gaps & possible solutions. • Consensus on the need for a detailed handover for category A & B babies.
Workshop 2	7 nurse managers	• Introduction of some of the existing handover improvement tools, e.g., SBAR, ISBAR. • Consensus on SBAR and its variants as a useful tool. • To improve current documentation on the Kardex and, consequently, handover content and process. • To improve the details documented on the matron's report, thus ensuring meaningful information is documented. • A checklist for checking patient information during referral /unit-to-unit transfer. • Consensus on the need to modify these tools so that they are context-appropriate.
Workshop 3	7 nurse managers	• Identified & discussed required modifications. • Modified SBAR to develop context-appropriate guidelines/SOPs.
Workshop 4	7 nurse managers	• Further modifications of SBAR • Handover SOPs as a checklist, i.e., a visual reinforcement to remind nursing staff of the mnemonic elements. • Consensus on converting the guide into a tool/checklist – a draft had been developed.
Workshop 5	7 nurse managers	• The nursing handover checklist was modified further. • Consensus on piloting this with High Dependency Units (HDUs)/Acute room/Category A babies.
Workshop 6	9 frontline newborn unit nurses	• Reflections on current practices. • Identifying gaps & possible solutions. • Introduction of some of the existing handover improvement tools, e.g., SBAR, ISBAR. • Introduction of the nursing handover checklist & SOPs. Minimal modifications. • Consensus on piloting this with HDUs/Acute room/Category A babies.

need for a standardised approach to nursing handovers, which would potentially structure the handover process and enable a detailed handover, more so for Category A babies (acutely ill, requiring oxygen, CPAP, IV fluids, and close monitoring) and Category B babies (stabilized but still unwell, often on IV medications or nasogastric feeding and requiring close monitoring) [30] in a context where patient to nursing staff ratios are high [31]. The subsequent meetings focused on exploring some of the nursing handover improvement strategies, i.e., SBAR and its variants [32–35] and the adaptation of these to fit the newborn unit context. Additionally, at the end of these meetings, there was a consensus on the need to pilot the draft tool during the handover of sick and hospitalised newborns in high-dependency units or acute rooms or category A babies, depending on the categorisation adopted by each hospital. Table 2 below provides a summary of the co-design workshop participants, activities, and outcomes.

NURSING HANDOVER TOOL

Situation	Name:		D.O.B:	D.O.A:			SEX:	
Background	Diagnosis				Referral Y/N			
	Weight	Birth weight:						
	Date today:	D.O.L:		Current weight:		Date today:	D.O.L:	Current weight:
	SHIFT		Morning	Afternoon	Night	Morning	Afternoon	Night
Assessment	Vitals	Vitals taken Y/N *Comments*						
	Feeding status	Feeds given Y/N *Comments*						
	Fluid management	Initiated Y/N						
		Cannula in-situ Y/N						
	Medication	Given Y/N *If N, why?*						
		Oxygen use Y/N *Comments*						
		On CPAP Y/N						
	Investigations	Done Y/N *Comments*						
	Mothers' status	Stable Y/N *Comments*						
Recommendations	Plans/changes from ward round	Re-categorised: Y /N *Comments*						
		New Investigations: Y/N *(If Y, Specify)*						
		Treatment changed: Y/N *(If Y, specify)*						
		For referral: Y/N						
		For review: Y/N *Comments*						
	Pending/outstanding issues							
Name/Initials/Signature			Received by:_ Handed over by: ____	Received by:_ Handed over by: ____	Received by:_ Handed over by: ____	Received by:_ Handed over by: ____	Received by:_ Handed over by: ____	Received by:_ Handed over by: ____

Fig. 2 Nursing handover checklist

Consequently, the ESBAR tool was developed in two formats, a checklist to be filled by nurses at the change of shift handovers, see Fig. 2 and a poster dubbed 'nursing handover standard operating procedures' that was shared across the study newborn units as a 'guide' i.e., a visual reinforcement to remind nursing staff of the mnemonic elements, see Fig. 3 below.

