

Effects of a simulation-based sedation training course on non-anesthesiologists' attitudes toward sedation and analgesia

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Received: 21 September 2013 / Accepted: 2 January 2014 / Published online: 18 January 2014
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Abstract The purpose of this study was to conduct a survey of emergency or complication during sedation and change of attitude toward sedation by simulation-based sedation training course (SEDTC) hosted by the Japanese Association of Medical Simulation. We used a questionnaire survey to non-anesthesiologists who participated in the 1st to 13th SEDTCs from 2011 to 2012. Survey contents included emergencies or complications during sedation and impressions of the Sedation and Analgesia guidelines for non-anesthesia doctors developed by the American Society of Anesthesiologists. Of 84 non-anesthesiologists, 81 have encountered patient respiratory suppression. More than 70 % non-anesthesiologists have encountered patient respiratory arrest. All non-

anesthesiologists have encountered patient cardiac suppression; 20–30 % of non-anesthesiologists have encountered patient anaphylaxis, asthma attack, and cardiac arrest; and all non-anesthesiologists have encountered patient vomiting and about 80 % aspiration. Non-anesthesiologists largely accepted the guidelines. SEDTC attendance improved significantly 13 points of 18 important suggestions. As non-anesthesiologists experience several complications during sedation, SEDTC may be useful for the improvement of their attitude toward the safety management of sedation.

Keywords Sedation and analgesia · Simulation training · Non-anesthesiologist · Guideline

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In 1993, the American Society of Anesthesiologists published 'Practice Guidelines for Sedation and Analgesia by Non-Anesthesiologists (ASA-SED),' which was updated in 2002 [1]. This guideline indicates recommendations and cautions for non-anesthesiologists to perform effective and safe sedation and analgesia. This guideline defines and emphasizes that sedation is a continuum to general anesthesia. High-quality, safe sedation needs preoperative patient examination, confirmation of fasting time, appropriate monitoring, adequate emergency equipment, compliance with the principles of drug administration, and validation of discharge criteria. In addition, practitioners should always be aware that the level of sedation can change with circumstances [1].

In 2011, the Japanese Association of Medical Simulation established the simulation-based sedation training course (SEDTC), which is performed for the improvement of sedation and analgesia safety for non-anesthesiologists. The SEDTC consists of a practical involving four sections:

a lecture about ASA-SED, discussion about several sedatives and analgesics utilizing cardiac simulation, basic airway management utilizing a manikin, and scenario-based training utilizing a simulator. The participants were expected to demonstrate (1) appropriate preparation for sedation, (2) appropriate management of drug-induced hypoxia and/or shock, and (3) effective communication skills.

In SEDTC, we mainly focus on the knowledge and skills of sedation. However, in real situations, the attitude of medical staff toward sedation safety is the most important factor. We focused particularly on the experience of complications during sedation and factors about safety management to perform sedation and evaluated them by questionnaires before and after SEDTC for non-anesthesiologists.

This study was approved by the institutional review board of Hyogo College of Medicine, and response to the questionnaire was considered as their consent to the study. We performed the questionnaire survey before and after the SEDTC. The questionnaire was performed from the 1st to the 13th SEDTC from 2011 to 2012. We excluded nurses, anesthesiologists, and initial trainee doctors. We analyzed the questionnaire results from only non-anesthesiologists to clarify the real situations about sedation that concern them. Survey content included emergencies during sedation, monitoring and airway management devices and techniques, and impressions of the ASA-SED. Questionnaire answers utilized a 5-point scale: ‘Very often,’ ‘Often,’ ‘Rare,’ ‘Have experience,’ and ‘No experience’ for

emergencies or complications during sedation, and ‘Strongly agree,’ ‘Agree,’ ‘Equivocal,’ ‘Disagree,’ and ‘Strongly disagree’ for attitude toward ASA-SED recommendations. Questions about emergency or complications during sedation were presented before the SEDTC lecture; those about attitudes toward ASA-SED were presented both before and after SEDTC.

