How to Assist Intensive Care Units in Improving Healthcare Quality. Development of Actionable Quality Indicators on Blood use

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Abstract. Previously developed quality indicators (QIs) for the intensive care did not give clues for quality improvement. We will improve this by developing new QIs that are actionable, reliable, valid and easy to register. Using a modified RAND technique we developed in three rounds new QIs for blood use at Dutch intensive care units (ICUs). The final set of QIs will be part of the National Intensive Care Evaluation quality registry and evaluated in a randomized controlled trial. In addition, a web-based feedback tool containing strategies for quality improvement will be developed. With the results of this project we hope to improve and maintain good quality of care at the Dutch ICUs.

Keywords. Quality improvement, Quality Indicators, Critical Care, Intensive Care, Erythrocytes, Blood

Introduction

Quality improvement is an important challenge in healthcare and it has become part of the daily routine of healthcare professionals. In many countries healthcare professionals are obliged to continuously improve their quality [1]. Many quality indicators (QIs) are increasingly used to summarize quality of care and provide performance feedback to professionals. QIs are measurable elements that give insight into quality of care [2]. In 2007 the National Intensive Care Evaluation (NICE) quality registry included a set of QIs developed by the Dutch Society of Intensive Care to improve quality of Dutch intensive care units (ICUs). However, an evaluation study [3] showed barriers to quality improvement, i.e. these QIs did not show enough variation between the ICUs; the definitions of the QIs were not clear and the QIs did not give clear direction towards quality improvement activities. A good QI is relevant (relates to a clinical outcome), important (the outcome is clinically important), actionable (if performance is low it is clear how to act), valid (measures what it is supposed to measure), reliable (produces consistent results), unambiguous (defined specifically) and feasible to
register (data is easily available) [2; 4]. To further improve the quality of Dutch ICUs the development of actionable QIs is of utmost importance. A conducted Delphi method among the board members of the NICE registry identified blood product use as a medical domain where quality improvement is needed.

Blood products are frequently used in critical care to improve oxygen delivery by increasing the hemoglobin level and improve hemodynamic stability. About 30 to 50% of the patients admitted to the ICU receives a blood transfusion [5]. Blood transfusions are expensive and not without risks, e.g. they are related to an increased mortality, morbidity and complication rate [6]. A restrictive transfusion practice shows a trend towards lower mortality [7; 8]. QIs can be of great value to gain or retain a good transfusion practice.

Guidelines have been developed that describe appropriate blood use. However changing practices in response to guidelines is hindered by barriers such as lack of agreement with the specific guideline or lack of outcome expectancy or self-efficacy [9]. Feedback on good QIs developed by the field may serve as an important step towards improvement of blood product use and when accompanied by action plans it seems to be more effective [10]. Therefore, we want to support in quality improvement by delivering feedback on the QIs together with a response checklist containing concrete action plans targeting specific goals.

This paper aims to describe a modified RAND method to develop a new set of actionable QIs and a response checklist for the Dutch ICU. The method is illustrated by the results from an ongoing study on a set of QIs for blood use at the ICU.

1. Methods

To come to a final set of QIs we first performed a modified RAND approach in three steps [11; 12]. An overview of the different steps is shown in Figure 1 and described in further detail in the following sections. Second, in a pilot study validity, feasibility of data collection and reliability of the QIs will be evaluated using retrospective data coming from Electronic Patient Records used in ICUs. Finally, the set of QIs will be part of the NICE quality registry and presented to quality improvement teams by a web-based tool including a checklist with possible barriers for good performance and their solutions. Its effectiveness will be evaluated in a randomized controlled trial.

1.1. Round 1: Experts, literature and guidelines

In the first round a broad inventory of potential QIs has been performed among a panel of experts. The expert panel consisted of intensivists participating in the NICE registry who have been recruited based on their expertise and interest in the topic. In addition NICE board members were asked to approach specialists in the field other than intensive care medicine to join the expert panel. The final expert panel consisted of eight people: five intensivists, one haemovigilant, one clinical epidemiologist in transfusion medicine and one anaesthesiologist.

In addition to the expert panel that proposed QIs we performed a literature search in PubMed to identify already available QIs. The search included all articles available in Medline up to January 2014. To identify articles we used several synonyms for the following concepts: quality indicator, critical care, blood, development, based on the work by Kotter et al. [13]. These concepts were combined using the Boolean operator
“and”, the synonym search terms per concept were combined using the Boolean operator “or”. Because we were interested in all QIs on blood use, we included studies that developed or evaluated QIs for blood use, reported clinical performance/process measures, or QI statements that had positive impact on mortality, morbidity or costs.