The ESBAR tool contains 5 domains: **Entirety** (a report of the general status of the unit including the total number of babies, new admissions, etc., and a debrief session for the nurses), **Situation** (a brief description of patient identification details e.g., name, sex), **Background** (a brief description of patient's history including diagnosis, birth weight, current weight etc.), **Assessment** (professional nursing assessment of the patient's status including vital signs, feeding status, fluid management, medication status and caregivers' status) and **Recommendations** (nursing actions required in the next shift, based on the patient's current status and the planned care outlined during ward rounds including further investigations, treatment changes, planned discharge/referral and any other pending tasks), and a last section on identification of nursing staff on shift. It is designed to cover three changes of shift handovers within 24 h per patient. The columns provide space for documenting whether specific aspects of care, e.g., whether vitals have been taken, by indicating a Yes/No response, with space to comment on the reasons for pending activities. The tool was primarily designed for nursing handovers; therefore, all sections are filled by the shift's incoming nursing team, including nursing students where applicable.

Phase two: piloting the intervention

Following the co-design of the ESBAR tool with nurses, we introduced these handover improvement communication tools through newborn unit nurses' continuous medical education (CME) sessions in each of the study hospitals. The CMEs focused on sharing the initial preliminary findings on nursing handover current practices, gaps identified, suggested improvement strategies and the practicalities of using the ESBAR checklist. We further obtained consensus from all frontline nurses who attended the CMEs to pilot the ESBAR tool within their unit. The one-pager tool was completed once per patient per day, with designated sections for each shift to document handovers across the 24 h, rather than multiple tools being filled at every shift change. To support the study sites, copies of the ESBAR tool were made by the study team. Furthermore, to support the use of the tool throughout the pilot, JJ made bi-weekly follow-up phone calls and physical site visits where required to address any arising concerns concerning the ESBAR tool use/content. After three months of use (May to August 2022), we conducted a mixed-methods evaluation to assess the tools' effects on nursing handover content and process indicators.

NURSING HANDOVER OF CARE CHECKLIST

Handover with ESBAR		Team Responsible
Entirety (Ward status report)	➢ Summary statistics: ○ Total number of babies ○ No of admissions ○ No of discharges & discharge ins ○ No of referral ins/out ○ No of abandoned/accommodations ○ Deaths if any ○ Orders ○ Incidence ○ Investigations e.g., x-rays/scans, transfusions ➢ Debrief (difficult shift/raise concerns if any/handover of bodies)	Team Leader
Situation	➢ Patient's name ➢ Age (Date of birth or day of life) ➢ Day of management in NBU ➢ Date of admission ➢ Sex	Shift nurse
Background	➢ Reason for admission /transfer (Diagnosis) ➢ Place of delivery (inborn or referral) ➢ Mode of delivery ➢ Apgar score ➢ Birth weight /current weight	
Assessment	➢ Current condition: ○ Vitals (RR, HR, Temp, Activity, SPO_2) ○ Oxygen status: mode, L/min ○ RBS: include trends over the shift ○ Episodes of resuscitation ○ Babies on CPAP ➢ Feeding status: ○ Type of feed, recommended amount (mls), what has been achieved and what is targeted, feeding route - NGT/cup? ○ Changes to feeds: feeding target/top ups/supplements ➢ Medication ○ (Doses given or not given) ➢ Fluid management (type/amounts/hrly) ➢ Investigations done (and pending) e.g., x-rays, labs ➢ Mother's status (*general status including ability to feed*)	
Recommendations	➢ Ward round recommendations/plan of care ○ Further investigations/what needs to be done/follow-up needed ○ Changes to treatment including medications/oxygen weaning ○ Category re-classification (Category A, B, C) ➢ Planned discharges /referrals ➢ Cases for review ➢ Any other pending issues for follow-up e.g., cannulations	

Fig. 3 Nursing handover SOPs

Study sample

The study population included newborn unit nurse managers and frontline nursing staff across the three study sites. For the survey, we adopted a total population sampling approach, where all the nurses providing care in the three newborn units were invited to participate in the before-and-after survey. For the qualitative in-depth interviews, nurse managers & frontline nurses were purposively selected to attain a maximum variation in the following characteristics: managerial position, training level (certificate, diploma, and degree-level trained nurses) and length of working experience in the unit.

Data collection

The effects of the nursing handover tool on nursing handover content and process indicators were assessed using an adapted version of O'Connell's Handover Evaluation Scale (HES) survey instrument [36]. This scale consists of 14 items across three domains: quality of information (6 items, e.g., whether handover information is up to date, sufficient, and easy to follow), team

interaction and support (5 items, e.g., whether staff have the opportunity to debrief, ask questions, and discuss workload), and handover process efficiency (3 items, e.g., whether handovers are timely and include relevant information). Items are rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). We adapted the instrument for the newborn care setting; although construct validity and reliability had been established elsewhere [36], we conducted a pilot with fourteen non-study hospital nurses to determine the face validity in a low-resource setting. Only minimal revisions were required following this pilot.

