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Wide cleft between theory and practice: medical students' perception of their education in patient and medication safety

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In medicine today, future doctors are expected to ensure patient safety. Yet medical students often feel uncertain if they can meet these high expectations. This study aims to quantify the perceptions of medical students regarding the actual quality of their education in the fields of patient safety and, in particular, medication safety. A questionnaire was designed and distributed to about 100 upper-level medical students. The students had to respond to 12 questions regarding the following categories: 1) familiarity with patient safety and/or medication safety; 2) personal experience in high-risk clinical situations; and 3) perceived relevance of knowledge in the area of patient and medication Safety for clinical practice. Of the respondents 42.1% and 36.8% had delved into the topic patient safety and medication safety, respectively. In clinical practice 88.2% of respondents had experienced a high-risk situation for patients. Regarding patient safety and medication safety, respectively, 82.9% and 85.3% of the respondents found these topics to be particularly relevant to their clinical practice. This study has shown that there is a measurable discrepancy between the students' perceived quality of their medical education and their feelings that they are well prepared to cope with severe clinical challenges.

1. Introduction

Medical students are exposed to several years of theoretical education to prepare them for being experts in today's challenging medical profession. They are expected to take thorough anamneses, make correct diagnoses, and choose the most suitable therapy options and follow up procedures – all in rapid-fire and error-free succession.

However, the students often feel uncertain and ill-prepared to deal with high-risk clinical situations. There is an apparent disconnect between society's high expectation of future doctors and the medical students' perceived quality of their education. During their medical training, not only are the students expected to be well-versed in patient safety but also in the new field of medication safety, considered to be an increasingly important topic in modern medicine. According to the World Health Organization (WHO), the term "patient safety" implies all measures to avert medical errors and adverse effects in patients during their medical treatment (The National Patient Safety Foundation 2003-2008). As an example of a clinical error-rate, Brennan et al. (2004) stated that 4% of hospitalizations are related to medical mismanagement. In addition, the topic 'medication safety' is an essential part of patient safety (World Health Organisation Regional Office Europe 2013). Medication safety is defined as every measure to prevent adverse drug events (Committee of Experts on Management of Safety and Quality in Health Care (SP-SQS) Expert Group on Safe Medication Practices 2005). These measures include checking for potential and exist-

ing drug-drug interactions, minimizing human errors in drug dispensing and taking a detailed medication anamnesis. Medication safety also entails teaching healthcare professionals safe handling of drugs and also teaching patients how to properly take their medication. Efforts have been initiated to improve patient and medication safety. For example the so-called WHO project "High5-s: Action on Patient Safety" was launched in 2006 (WHO Collaborating Centre on Patient Safety 2006). The aim of this currently running WHO project is to substantially reduce or eradicate five highly prevalent patient-safety-problems in health care worldwide.

With respect to medical education, there are existing suggestions about how to improve medical school curricula by addressing patient safety issues (European Union Network for Patient Safety 2010, World Health Organisation 2011). These comprise big catalogues containing relevant recommendations for designing a comprehensive medical school curriculum (European Union Network for Patient Safety 2010; World Health Organisation 2011).

Even so, the current curricula often fall short: Several medical student questionnaires have pointed out that there is still a need for a further concentration on patient safety (Toennessen et al. 2013; Patey et al. 2007; Leung and Patil 2010; Carruthers et al. 2009; Ginsburg et al. 2013; Almaramhy et al. 2011). These cited questionnaires however, evaluated the students' attitudes and/or knowledge only about patient safety and not about medication safety. To the best of our knowledge, no study has systematically examined the perceptions of upper-level medical students

towards the quality of their training, in particular, regarding both fields — patient safety as well as medication safety. As it does not suffice to merely guess what students think, there is a need to quantitatively assess these perceptions.

The objective of this current study is to quantify the perceptions of upper-level medical students about how they view their education in patient safety and medication safety.

2. Investigations and results

2.1. Method

A questionnaire about the perceptions of medical students regarding aspects of patient and medication safety, was developed based on relevant questionnaires (see Toennesen et al. 2013; Patey et al. 2007; Leung and Patil 2010; Carruthers et al. 2009; Ginsburg et al. 2013; Almaramhy et al. 2011; Lauterberg et al. 2012). A student evaluation form from RWTH Aachen University was also used to compile this completely new questionnaire.

