Dynamic Pocket Card for Implementing ISBAR in Shift Handover Communication

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Abstract. A risk factor for patient safety are communication failures among health professionals. Communication standards such as SBAR or ISBAR (situation, background, assessment, recommendation) aim at improving the exchange of information between health professionals by specifying a certain structure and content of information. However, those tools are not well established in daily clinical practice and IT support is missing which results in unstructured, inefficient and error prone information exchange. In this paper, we address this issue by presenting a mobile application that implements the ISBAR communication standard for the intensive care unit (ICU). The system can serve as digital pocket card supporting nurses in preparation for reporting and in a structured information provision during shift handover and in daily reporting. We collected requirements in collaboration with a hospital and developed a prototype. Within the application, nurses can take notes on the five information categories of ISBAR, which allows to reproduce the information in reporting situations in a structured manner. In future, it will be assessed in a pilot phase whether the digital pocket card is suitable for everyday clinical use.

Keywords. Health information exchange, patient handoff / organization and administration, shift handover, ISBAR, Change of shift report, medical communication, patient safety

1. Introduction

For ensuring continuity of care and improving the quality of care, effective communication of information between personnel is necessary. Any handover error can endanger patient safety [1]. A large proportion of all critical errors in the course of treatment involve faulty communication during shift handover. Most events are due to inadequate communication [1]. Studies showed that poor communication contributes to hospital adverse events in more than 60% [2]. In particular, settings where fast and effective management is essential (e.g. in an ICU) are vulnerable to poor communication [3]. To overcome these limitations, communication strategies are desired, that allow to efficiently exchange information and in this way limit the probability of errors [2]. The communication tool SBAR and its derivate ISBAR,

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SBAR-R, ISBARR and ISOBAR were developed to increase handover quality. It is widely assumed to increase patient safety [4] and it was demonstrated that it increases the quality of communication and the completeness of transferred information [5]. SBAR provides a clear structure for information provision, ordered in a logical way. Furthermore, it enables adequate preparation before a communication process starts. Using SBAR, two persons share the same mental model which improves understanding and awareness [4]. Even though there is clear evidence of improvement in clinical communication, SBAR is not yet well implemented in practice and there is no technical solution available that helps in implementing SBAR in clinical practice. The objective of this work is to develop a concept for implementing SBAR using information technology. We will introduce a mobile application that reflects the SBAR information categories and helps health professionals in structuring their information for reporting and shift handover.

2. Related work

SBAR or ISBAR are acronyms for Identification, Situation, Background, Assessment and Recommendation [4]. It refers to a technique used to facilitate communication and comprises five information categories that are ordered in a logical manner. “Identification” includes identification of the communication partner. “Situation” determines what is going on and describes the situation that is focus of the communication. “Background” captures the context of the patient. “Assessment” summarizes the actual problem (e.g. information on vital signs, laboratory values, and observations). Within “Recommendation”, the next steps in patient care are introduced.

The ISBAR standard can be used in various situations and has been proven to be easy to use [6,7]. There is research on and practical implementations of standardized handover protocols [8,9]. In a study by De Messet et al., it was shown that the ISBAR communication standard improves communication in hospitals between nurses and doctors [10]. Pocket cards were distributed in hospitals which showed the individual steps of ISBAR and thus served as a kind of checklist when implemented in daily practice [10,11]. By using the ISBAR checklist, the nurses in particular were able to prepare themselves better for the conversation / exchange of information with the doctors. The self-confidence gained through the preparation led to a flattening of the hierarchy of doctors and nurses, which resulted in a better description of the situation by the nurses and clearer instructions from the doctors [11]. Many studies focus on interprofessional communication between nurses and doctors. Cornell et al. demonstrate that ISBAR shortens the time for exchanging information between nurses and enables more efficient communication [5]. Yang and Zhang [6] showed that applying ISBAR leads to more relevant information being exchanged and has a positive effect on cooperation. However, no study could be found to reporting on the implementation of the ISBAR standard using IT resources.

3. Methods

We are focusing on shift handover in ICU and develop the digital pocket card in collaboration with nurses of an ICU. However, the concept will be general and can be easily adopted to other clinical wards.