All nurses working in NBUs across the three study sites were invited to participate in the survey. The data was collected in two time periods: before the intervention (January– April 2022) and three to 4 months after the intervention (September – December 2022), targeting the same NBU nurses who responded to the baseline survey. The survey tools were made available to all potential participants through the nurse managers. To minimise the risks of bias because of exposure to the 'intervention', we deployed a survey questionnaire before participants from study hospitals who participated in co-design meetings were invited to participate in the tool development meetings. This self-administered questionnaire took approximately 30 min to complete.

To complement the survey responses, we conducted non-participant observations of nursing handover sessions across various shifts, i.e., morning, afternoon & evening change of shift handovers and conducted in-depth interviews with nurses. The observations aimed to understand handover practices before and after the introduction of ESBAR. Using a semi-structured guide, we noted the artefacts used (e.g., charts, Kardex, notes), the site of handover (bedside vs. nurses' station), patterns of communication and interaction, and the type of information exchanged (e.g., patient details, treatments, pending tasks). We also recorded whether ESBAR elements were evident, along with contextual factors such as interruptions and duration. Similarly, we conducted in-depth interviews pre–ESBAR to further explore insights from observations on nurses' handover practices, perceived gaps, and their thoughts on the potential of adopting a structured, improved handover communication. Post–ESBAR, interviews were aimed at exploring nurses' experiences of using the ESBAR tool and their perceptions of its influence on nursing handover content and process indicators. To explore these, we developed an observation guide and an interview guide, which were developed and pilot-tested before use. Further, changes were made iteratively during data collection. Final interview guides used are provided, see supplementary files 1 & 2. Before shift-to-shift handovers, we sought verbal consent to observe the team. All participants were invited to participate in the interviews, which were conducted within the workplace, before or after their work shift. All interviews were conducted by JJ, lasted about 45 min on average and were audio recorded with consent from the participants.

Data analysis

Survey data entry was done in Excel and imported to STATA 15 for analysis. Descriptive statistics, i.e., median, interquartile range and percentages were used to summarise the socio-demographic characteristics of survey participants. We computed scores for each participant per domain by summing the scores for all Likert scale questions per domain per individual for each study period (i.e., at pre- and post-intervention). We then performed a paired t-test analysis to determine if there were any changes in means for matched pairs pre- and post-intervention periods. We report the aggregated data for each of the three domains in the results section.

All audio records were transcribed verbatim, and interview transcripts were anonymised. JJ read through the transcripts to check for accuracy, as well as initial familiarisation. The transcripts and the typed observation notes were then imported to NVivo 12 (QSR) for analysis. A thematic content analysis approach [34] was adopted; the first step involved re-reading the transcripts to identify initial codes, which were then grouped into broad conceptual themes by identifying related codes and matching patterns. The analysis primarily focused on identifying themes that describe nurses' handover practices, the experiences, and perceptions of nurses on the use of the ESBAR tool, including practicalities of ESBAR use, its influence on nursing handover content and process indications, and implementation enablers and challenges. JJ developed the initial coding framework, which was discussed between two authors, JJ & JN and a consensus was reached on the coding framework. Using this framework, all the data were coded using NVivo, and we draw on this to support the presentation of emerging themes. The use of data from both in-depth interviews and survey responses allowed for data triangulation.

Results

In this section, we present both quantitative and qualitative results. We begin by reporting the study sample summary, survey respondents' characteristics and the nursing handover domains mean difference in pre- and post-study periods. Further, we present the five broad emerging themes from the qualitative element of the study.

Study sample summary

A total of forty-three nurses (79.6% response rate) filled the survey questionnaire at baseline, and a total of 37 nurses (68.5% response rate) filled the survey post-intervention. Of these, only twenty-four pairs were matched.