As a pre-test the questionnaire was first sent to ten experts in medicine/pharmacy in order for them to first evaluate clarity, simplicity and comprehensibility of the questions.

The questionnaire, consisting of 12 questions, was distributed to about 100 upper-level (10th semester) medical students of RWTH Aachen University, Medical School, Aachen, Germany during the summer semester of 2012. The study cohort consisted of 76 students who responded. In addition to socio-demographic data, the questions comprised the following categories: 1) Familiarity with patient safety and/or medication safety; 2) Personal experience with high – risk clinical situations; and 3) Perceived relevance of knowledge in the area of patient safety and medication safety for clinical practice.

On hand of three yes/no questions, data were acquired about awareness and familiarity with ‘patient safety’ and ‘medication safety’, and whether respondents were willing to participate in a newly offered education module named “patient and medication safety”. First, the students were asked if they had ever heard about the terms patient safety/medication safety. Then these terms were defined and the students were asked if they had ever delved into these topics.

If they had not participated in the aforementioned module, they were asked to put a check mark next to given answers why not. A six-point rating scale was used in questions about students’ opinions on the relevance of the topic patient safety and medication safety and adequacy of preparation for the upcoming challenges in everyday clinical work. Lower values reflected a more positive attitude (1 = “strongly agree”, 6 = “strongly disagree”). In addition, the students were asked to make a check mark in a given list next to the two biggest sources of risks to patients in hospitals.

Regarding how often the students experienced situations in which the patients were endangered, the students had to answer on a scale of: ‘never’ – ‘rarely’ – ‘sometimes’ – ‘often’. Finally, beside socio-demographic characteristics, we attempted to gain information about past experiences concerning patient care, expressed in months and we asked whether the current medical studies were their first education in a health care profession.

The Ethic committee of the RWTH Aachen University determined, that the conduction of this anonymous survey was exempt from review.

The entire group of tenth-semester students (n = 220) was informed by email about the research project and the survey date. The participation was voluntary and data acquisition and analysis anonymous. The questionnaire was administered after a regular lecture. Out of about 100 students who attended the lecture, 76 completed the questionnaire. In relation to the num-

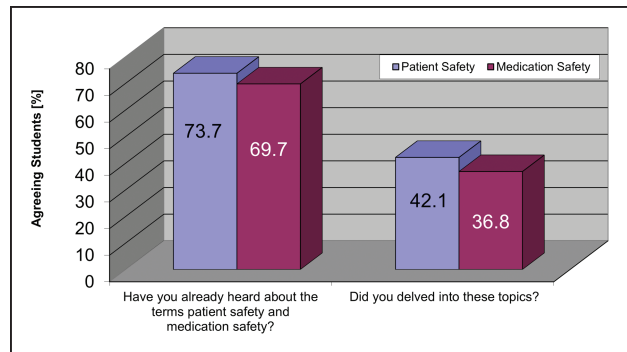


Fig. 1: Agreeing students to the question about familiarity with the terms “patient safety” and “medication safety” and to the question if they had delved into the topics.

ber of invited students (n = 220) this represents a response rate of 34.5%.

Data analyses were performed with IBM SPSS® Statistics 21 software. Degree of association between variables was measured by calculating Spearman’s correlation coefficients.

2.2. Results

2.2.1. Sample size

Out of 220 possible participants, 76 upper-level medical students took part in the survey. The ratio of female (72.4%, n = 55) and male (27.6%, n = 21) students nearly reflects the normal gender distribution among medical students at RWTH Aachen University, Medical School (RWTH Aachen University 2013). The mean age was 26 years (SD = 2.805). Eighty percent of the respondents declare that their current medical studies were their first education in the health care profession.

On average, the respondents had 15.75 months of experience (min = 0, max = 120) in patient care. This mean value correlated with a previous education in a healthcare profession (Spearman’s rho = 0.434, p < 0.001).

The following results are grouped into the three categories as defined above.

2.2.2. Familiarity with patient safety and/or medication safety

Of the respondents 73.7% were familiar with the term patient safety (n = 56) and 69.7% were familiar with the term medication safety (n = 53). However, after reading a valid definition of these terms, 42.1% (patient safety, n = 32) and 36.8% (medication safety, n = 28) of students confirmed they had delved into these topics (Fig. 1).

