Pediatric Anesthesia

Pediatric Anesthesia ISSN 1155-5645

ORIGINAL ARTICLE

Quality of handover in a pediatric postanesthesia care unit*

Florian Piekarski[1], Jost Kaufmann[2], Michael Laschat[2], Andreas Böhmer[3], Thomas Engelhardt[4] & Frank Wappler[2,3]

1 Medical Faculty of Health, Witten/Herdecke University, Witten, Germany
2 Department of Pediatric Anesthesiology, Children's Hospital of Cologne, Köln/Cologne, Germany
3 Department of Anesthesiology and Intensive Care Medicine, Witten/Herdecke University, Köln/Cologne, Germany
4 Department of Anaesthesia, Royal Aberdeen Children's Hospital, Aberdeen, UK

What is already known

- Handovers in adults are known to be incomplete concerning most information expected to be transferred to PACU.

What this article add

- There is a great gap between documented patients' information and information transferred during handoff.

Implications for translation

- Postoperative handoffs require more attention by involved personal to increase transferred information to prevent adverse events. Studies investigating improvement techniques for handoffs in pediatric anesthesia are required.

Keywords
patient handover; postanesthesia care unit; checklist; risk management; children

Correspondence
Florian Piekarski, Department of Pediatric Anesthesiology, Children's Hospital of Cologne, Amsterdamer Str. 59, D-50735 Köln/Cologne, Germany
Email: Florian.Piekarski@uni-wh.de

Section Editor: Dean Kurth

Accepted 10 February 2015

doi:10.1111/pan.12646

***Presented in part as a poster at the Capital Congress of the German Society of Anesthesiology and Intensive Care Medicine, Berlin, Germany, September 2013.**

International clinical trials registry platform – ICTRP: ClinicalTrials.gov Identifier: NCT02114866.

Summary

Background: The quality of anesthetic handovers to postanesthesia care units (PACU) is known to be poor in adults, and only very limited reports are available regarding the quality of handovers in pediatric anesthesia. In particular, it is not known which and in what quality information is communicated. This current study investigated, therefore, the presence of any handover component as well as its consistency in a pediatric postanesthesia care unit.
Methods: This prospective observational study evaluated postoperative anesthetic handovers to a pediatric PACU using a detailed checklist, comprising 55 possible items. The main outcome measure was the proportion of information verbally transmitted in relation to the written documentation within the anesthesia record.
Results: Four hundred and forty-three handovers were observed with two handovers excluded due to missing data. Type of surgery (93% [95% CI 91–95]) and any intra-operative regional anesthesia (89% [95% CI 85–94]) were most frequently communicated. Items such as ASA-PS (3% [95% CI 2–5]) and fluid management (4% of cases [95% CI 2–6]) were rarely handed over. Eleven of the 55 items contained within the checklist were communicated in more than 70% of patients.
Conclusions: The observed handovers to PACU staff were incomplete and missing important information. However, omission of essential information potentially compromises patient safety. A standardized universal mandatory handover protocol following pediatric anesthesia is required.

Introduction

Patient handover is an interactive process of transferring patient-related information from one caregiver to another and is essential to ensure continuity and safety of patient care (1). The Joint Commission showed that in over 60% of all adverse events, a communication failure can be identified as the root cause (2).

Postoperative handovers in adult anesthesia are known to be informal and inconsistent. As a result, even information considered important is frequently omitted (3–7).

The majority of children undergoing surgery are healthy (ASA-PS I or II) and require only minor surgical interventions (8). Consequently, less information requires transfer, and a complete and consistent handover should be possible in a pediatric postanesthesia care unit (PACU). This applies in particular to important and relevant information such as respiratory comorbidities, which may require immediate interventions (9–11).

Previously, only one study investigated handovers in a pediatric PACU reporting if each of selected five 'key components' were mentioned (12). However, this study did not report if that information was initially available or indeed accurately communicated. This current study investigated, therefore, the presence of any available handover component as well as its consistency in a pediatric postanesthesia care unit.

Methods

This study was approved by the Ethics Committee (IRB) of the University of Witten/Herdecke, Germany (Ref: 110/2012), registered with the ClinicalTrials.gov Register (Ref: NCT02114866) and conducted between November 2012 and March 2013. The ethics board determined that informed consent from a parent or legal guardian was not required due to the solely observational data collection without any interference with the established standard of perioperative medical care.

Any patient (<18 years) who underwent elective interventions and was admitted to the main PACU during normal operating hours at Children's Hospital Cologne was eligible for inclusion. All patients had their preoperative findings documented on the anesthesia chart by an anesthesiologist during the preoperative visit.