Table 3 Study sample

Hospital code	1	2	3	Total
Survey – nurses (self-administered)	Pre (n = 10) Post (n = 8)	Pre (n = 14) Post (n = 12)	Pre (n = 19) Post (n = 17)	Pre (n = 43) Post (n = 37)
In-depth interviews – nurses	Pre – 4 IDIs Post – 4 IDIs	Pre – 6 IDIs Post – 8 IDIs	Pre – 5 IDIs Post – 10 IDIs	Pre – 15 IDIs Post – 22 IDIs
Handover sessions observed	Pre–12 sessions Post – 12 sessions	Pre–18 sessions Post – 18 sessions	Pre–18 sessions Post – 18 sessions	Pre–48 sessions Post – 48 sessions

Table 4 Socio-demographic characteristics

Characteristics of survey respondents		
Characteristic	**Pre (n = 43)**	**Post (n = 37)**
% Female	90%	81%
Age in years (Median, IQR)	38 (33–47)	35.5 (33–48.5)
Highest qualification		
% Enrolled/certificate nurse	5%	6%
% Diploma nurse	69%	64%
% Higher diploma nurse	10%	19%
% Bachelor's degree	14%	11%
% Master's degree	2%	0%
Work experience in years (Median, IQR)	8.45 (5–19.25)	9(6–18.5)

The number of matched pairs was low compared to the total number of participants who participated in the survey. This is explained by changes in staffing within the NBUs, i.e., movement/rotation of nursing staff within the NBUs between the two time periods.

Additionally, we conducted a total of 32 interviews (pre = 15, post = 22). We also observed shift-to-shift handover sessions: pre = 48 sessions and post = 48 sessions across the three sites. Table 3 below indicates the details of our study sample, i.e., the number of survey respondents surveyed, interview participants and the number of observed handover sessions in each of the three sites.

Survey respondents' characteristics

The respondents' characteristics between the two time periods were relatively similar. The sample included more women than men (86% vs. 14%). Respondents' ages ranged from 36 to 47 years. Two-thirds of the participants were diploma-level trained nurses (69%). The median experience was 8.9 years (IQR 6–19 years). The details of survey respondents' characteristics per observation period are summarised in Table 4 below.

Pre- and post-intervention mean differences

Overall, survey results indicate that there was no observed difference (i.e., the confidence intervals for the mean difference include zero) in means for all the three nursing handover domains i.e., quality of nursing handover content/information (mean difference = -0.42 (-0.29 – 0.38), the efficiency of the handover process (mean difference = -0.28 (-0.30 – 0.49), and team interaction and support (mean difference = -0.9 (-0.19 – 0.75), pre and post-intervention. Table 5 below provides a summary of the means and mean differences between the two time periods for the matched pairs. See Table 6 (in the supplementary materials) for a summary of means and mean differences for all participants pre- and post-study.

Emerging themes

Practicalities of ESBAR use in the NBU setting

Across study sites, the ESBAR tool was perceived to be practical and easy to use because of its simplicity. However, the high patient-to-staff ratios in these settings were reported to have made it impossible to uniformly use it across all babies. E.g., the use for the handover of category A babies (acutely ill requiring monitoring) as agreed, worked in two sites where babies in this category were about 3–8, with about 2–3 nurses caring for a total of about 45 babies on average per shift. However, in one site where category A babies were about 22 on average, with 3–4 nurses caring for a total of 70 babies in the unit, it was deemed impractical to use. Some nurses in this site, however, reported having adopted the ESBAR reporting format in their verbal handovers.

> *...it is practical because the way we do the handing over, I have got a file, I will tell you that this is baby L, admitted 3 days ago due to 1 2 3, currently the baby is on this and this, sugars in the morning, vitals observation in the morning. And when you look at the files, it's simple questions. 'Did the baby feed?'*

Table 5 Paired pre- and post-summary statistics_Means

Summary statistics_Means (SD)			
	Pre (n=24)	**Post (n=24)**	**Mean difference (CI)**
Quality of information	3.76 (0.63)	3.72(0.54)	- 0.42 (-0.29 – 0.38)
Interaction and support	4.05 (0.84)	3.78 (0.79)	-0.28 (-0.30 – 0.49)
Efficiency	3.27 (0.65).	3.18 (0.73)	-0.09 (-0.19 – 0.75)

> *'Yes.' And that is what we want to know because we want to know if you did blood sugars, it was 1.8, then the next question is, 'Is it that the baby never received enough fluid or is it because the baby didn't feed?' So, it is practical and simple to use... (Nurse 0104, post-ESBAR) [Hospital 3].*
> *...it is simplified as much as possible, but now to make it practical for all babies at a go, it has proved somehow difficult when you are alone. (Nurse 087, post-ESBAR) [Hospital 1].*

Similarly, in the two sites where ESBAR was adopted for category A babies, it was reported that use was not consistent across the shifts. For example, the use of ESBAR during evening shifts was reported to be minimal, due to the practicalities of the use of the checklist, both as reference material (containing patient information filled during morning & afternoon change of shift) by the nurse ending the shift and as a place to document the report by the nurse beginning the shift. To address this, a handover book where elements of ESBAR were integrated was introduced in one site for documentation, and nurses were encouraged to use their own notes or patient files as reference points, but report based on ESBAR. This encouraged the integration of ESBAR in handovers across all shifts.