We collected requirements of an ICU of the Biel Hospital Centre by means of a task and process analysis that resulted in user stories and use case diagrams. For this analysis we combined parts of an established process analysis method by Pomberger and Gerken [16,17] with semi-structured interviews and feedback loops. This method has been proven useful for analyses designed to implement computer systems in healthcare environments. Basic information on the processes in the intensive care unit was determined by means of a literature search. With the help of ARIS Express, we modelled this information as an event-driven process chain. This process chain formed the basis for a discussion with the stakeholder, i.e. the leading nurse responsible for the process management at the ICU and the IT specialist of the hospital responsible for innovations. This discussion and in depth system analysis followed the seven analysis steps of Pomberger [16].

Furthermore, we searched for literature on Pubmed and Google Scholar focusing on possible benefits of ISBAR and the state of implementation of ISBAR in hospitals. Since the acronym “ISBAR” is rarely used, the search was conducted with "SBAR". In the following, we use term “ISBAR”. Search terms included: "SBAR communication hospital", "SBAR nurse doctor", "SBAR communication standard", "interprofessional communication hospital". We enabled the Pubmed the filter "Best Matches".

After collecting requirements, we developed a concept comprising several variants of a technical solution to address the requirements. These were discussed with the stakeholder. Based on their feedback and comments, we selected one variant to be implemented in an iterative process. We continuously collected feedback on mockups and prototypes with results integrated into the prototype. The mobile application was implemented with the Ionic 3 Framework. Ionic 3 is based on web components like HTML, SCSS and TypeScript and is therefore a hybrid framework. We chose Ionic 3 since it covers the requirements of the app well.

4. Results

4.1. Process analysis and requirements

Basically, communication is realized face-to-face at the ICU. Telephone is only used when communication with other wards is required. Shift handover takes place between single nurses three times a day at the ICU. Beyond, there are two meetings per day where nurses together with physicians report on patient issues. So far, there are no specifications on which information has to be reported during a shift handover or group meeting. The following requirements were collected. The mobile application should

- provide hints on the five ISBAR information categories,
- allow to create an ISBAR note where fields can remain empty and information can be added to the single information categories,
- provide a summary of ISBAR notes,
- be available in German and French,
- allow modification or deletion of notes at any time,
- consider the material design guide (https://material.io/),
- store data directly on the device.

4.2. Variants

Following the process analysis, we developed five variants of a possible solution. They differ in the degree of support provided and in the extent to which communication remains synchronous or gets asynchronous.

- Variant 1: Mobile representation of the ISBAR schema with hints, but without any interaction possibility, simple digital pocket card.
- Variant 2: Mobile representation of the ISBAR schema where nurses can take notes for the single ISBAR information categories. Notes are stored locally on the device. Taking notes is voluntary.
- Variant 3: Mobile representation of the ISBAR schema where specific data (e.g. pulse) has to be filled by the user. Data is transferred to an external server and can be used for documentation purposes.
- Variant 4: The information is collected using the ISBAR schema. Information can be entered manually or dictated. The information has to be complete, i.e. the face-to-face communication is redundant. Data is stored on an external server.
- Variant 5: extends variant 4 by a structured data entry which enables a structured data storage.

In discussion with the stakeholder, we decided to implement variant 2. The main reason was, that the mobile application is not intended to replace the face-to-face communication, but it has to ensure that the relevant information is shared. The shift handover should be optimized by the system. It should remain to the nurses to decide which information they record in preparation to shift handover. Variant 2 forms the basis for the implementation and is referred to as dynamic pocket card in the following.

4.3. The dynamic pocket card

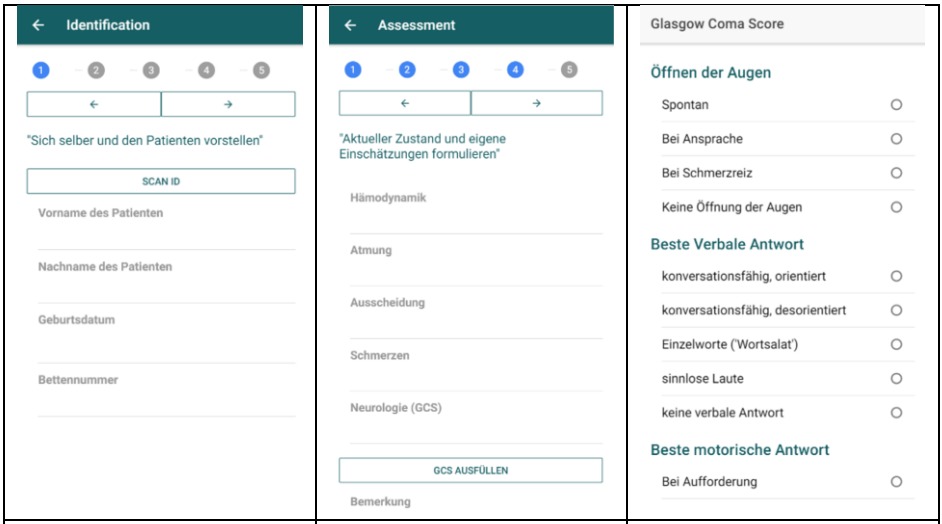
The application was designed to facilitate collaborative work among nurses at the ICU. The dynamic pocket card provides the following functionalities:

- generating notes for single patients following the ISBAR schema,
- adding patient details by scanning the case id from patient bracelet,
- accessing and deleting generated notes, and
- entering Glasgow Coma Scale values.

The main functions of the app are creating, storing, modifying, and deleting an ISBAR note. In the current implementation, we did not yet implemented a connection to the hospital information system. Thus, scanning the patient bracelet id currently does not provide more patient details such as patient name or date of birth. This remains open for the future.

The dynamic pocket card can be used to prepare for a shift handover (Figure 1). Filled with information, it allows to recapture the relevant patient events. Another scenario is to simply use the five steps as indicated by the app and the provided hints during reporting to structure the information provision. An ISBAR note is created in several steps representing the information categories of ISBAR: Identification, Situation, Background, Assessment and Recommendation (Figure 1a, 1b). For each information category, hints are provided. The user can add personal notes. In the Assessment category, the user can click on a button to enter information on the Glasgow Coma Scale (see Figure 1c). After completing the form, the user

automatically returns to the home page. The entered information is summarized on one screen. Additionally, the user can access terms of use and data protection regulations as well as changing the language (German and French).



1a: Screen for step "Identification" | 1b: Screen for step "Assessment" | 1c: Filling information on Glasgow Coma Scale

Figure 1: Screens of the dynamic pocket card.

5. Discussion and conclusion

Electronic health record (EHR) systems lack supporting shift handover communication. To address this issue, we introduced our dynamic pocket card concept with implemented prototype to support reporting and shift handover. The system was tested in a usability test, but so far only one ICU nurse joined the test, which cannot be considered representative. The feedback was entirely positive. Feedback was already considered and integrated into the system (e.g. scanning the patient bracelet, entering Glasgow Coma Scale). Additional comments concerned font size and interaction with the app. Our solution was tailored to the cooperating department which allowed us to achieve a high level of acceptance. However, it has to be assessed whether the application is well adopted by other departments and nurses. Furthermore, it has to be analyzed in a comprehensive study whether the dynamic pocket card improves communication and whether a mobile application is really the right medium to implement ISBAR. Studies show that smartphones are used in hospitals for clinical purposes including information retrieval, taking notes or for internal communication [13]. A study by O' Conner et al. demonstrated that 57% of staff takes clinical photos with their smartphone [14]. Depending on the hospital, there are different regulations for the use of the smartphone in clinical practice. In the collaborating hospital, there are no restrictions regarding use of personal mobile phones and it is planned to equip the personnel with business devices which would support the practical implementation of our digital pocket card.

Surprisingly, the stakeholder decided for a variant that is not entirely integrated into the hospital information system (HIS) even though they were convinced of the benefits of such integration. When scanning the patient bracelet with the current version of the dynamic pocket card, only the case ID is read. An interface to the HIS is indispensable to get the patient master data like name and date of birth. Other studies showed the benefit of an interface to the HIS. Vawdrey et al. developed a collaborative application supporting the shift handover [15]. It has already been widely implemented in a U.S. hospital. The application creates user-customizable printed reports and includes a variety of EHR data (e.g. data on allergies, medications, 24-hour vital signs). In contrast to our dynamic pocket card, their system is not implementing the ISBAR schema, but provides predefined information fields to be filled. The system of Vawdrey et al. is much more complex and provides detailed information that is already available in the EHR. With regard to the suitability of the prototype and its influence on a more structured and efficient communication in clinical everyday life, a pilot phase would have to be planned and carried out.

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