For statistical analysis, we applied the Mann–Whitney *U* test for comparison of attitude to ASA-SED recommendations before and after the SEDTC. $P < 0.05$ was considered statistically significant.

In this study, the 176 medical staff participants included 90 non-anesthesiologists; 84 non-anesthesia doctors answered the questionnaire, providing the results for data analysis (response rate, 93.3 %). The total of 84 non-anesthesia doctors (50 men, 34 women) had an average clinical experience of 7.9 ± 4.2 years: their specialties are emergency medicine (10), dentistry (44), internal medicine (20), surgery (8), pediatrics (1) and obstetrics/gynecology (1).

The complications and emergencies non-anesthesiologists have encountered during sedation are shown in Fig. 1: 81 of 84 non-anesthesiologists have encountered patient respiratory suppression during sedation, more than 70 % of non-anesthesiologists have encountered patient respiratory arrest, all non-anesthesiologists have encountered patient cardiac suppression, 20–30 % of non-anesthesiologists have encountered patient anaphylaxis, asthma attack, and cardiac arrest, all non-anesthesiologists have encountered patient vomiting, and about 80 % of non-anesthesiologists have encountered aspiration.

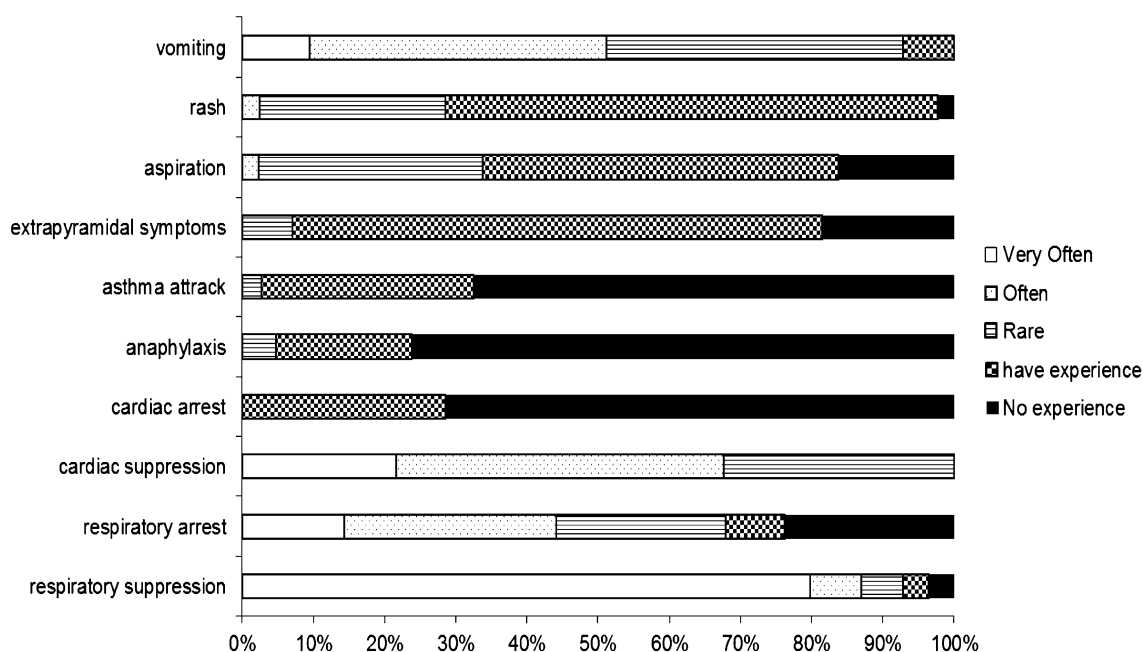


Fig. 1 Participants' answers about several complications they have encountered during sedation