> *...We took two books. There is one now. The two books became a challenge because you cannot follow up with a patient, because their details for today are here, and even for tomorrow they are there. We stopped that one and said the night shift will note that and record somewhere else... but in the morning when you are giving a report you will report as it should be. (Nurse 086, post-ESBAR) [Hospital 1].*

Perceived influence of ESBAR on the quality of nursing handover content

Following the integration of ESBAR into nursing handovers through the adoption of the ESBAR format in verbal handovers at one site and the introduction of a nursing handover book in two sites, nurses reported that their ability to track pending tasks for implementation during their shift had improved. Consequently, this was perceived to have led to improved information exchange at handover, i.e., through the provision of a 'detailed' report using ESBAR format and through consolidation of the most updated patient information on the handover book. This was further reported to have reduced post-shift follow-up phone calls to nurses due to incomplete or inaccurate information.

> *...It does help to give more information about the baby, it's not like the way we were taking [the report], you say this is so, and so, has diagnosis this one, continue management.... now for that one [using ESBAR], when you take it, like here in HDU, you can know, when this baby was admitted...you can know any gaps, that are there. If you are told medication was not given, you can ask, to know, why was it not given...you are going to get the solution to get that medication [administered]... (Nurse 0105, post-ESBAR) [Hospital 3].*
> *...it has helped us to put patient information together and continuity of care... we used to do the summary notes and you discard it and this one the information is there, and there are no more phone calls "H did you give this?" you know, there are no more phone calls...(Nurse 086, post-ESBAR) [Hospital 1].*

The completeness of information exchanged during handovers may have had direct implications on care. Nurses reported that when critical information was not provided to them and was not documented, it led to missed or delayed care. For example, during one of the handover sessions, we observed a scenario where a nurse on shift had missed administering a prescribed medication to a baby; she narrated that she had not received any information regarding this at the beginning of her shift. Additionally, the prescription and initiation of medication had not been documented in the file, i.e., details of this were not documented in the treatment chart/sheet.

After a student who was handing provided the details of baby X, the incoming nurse asked how this baby was doing after being given a loading dose of drug x, the nurse who had been on shift was silent, then she quickly retrieved the file of this specific baby, she then indicated that she was not aware that this baby was on such a medication. As she checked the file, she noticed that this had also not been indicted/prescribed on the file. The incoming nurse responded that during her shift (previous day), the clinician had issued the prescription of the same, and the mom had bought the required medicines and this had been administered the during her shift [this appeared to have been a gap in documentation? Similarly, it appeared that this information was not passed on to the night nurse at change of shift] (Observation notes _pre-ESBAR) [Hospital 1]

Influence of ESBAR on the perceptions and practice of the nursing handover process

In addition to the perceived positive influence of EBAR on improving the quality of nursing handover content, some nurses reported that the use of ESBAR had led to an improvement in the nursing handover process. For example, a reduction in time spent at handover was reported; nurses attributed this to the use of ESBAR, which provided a structured approach to their handovers, therefore minimising the chances of irrelevant conversations happening during handover. However, where the number of babies in category A was high, some nurses felt that the use of ESBAR was time-consuming.

> *I would say that the nursing handover tool has helped because it gives us a guide of what exactly is supposed to be handed over. So, I would say that it takes less time to use that tool because you are not scattered when you are asking or when someone is giving out the information. (Nurse 097, post-ESBAR) [Hospital 2].*
> *It consumes time. To be honest, people used to wonder for how long they would fill it, but that's mostly morning hours, afternoon it does not take time. Morning hours, you know, you have those details, their name, diagnosis, sex... But morning you must fill in a lot of details... (Nurse 092, post-ESBAR) [Hospital 2].*

Furthermore, we observed consistent sub-optimal participation in handovers in two sites pre-ESBAR, linked to late reporting to work, and a lack of interest by some individuals. Post-ESBAR, one site had put in measures to address late reporting, e.g., withdrawal of off days, as such participation had improved. Nonetheless, sub-optimal participation was persistent mostly for evening change of shifts from afternoon to night shift staff across the study hospitals pre- and post-ESBAR.