2.2.3. Personal experience with high-risk clinical situations

Students were asked to select for two main sources of risk for patients being treated in hospital. The results were compared with a national German hospital survey with the same purpose (Lauterberg et al. 2012). Figure 2 illustrates the answers to both surveys. According to the students’ responses, the main source of risk was hygiene with 75% (n = 57, Lauterberg et al. 2012: 32.2%). Of the respondents, 19.7% (n = 15) indicated ‘Transitions of care’ as an important risk source (Lauterberg et al. 2012: 46.5%).

Drug therapy was recognized as the second main source of risk in the current survey and the national one (mean = 50%, n = 38; Lauterberg et al. 2012: 34.3%).

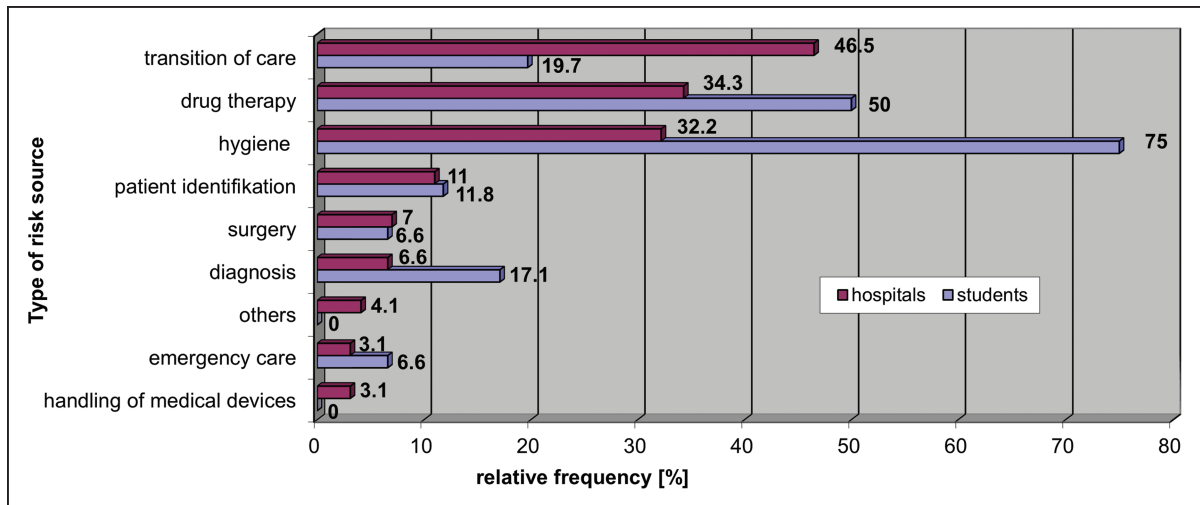


Fig. 2: Student's assessment of the two main risk sources in clinical practice. Their answers are compared to the assessment of hospitals in a national survey conducted by Lauterberg et al. (2012), presented as percentage distribution.

Only eight students (10.5%) had not experienced any high-risk situation in which a patient was endangered. Every third student (32.9%, $n=25$) was 'sometimes' or 'often' involved in such a high-risk situation (Fig. 3). The students' practical experience in patient care correlates in a weak extent to their experience in risky situations (Spearman's $\rho=0.326$, $p=0.007$).

2.2.4. Perceived relevance of knowledge in the area of patient safety and medication safety for clinical practice

The survey was conducted for medical students in their final semester of theoretical training and administered shortly before starting their practical clinical year. Of the students 30.3% declared themselves not adequately prepared for clinical practice ("disagree", "strongly disagree"; $n=23$). Of the participants, 60.5% (patient safety; $n=46$) and 63.1% (medication safety; $n=48$) assessed themselves as moderately prepared ("somewhat agree", "somewhat disagree") [item mean 3.87 ± 1.112 ; 3.97 ± 1.070]

The high relevance of knowledge in the area of patient safety and medication safety for clinical practice was adhered by 82.9% (patient safety) and 85.3% (medication safety) of students ("strongly agree", "agree") [item mean 1.71 ± 0.745 ; 1.68 ± 0.808].

Of respondents, 67.1% and 75% showed a high interest in participation in the educational module for Patient Safety ($n=51$) and Medication Safety ($n=57$), respectively.

