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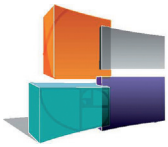

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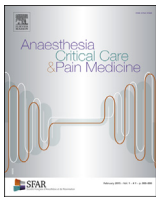

Original article

Residents in tutored practice exchange groups have better medical reasoning as measured by the script concordance test: A pilot study

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ABSTRACT

Background: This pilot study attempted to evaluate the impact of a practice exchange group (PEG) tutored by a senior anaesthesiologist on clinical reasoning performance of anaesthesiology residents for uncertain situations. Changes in clinical reasoning were measured by script concordance tests (SCT).
Methods: First, a curriculum, with educational objectives and assessment tools, was proposed to all residents at the beginning of their 6-month training. The first group (control) consisted of residents undergoing a 6-month rotation without PEG training. The second group (PEG group) consisted of the residents starting a new rotation 6 months later, who followed a weekly PEG session. In both groups, clinical reasoning was assessed in the same manner, with SCTs, multiple-choice questions (MCQs) and questions with short answers. The primary outcome measurement of this study was the SCT results in the group with PEG training (PEG group) in comparison with those without (control group).
Results: The performance in the SCT, expressed as the degree of concordance with the panel [95% confidence interval or CI], was better in the PEG group including 19 residents (72 [68 to 76] %) as compared to the control group including 17 residents (60 [57 to 63] % $P < 0.001$). Performances (mean [95% CI]) in MCQs and short answers were better in the PEG group (64 [57 to 71] and 74 [68 to 72] %, respectively) when compared with the control group (32 [28 to 36]% [$P < 0.001$] and 60 [52 to 68] % [$P < 0.01$], respectively).
Conclusion: Our pilot study suggested that a senior-directed, peer-conducted educational training might improve the clinical reasoning of anaesthesia residents as measured by the SCT.

1. Introduction

The on-call period is an important component of anaesthesiology residency training because residents practice technical skills and more importantly apply appropriate clinical reasoning to unresolved cases where clinical information may be incomplete and uncertainty may exist. The patient's condition may be critical, which does not allow enough time to perform all required investigations and unstable vitals potentially render professional guidelines difficult to apply. In addition, no established recommendations are available regarding specific anaesthesiology residency training in this context of uncertain anaesthesia care.

Peer learning or peer teaching is a method in which the student plays a direct role, not only as a learner but also as a teacher, by taking an active part in debates between peers [1]. This method has shown its efficacy on the education of clinical reasoning [2]. It is used particularly in the context of practice exchange groups (PEGs), also called peer or quality groups [3]. A PEG consists of a small group made of physicians drawn from the same specialty (peers) who meet regularly to review patient cases extracted randomly from their daily practice [4]. For each case, an exchange between participants leads to a confrontation of practices. At the end of the discussion, practitioners have to agree on a specific direction for action. If no satisfactory solution can be agreed upon, a literature search is then initiated. In the context of continuing

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medical education, the purpose of PEGs is to improve the quality of care, in comparison with peers and with medical frames of reference [3]. This methodology has also been successfully used for initial medical training [2,5] but, to our knowledge, it has not yet been used in anaesthesiology when residents are confronted with uncertain situations.

Therefore, this pilot study attempted to evaluate the impact on clinical reasoning during anaesthesiology residency training based on a PEG tutored by a senior anaesthesiologist. Changes in clinical reasoning applied to anaesthesia practices during uncertain adult general surgery or obstetric situations were assessed by using a panel of tools, including the script concordance test (SCT).

2. Material and methods

Residents in the anaesthesiology training program at Rouen University were invited to participate as subjects in the study. This prospective study took place over an 18-month period from May 2009 to November 2010 and consisted of two stages. The first stage was the development of a 6-month resident curriculum by a panel of academic and staff anaesthesiologists for uncertain situations with the establishment of educational objectives and assessment tools. The Ethics and Evaluation Committee for Non-Interventional Research at the Rouen University Hospital approved the study. All participants received information before any study procedures were undertaken. Afterwards, residents in the anaesthesiology training program were invited to willingly participate as subjects in the study.