> *...There has been a challenge there I can say, because, we have got issues of, not all people coming at the same time. Considering Nairobi is also unique, 'Oh I was caught up in the jam, oh!'. You know, a lot of stories. So sometimes we do not wish for delay for too long to wait for our people to come, there are those situations you find you see, now let us continue with the report, so and so will come and he/she will find it going. So those gaps are always there... (Nurse 0104, post-ESBAR) [Hospital 3].*

Perceived influence of ESBAR on nursing teamwork and interaction

Beyond the influence of ESBAR on the quality of nursing handover content and process, we also explored its influence on nursing teamwork and interactions. Across sites, nurses' interactions within nursing teams, i.e., the ability to ask questions and seek clarifications during change-of-shift handovers, were perceived to be largely dependent on nursing team interpersonal relationships. Some nurses were reported to be receptive and open to responding to questions, while others were 'hostile' as they perceived that the questions were aimed at challenging their competence. Nonetheless, we observed nurses who actively sought clarifications/additional information and were positively responded.

> *...people ask depending on whoever is handing over the report to you. There are those people you can ask, and they have no problem with it but there are other people who if you ask, say they'll just research for yourself that information. The person sees it as if you are policing her or something... (Nurse 096, post-ESBAR) [Hospital 2].*

We also observed that ESBAR may have altered nurses' interactions during handovers. For example, pre-ESBAR, the handover conversations were in a narrative form, with the nurse who had been on shift leading the report provision. However, post-ESBAR, we noted the change of roles, with some nurses who were coming in for the shift leading the conversation, which took a question-and-answer approach as they filled the ESBAR tool. This suggests that while the conversation approach was altered, using a structured tool provides an opportunity for nurses to seek clarification, enhancing the completeness of information exchanged during end-of-shift handovers.

The team started the handover at the HDU, all the three nurses who were on the shift, the two incoming nurses and nursing students gathered at the HDU for report taking. One outgoing nurse begun at a corner with a baby on a resuscitator, he began by patient identification info' and history i.e., the baby's name, the diagnosis, the date of birth, the date of admission, the birth and current weight. He briefly paused one of the incoming nurses who was filling the ESBAR tool, took over and somehow led the conversation, she went through the tool items, in a question-and-answer format rather than a conversation led by the outgoing nurse. The team however seemed comfortable with this approach. This continued during the handover of all the four babies that were in this room. (Observation notes post-ESBAR) [Hospital 2]

More positively, we observed that one study site had integrated debrief sessions at the end of their handovers. These sessions occurred once a week, intending to provide nurses an opportunity to discuss concerns around workload, well-being, and any patient care-related concerns.

The handover ended at 8:30 am, but just before the nurses who had been on night shift left, the in charge reminded them that today was Monday and as usual debriefs happen every Monday morning. She asked the team of 4 nurses to sit at the station while she stood facing them. She begun by asking each one of them how their last week was, she said "Tell us how you're last week was", the first two nurses indicated that their week was good, no -complaints, another indicated that she was happy there were no babies lost in the shifts she had worked, except a few challenges during the weekend i.e., lack of supplies – no nasogastric tubes, no 2cc syringes etc. and they had had to borrow from other departments. The in -charge promised to follow this up with the office. Another nurse talked about being unwell, and that even though she had come to work she was pushing herself and lastly the in charge spoke about the stress that came with head count documentation requirement, but she was glad this was over. The debrief ended 8:47am. (Observation notes post-ESBAR) [Hospital 2].

Pilot implementation challenges and enablers

Generally, while the use of ESBAR was perceived to have a positive influence on the quality of nursing handover content, process, and interactions. However, some challenges emerged during this pilot, which included a lack of

interest among staff to adopt new changes, a lack of supplies for sustained use of ESBAR and concerns around duplication (i.e., similarities of content with the comprehensive monitoring chart), which seemed to have discouraged active use of the ESBAR tool in one facility.

> *It's just an attitude because if it was something that would have been recommended by the Nursing Council like it's a must you do it, people would have done it without complaining, but now because there is no pressure, per se, like now I can insist let me use it and then maybe someone else, someone like Xx will say let me also use it…(Nurse 0102, post-ESBAR) [Hospital 3].*
> *It is good, actually, ESBAR is a form of communication and even as we are giving the verbal report, we follow that format…but we noted that it was like repetition in terms of you have a comparative chart, we have the nursing kardex and when you're giving the report you always follow the ESBAR way of giving information….(Nurse 0107, post-ESBAR) [Hospital 3].*

Despite the highlighted challenges, ESBAR was actively adopted i.e., direct (documentation on the ESBAR tool per patient) and indirect (documentation on the handover book) use of ESBAR in two facilities, some of the reported facilitators of use included: good teamwork within the nursing team, nursing managers taking an active role in championing the use of ESBAR, and the engagement of frontline nurses in the co-design and in the introductory training that covered 'why the use ESBAR' and 'how to use' was perceived to have encouraged adoption & on-job 'training' of other colleagues on how to use ESBAR.