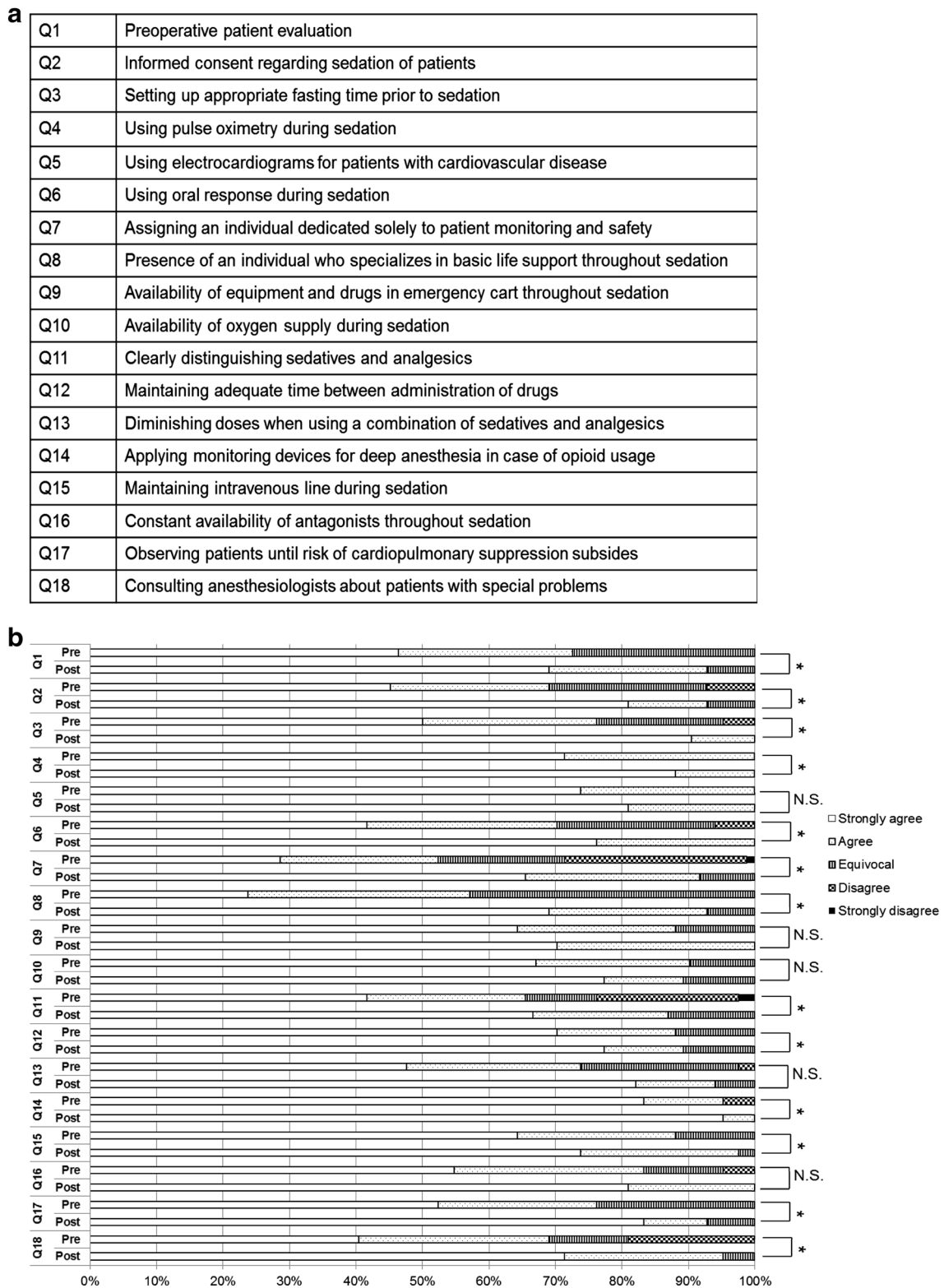


Fig. 2 Effect of simulation-based sedation training course toward attitudes to sedation and analgesia of non-anesthesiologists. a Questionnaire content before and after the sedation training course. b Comparison of attitudes toward various points of guideline for

sedation and analgesia between pre- and post-course participation. Statistical analysis was performed before and after the course. *N.S.* not significant. **P* < 0.05