These new educational objectives were given to all residents at the beginning of their 6-month rotation in our institution. Two resident groups were included 6 months apart without randomization. The first group was the control group and consisted of residents undergoing their 6-month rotation without PEG training. The second study group (PEG group) consisted of the residents starting their new rotation in our institution 6 months later and who underwent a weekly PEG session. In both groups, at the end of the training period, each resident had clinical reasoning assessed in the same formal manner, which consisted in a SCT, multiple-choice questions (MCQs) and short-answer questions. A MCQ was a question in which residents were asked to select the best possible answers out of the 5 choices from a list. The short-answer questions were about a clinical case realistically approaching situations that were experienced by residents.

The primary outcome measurement in this study was the resident performance as measured by the SCT with and without weekly PEG sessions. Secondary outcomes were the impact of this new program on the MCQs and short-answer questions.

2.1. Learning objectives

A panel of academic and staff anaesthesiologists, including three academics and 20 staff anaesthesiologists, all involved in uncertain anaesthesia and critical care for adult general surgery and/or obstetrics at the Department of Anaesthesia and Critical Care of Rouen University Hospital and the Dieppe General Hospital, was established. They were interviewed openly based on pedagogic and knowledge goals linked with residency training for anaesthesia and critical care in emergency situations. Objectives were then synthesized and transmitted to all participating residents.

2.2. Establishment of a tutored PEG

Each week in the PEG group, anaesthesia residents met at the University Hospital for 90 min under the supervision of a senior academic teacher. Four residents individually presented an anaesthetic situation they had to deal with during a recent uncertain anaesthesia period (2 obstetric cases and 2 adult uncertain surgery cases per week) to their peers. These cases represented either situations linked to difficulties associated with intensive care or came from daily practice. Following case presentation, there was an open discussion and the residents compared their practices. At the end of the exchange, the senior anaesthesiologist helped when necessary to reach a final joint consensus with the approval of the entire group. The senior teacher routinely insisted on the importance of clinical reasoning based on a single diagnostic decisional tree (in order of probability), additional examinations to be performed and medical care according to the degree of severity. In addition, a review of physiology and physiopathology was performed by the group.

2.3. Assessment of clinical reasoning

The same SCT was used as the main evaluation tool at the end of the 6-month training period for the control and PEG groups. The SCT confronted the residents with authentic uncertain clinical situations which were described in vignettes, each of them corresponding to one of the previously set objectives. The clinical situations were problematic even for experienced clinicians, either because there were not enough data or because situations were ambiguous. There were several options for diagnosis, investigation or treatment. The items (questions) were based on a panel of questions that an experienced clinician would consider relevant to this type of clinical setting. The item was consistent with the presentation of relevant options and new data (not described in the vignette). The task for the student consisted in determining the effect this new data had on the status of the option. An example of items from the therapeutic section of the test is illustrated in Table 1.

The SCT included 15 vignettes describing clinical situations that residents could be confronted with. Each vignette included three items. The first item either included a diagnostic hypothesis, plan for investigation or a treatment recommendation (Table 1). Then, new information (a sign, a symptom or a result of investigation) was presented. The resident's task was to assess, using a 5-point Likert scale, the influence of this new element on the diagnostic hypothesis, the plan for investigation or the treatment. The different points on the scale corresponded to positive values (the option was enhanced by the new data), neutral ones (the data did not change the status of the option) or negative ones (this option was ruled out by the data).

The scoring system was based on the principle that any answer given by one expert had an intrinsic value, even if that answer did

Table 1
Example of a script concordance test (SCT) applied to the case of a 20-year-old female patient admitted for a laparoscopic appendectomy for whom anaesthesia must be induced.

If you were considering doing	And then you find	The effect on the relevance of this treatment becomes
Preoperative nasogastric tube	Fasting for 6 hours	−2 −1 0 +1 +2
Rapid sequence induction	No preoperative nausea and vomiting	−2 −1 0 +1 +2
Intravenous midazolam premedication	Preoperative anxiety	−2 −1 0 +1 +2

−2: contra-indicated totally or almost totally; −1: not useful or even detrimental; 0: neutral; +1: useful; +2: necessary or absolutely necessary.