Recent guidelines, which are based on a review of the evidence and are currently implemented in Dutch ICUs, were used to select QIs from. One of the authors (MRB) and the board member involved in the expert panel (SA) evaluated all guidelines and selected those items that were thought to be relevant, actionable and feasible as QI.

1.2. Round 2: Rating of Quality Indicators

For the second round of QI development all QIs from three different sources (experts, literature and guidelines) were joined and duplicates were removed. Using an online survey tool all members of the expert group independently rated the QIs on a 9-point Likert scale (1=totally disagree, 9=totally agree) on three different criteria 1) relevance: impact of disease or risk on health and on health expenditure; 2) actionability: if performance on the QI is low it is clear how to act; 3) feasibility: electronically availability of data.

1.3. Round 3: Discuss Quality Indicators

In the third round the results of the second round were presented to the expert panel in a face-to-face consensus meeting where the QIs were discussed. After the discussion each of the QIs have been rated individually for the second time on the three criteria on a 9-point Likert scale and, additionally, the experts gave them an overall score for usefulness. QIs with median scores of 7-9 on all three criteria [11] and an overall usefulness score higher than the median of all scores together were selected. Each of the selected QIs were fully described according to the AIRE instrument [2] and important case-mix variables to understand the selected QIs were discussed.

1.4. Response Checklist (in progress)

For each of the selected QIs barriers that lead to poor performance will be identified by the same expert panel based on the blood transfusion process. Those barriers will be categorized conform a framework for quality improvement developed by Cabana et al [9]. In preparation of a face-to-face meeting the panel members were asked to come up with possible actions to overcome these barriers. During the meeting these actions were discussed and the most appropriate ones will finally end up in the web-based response checklist supporting NICE participants in quality improvement.

2. Results

In the first round 19 unique QIs for blood product use were proposed by the experts and 9 articles were selected from the literature for full text screening. Together with the extraction of QIs from the guidelines these three sources resulted in a set of 30 concept QIs (see Figure 1). All experts rated the QIs on the three different criteria. All QIs,
except one, had a median score of 3 or higher for either relevance or actionability and a median >5 for feasibility.

During the face-to-face consensus meeting we discussed the pros and cons of all the QIs with seven panel members. It was decided that seven QIs could be combined into three composite QIs, another seven were rejected. The remaining 19 QIs were rated again on relevance, actionability and feasibility.

![Diagram of the development process]

Figure 1. Development process.

After this second round of rating the following seven potential QIs had median scores of 7-9 on all three criteria: 1) is there a protocol for blood transfusions; 2) percentage of patients that received a red blood cell transfusion; 3) units of red blood cells transfused; 4) percentage of blood products lost; 5) transfusion delay: time between lower threshold and start transfusion; 6) percentage of patients that received a plasma transfusion; and 7) number of plasma units transfused. Important case-mix variables such as admission type, diagnosis, age, and cardiac surgery to understand the QIs were defined.

To improve the indicator ‘units of red blood cells transfused’ improvement strategies included in the response checklist are for example: revise blood transfusion protocol with your hospital transfusion committee, train staff in managing blood transfusions, or talk with your clinical chemist if you do not trust your hemoglobin measurement.

3. Discussion

In this paper we described a modified RAND method to develop a new set of actionable QIs for the Dutch ICU. A set of seven QIs was generated to measure the appropriate use of blood products in patients admitted to the ICU and improvement strategies to be included in the web-based response checklist were established.

Pronovost et al [14] developed within a set of ICU QIs one QI for blood transfusion. This QI was similar to one of our QIs, however we developed a broader set of QIs to gain better insight in the quality of blood use at the ICU.

Our study has several strengths. We conducted a modified RAND approach in which scientific evidence and expert opinions were combined similar to the commonly
used and validated original method and to earlier used methods [11; 12]. We performed differently compared to the RAND method by asking experts to think ‘outside the box’, we did not gave them a package of preselected literature. Another advantage is our focus on the actionability of the QIs in the selection of the QIs. The focus on actionability of QIs will increase the chance of actually directing improvement measures and might thus improve quality of care. Furthermore, the validity of the QIs will be evaluated using retrospective data in a pilot study.

Although our method is generalizable, the generalizability of the results might be limited because of the national setting in which the QIs were developed, with a Dutch national expert panel. However, international guidelines and literature were reviewed and the expert panel consisted of members with international experience and expertise on the topic. Besides, our aim was to develop QIs for the Dutch ICUs for internal comparison.

The results of our study are a first step towards implementation of new QIs at the Dutch ICUs. When the QIs are implemented the quality of blood product use can be routinely measured and the web-based response checklist will assist ICUs in performing quality improvement.

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References