Before SEDTC, non-anesthesiologists generally accepted the recommendations of the ASA-SED. However, about 20–30 % disagreed about the points ‘Place individual who is dedicated solely to patient monitoring and safety,’ ‘Distinguish sedatives and analgesics clearly,’ and ‘consult anesthesiologists about patient with special problems.’ After SEDTC, none of the participants showed disagreement with all recommendations. SEDTC participation significantly improved attitude toward 13 of 18 recommendations ($P < 0.05$) (Fig. 2).

Worldwide, procedural sedation is administered by a diverse group of practitioners to patients of all ages in a variety of clinical specialties [2–4]. However, sedation includes a continuum of states of consciousness, progressing from mild through moderate to deep sedation and to general anesthesia, and it is not always possible to predict how an individual patient will respond [5, 6].

Although target levels of sedation have been defined, the actual level of sedation in patients may easily fluctuate. One closed-claims analysis demonstrated that the most common source of injury during procedural sedation is respiratory depression as a result of oversedation [7].

At times, these sedation practices may result in cardiac or respiratory depression, which must be rapidly recognized and appropriately managed to avoid the risk of hypoxic brain damage, cardiac arrest, or death [8].

Our results revealed that almost all non-anesthesiologists had encountered events of respiratory and cardiac suppression. Notably, more than 80 % of non-anesthesiologists answered that they often encounter respiratory suppression. This finding implies that patients sedated by non-anesthesiologists often encounter the risk of respiratory arrest leading to emergency. Thus, non-anesthesiologists should undergo some training for basic airway management such as the bag-valve mask or supraglottic airways such as the laryngeal mask. As for vomiting and aspiration, all non-anesthesiologists had experience with vomiting, and aspiration accompanying vomiting may cause critical complication such as Mendelson’s syndrome. To avoid severe vomiting and aspiration, compliance with the fasting period is important [1, 9].

Regarding attitudes toward ASA-SED, some of the non-anesthesiologists disagreed about the points of placing an individual dedicated solely to patient monitoring and safety, distinguishing sedatives and analgesics clearly, and consulting anesthesiologists about patients with special problems. This finding implies that non-anesthesiologists may not understand the effects of drugs used for sedation and analgesia, which can cause severe complication during sedation. Attending the SEDTC largely improved the attitudes to ASA-SED. Notably, the numbers of those disagreeing almost disappeared in regard to almost all recommendations.

SEDTC based on ASA-SED was developed for the improvement of medical safety about sedation. The effect of the training on non-anesthesiologists’ attitudes toward ASA-SED was apparent. We should further improve the content of the simulation course to satisfy the needs of non-anesthesiologists in the future [10].

Anesthesiologists who have varied and deep understanding and experience concerning respiratory physiology, airway management, and administration of sedating and analgesia drugs should lead the safety management of the whole hospital. For the improvement of safety management of sedation, we should not only educate medical staff about knowledge or techniques of sedation but also reconstruct the system of sedation. For example, the persons who develop safety systems should state the obligatory monitoring and determine the standard of discharge. Not only deep understanding of sedation principles and safety management by individuals but also construction of a system of medical safety in the entire hospital is important [11]. We conducted a survey of emergencies or complications during sedation and change of attitude toward sedation by SEDTC participants. SEDTC participation may improve the attitude of non-anesthesiologists toward sedation and analgesia.

Conflict of interest The authors have no affiliation with any manufacturer of any device described in the manuscript and declare no financial interest in relationship to the material described in the manuscript. Financial support for the study was provided by our institution and department.

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