Discussion

Integrating structured handover tools such as SBAR and its variants into clinical routines has been shown to improve patient safety outcomes (e.g., fewer adverse events and complications) [11, 13, 14] and increase nurse satisfaction with the handover process [10, 11]. However, most of this evidence comes from high-income countries, with limited studies from low-resource settings such as Kenya. In this study, we pilot-tested an adapted nursing handover tool, ESBAR, to assess its potential effects on handover content and process indicators.

Our findings suggest that, despite contextual challenges, standardising handover communication for Category A babies through ESBAR was both feasible and acceptable. Nurses found the tool practical and relevant, in part because they were directly involved in shaping its adaptation to their setting. Existing literature suggests that co-design, which is defined as "*the meaningful involvement of end-users in the design process*" [37], is a powerful tool that allows the development of contextually relevant interventions with end users who are 'experts' in the subject area. This approach enables the development of interventions with conditions of the real world/setting in mind, which are more likely to generally meet the specific needs of the end users, therefore, promoting local acceptability and adoption, ownership and sustainability, as users are likely to be more invested in interventions that they have helped to create [38, 39].

However, contextual barriers that include limited staff interest, resource constraints (e.g., printing costs), concerns about duplication, and high patient-to-staff ratios [31] made it difficult to use ESBAR for all Category A and B babies across all shifts. Nonetheless, nurses adapted the tool creatively by incorporating its structure into centralised handover books and verbal handovers. These adaptations highlight the importance of flexible, context-sensitive strategies for implementation, such as embedding ESBAR prompts into existing documents (e.g., the Kardex) to reduce duplication and time burdens.

Nurses also reported that ESBAR improved the quality and completeness of information exchange. It encouraged a more structured flow in both verbal and written handovers, leading to more detailed and focused patient information and potentially reducing the risk of missed or delayed care. In other settings, SBAR and its variants have been shown to have improved the quality of handover information, as it provides a consistent framework that enables clinical teams to provide key information in a logical and organised order, minimising omissions [21, 40]. Relatedly, ESBAR was also perceived to have influenced the nursing handover process and nursing team interactions. The innovative integration of ESBAR into a shared, centralised handover book and the introduction of debriefs seemingly improved the overall team climate within the nursing teams, as its implementation/use required collective team effort. This has also been demonstrated elsewhere, as reported by Bond's study, where the utilisation of the SBAR tool to standardise handoff communication between nurses, physicians and anaesthetists in a surgical intensive care unit showed that teamwork had significantly improved among care providers post-implementation [41].

However, we were unable to demonstrate quantitative effects. We argue that two factors may explain this: firstly, the study setting: similar to most healthcare cadres, nurses in many healthcare settings do not receive formal training on the nursing handover process, and as such, these practices are often learnt from peers and senior colleagues in practice [42, 43]. This implies that what nurses perceive as a 'good handover' or 'best handover practice' is fluid and variable across settings, which in part might explain our survey results, where

at baseline, we observed relatively higher scores of self-reported perceptions on the handover process pre compared to post-intervention. Furthermore, this suggests that the participation of nurses in our study in co-design meetings and the introductory training may have reconstructed their understanding and perceptions of handover processes [44, 45]. Therefore, nurses' reflection on their practices and what is perceived as best practices may have led to the slightly lower scores observed post-intervention compared to baseline. Secondly, response bias: we adapted and piloted a Likert scale-based, self-reported survey instrument, i.e., O'Connell's Handover Evaluation Scale. However, Likert scales are argued to be subject to biases from various causes, including central tendency bias (where respondents avoid using extreme responses), acquiescence bias (where respondents agree with statements as presented and social desirability bias, which occurs when respondents attempt to represent themselves or their institutions more positively) [46, 47]. While we attempted to minimise such biases during the pilot phase through modification of the survey questions, we cannot rule out the occurrences of these biases. For example, the observed high scores at baseline could potentially suggest the occurrence of social desirability bias in this survey.