The majority of them had never participated in the offered program. The main reasons for non-participation were: lack of information about the existing program (65.8% of students,

$n=50$), lack of interest (32.9% of students, $n=25$), lack of time because of overloaded medical curriculum (11.8% of students, $n=9$).

3. Discussion

This was the first questionnaire ever held at a German medical school to evaluate how 10th semester medical students perceived their education in patient safety and medication safety. Tenth semester students were chosen since they are thought to be at the height of their knowledge and are finishing their last theoretical semester before entering their practical year.

Unlike a questionnaire study by Toennesen et al. (2013) this current study did not ask about a student's actual knowledge in the fields of patient safety and medication safety but rather about the degree of their familiarity with these themes.

At RWTH Aachen University Medical School, less than half of the students delved into the issues of patient or medication safety. This means that many students are not well prepared for their clinical practice in these fields.

Regarding the German national survey (Lauterberg et al. 2012) and this current study, both cohorts of respondents identified the same three main risk sources but in different order of importance. Whereas the German national survey of experts listed 'Transition of care' 'drug therapy' and 'hygiene' as the most important topics in this order, the RWTH students listed as most significant the source 'hygiene', followed by 'drug therapy' and lastly, 'transition of care'. Consequently, this discrepancy in responses reflects a lack of sensitivity of the students during their theoretic-

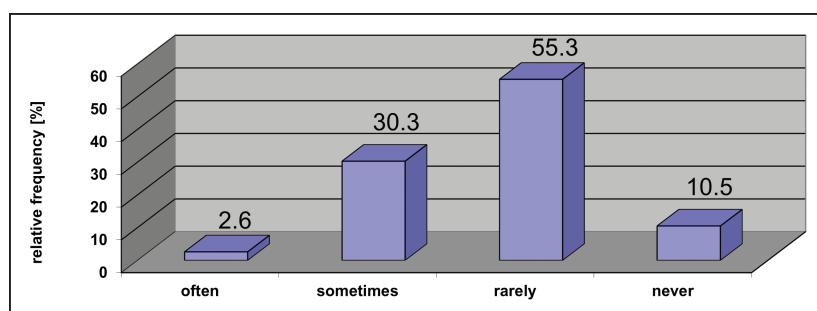


Fig. 3: Students' experience in high-risk situations in which a patient was endangered.

cal medical education about the crucial importance of ‘transition of care’.

In addition, the current results show that 88.2% of the students had already encountered high-risk situations during clinical training and that students feel unprepared for clinical work. This agrees with results of Warholak et al. (2011a, b) and Toennesen et al. (2013).

The aforementioned educational module “patient and medication safety” has been offered at RWTH Aachen University since 2010. However, only a minority of students realized how important the topic was and participated. Many of the students did not even know it existed. This lack of awareness about the module should be addressed. It may reflect a general lack of time.

Although patient safety is becoming popular in both national and international context, adequate safety education is not part of regular medical education. Consequently, students are not familiar with the issue, which is confirmed by our survey. All health care professionals should receive a basic level of Patient Safety awareness during their medical studies. Regarding medication safety, the current study shows that many students were aware of medication related risks, but at the same time, they recognized that further education in medication safety is needed. Safety topics should contain two key parts: patient and medication safety.

The cohort represents 35% of the tenth semester medical students, even though the entire class was informed about the study. Therefore there may be a self-selection bias. Students who had decided to participate in the survey are more likely to be very interested in the topic. On the other hand, the absent students could be considered as disinterested students. Even though it would be better to have a 100% respondents, this is impossible due to privacy issues. Moreover, there may be a tendency for students to answer questions in a socially acceptable outcome (social desirability bias).

In conclusion, this study has proven that there is a wide cleft between the students’ perceived quality of their medical education and their feeling of being well-prepared to face clinical challenges. This implies that there is a realistic need for adding modules regarding patient safety and, in particular, medication safety, into the fixed medical curriculum. To ensure excellent healthcare in the future, it is urgent to sensitize medical students early-on during their studies about the relevance of both patient safety and medication safety. In particular, they need to know how to handle issues such as critical drugs, drug-drug interactions, and dealing with mistakes. It is also important for students to know how to implement international risk-management guidelines in clinical practice.

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