While these factors help explain the lack of measurable change, the discrepancy between qualitative and quantitative findings also underscores the complexity of evaluating handover interventions in real-world, resource-constrained settings. The absence of significant quantitative effects does not necessarily indicate a lack of impact but highlights the limitations of survey-based tools in capturing nuanced changes in practice and team dynamics [48].

Despite these challenges, important enabling factors emerged, including strong teamwork, local champions encouraging the use of ESBAR, and the value of adapting interventions with input from nurses themselves.

In summary, although we could not demonstrate quantitative effects, our qualitative findings suggest that ESBAR positively influenced handover content and processes. Adoption of ESBAR as a verbal communication guide, rather than an additional documentation tool, may be a more feasible strategy in low-resource contexts.

Conclusion

We conclude that standardised communication tools provide an opportunity for improved information exchange during handovers. There is potential to integrate these into healthcare workers' handover practices in low-resource settings, more so as a communication guide. However, there is a need to consider innovative ways of integration to avoid the introduction of an extra burden of documentation for staff who are already constrained by other contextual challenges. To determine this, we recommend the adoption of a co-design approach, which would potentially ensure the needs of frontline users are considered and met, therefore, promoting adoption and acceptability.

Strengths and limitations

Using both quantitative and qualitative methods enabled triangulation of findings. However, our survey sample was small and underpowered to detect significant effects, partly due to staff movement and leave between survey rounds, which reduced the number of matched pairs. This limited our ability to quantify the effects of ESBAR.

We also acknowledge limitations in the participatory design process. While nurses contributed to shaping the intervention, the topic of handover was pre-determined, and frontline nurses were more actively involved in later rather than earlier stages. Earlier and more consistent engagement of a wider group of nurses might have increased ownership and strengthened uptake. In this sense, the process reflected elements of both co-design and co-development.

Abbreviations

ACSQHC	Australian Commission for Safety & Quality in Health Care
CME	Continuous Medical Education
CIN-N	Clinical Information Network – Neonatal
HICs	High-Income Countries
HES	Handover Evaluation Scale
HDU	High Dependency Unit
IQR	Inter Quartile Range
ISBAR	Introduction, Situation, Background, Assessment, Recommendation
NBUs	Newborn Units
ESBAR	Entirety, Situation, Background, Assessment, Recommendation
SBAR	Situation, Background, Assessment, Recommendation
SOPs	Standard Operating Procedures
WHO	World Health Organization

Supplementary Information

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Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Supplementary Material 4

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Author contributions

JJ, JN, and DG designed the study. DM, CW, JA & ME reviewed and provided feedback on the study proposal. JJ facilitated the co-design workshops, supported by DM & JN. JN & DG were responsible for the supervision of data collection, and data analysis, which was primarily done by JJ. JJ wrote the manuscript with fundamental critical input from JN, and DG. All authors reviewed the manuscript. The authors read and approved the final version of the manuscript.

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Data availability
The datasets used and/ or analysed during this study are available from the authors upon reasonable request and with permission of the KEMRI-Wellcome Trust Research and Governance Committee.

Declarations

Ethics approval and consent to participate
Ethical review and approval were granted by the Kenya Medical Research Institute (KEMRI) Scientific and Ethics Review Unit (KEMRI/SERU/CGMR-C/122/3649) and the National Commission for Science, Technology, and Innovation (NACOSTI), Kenya. All study procedures were conducted in accordance with the Declaration of Helsinki [49], the Belmont Report principles of Respect for Persons, Beneficence, and Justice [50], and relevant national guidelines and regulations. The ethics review committee approved the use of both written (for the interviews & structured questionnaire-based survey) and verbal (for the observations) informed consent in this study. Therefore, written informed consent was sought from all study participants before interviews. All interview participants provided consent to participate in the study. Informed consent forms were also provided to the survey participants and were signed and returned with the questionnaire by participants who participated in the survey. For the observations of nursing handover sessions, information sheets were provided, and the study was explained to nursing teams during the end of the shift, following which verbal consent was sought to allow JJ to participate in nursing handover sessions. This allowed for a continued consent process, which involved a brief reintroduction of the study at every change of nursing shift and seeking consent to participate; as such, participants had an opportunity to express discomfort (if any) with being observed. The verbal consent was documented as part of the field notes. For the Co-design workshops, study-related information and activities were explained to all participants at the beginning of each workshop and verbal consent was gained to use meeting notes and workshop proceedings to describe the Co-design process and its outcomes. All methods were carried out as per relevant guidelines and regulations.

Consent for publication
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Competing interests
The authors declare no competing interests.

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