Any potential handed over information was documented on a prior developed checklist (Data S1). The items used on this checklist were based on the German standard anesthesia record. These items were further refined and supplemented. During an initial period of 1 week, the proposed study checklist was tested for its usability and completeness. Verbal handovers were documented using the checklist and every item was cross-checked with the anesthesia and patient record. These initial handover observations were reviewed within the study group and the final study checklist implemented as the observation study protocol.

The handover checklist was divided into three sections: preoperative, intra-operative, and postoperative, and contained a total of 55 items. The preoperative section included all available information such as name, age, weight, underlying disease, ASA-PS, and other anesthesia-associated risks. Intra-operative data contained detailed information about the conduct of anesthesia including airway management, hemodynamic records, and administered drugs and fluids. The postoperative section described information for postoperative care such as pain management and PACU discharge plans.

One investigator (F.P.) observed all handovers and documented all transferred information. This investigator was not involved in the care of patients or communication. The anesthesia record was checked then the 55 items on the checklist and if documented, the item was marked on the checklist as well.

All members of the department for pediatric anesthesia were aware of the observational study at the start but not of the content of the checklist. No communication with the observer was permitted during the study.

The main outcome measure was the proportion of information verbally transmitted in relation to the written documentation within the anesthesia record.

Sample size planning and statistical analysis: based on data of a comparable study in adults, a minimum of 400 handover observations were required for a hypothetical rate of 10% missing communication of an item and a confidence interval of ±3% (6). Data were entered into a spreadsheet (Excel 2011; Microsoft Corporation, Redmond, WA, USA) and verified independently by a second investigator. A descriptive analysis of quantities and percentages was performed using spss 21 (IBM Corp., Armonk, NY, USA).

Results

During the 15-week study period, 443 patient handovers were observed and two handovers excluded due to missing data.

Preoperative information reported to PACU staff is presented in Figure 1. Patient names were reported in 69% (95% CI, 66–74), their age in 62% (95% CI, 57–67), and the ASA-PS in 3% (95% CI, 2–5) of all handovers. If documented on the charts, relevant anesthesia-

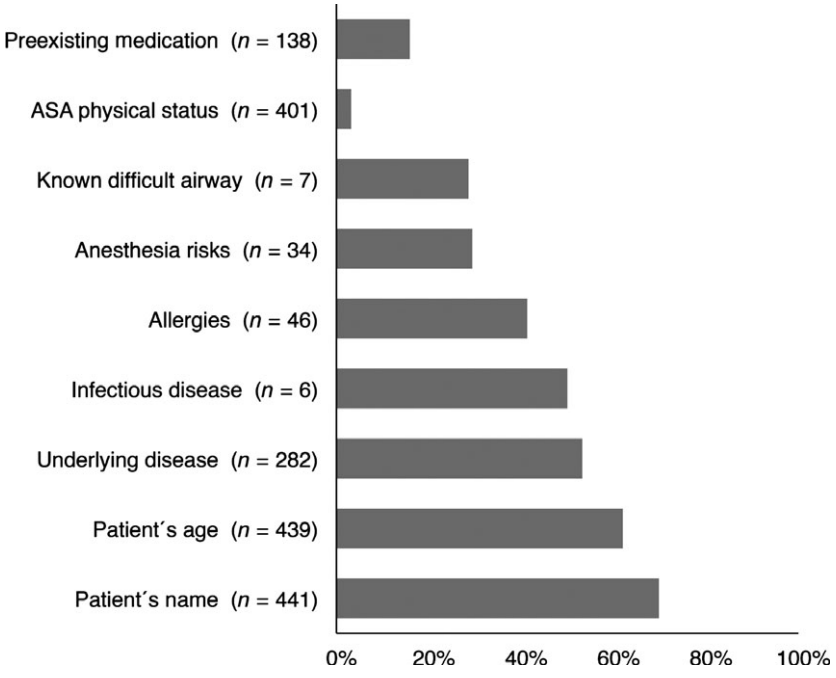

Figure 1 Preoperative data documented and verbally communicated during handover, *n* = observed number of cases.

related risks were communicated in 30% (95% CI, 25–35).

Preexisting conditions (Figure 2) such as congenital heart defects (CDH) were verbally communicated in 29% (95% CI, 13–45).

Intra-operative handover information is illustrated in Figure 3. Type of surgery was communicated in 93% (95% CI, 91–96), general anesthesia technique in 64% (95% CI, 60–69), intra-operative fluid management in 4% (95% CI, 2–6), and intra-operative relevant anesthesia episodes in 42% (95% CI, 28–55) of all handovers.

Details for postoperative handover orders are shown in Figure 4. Pain management instructions were given in 10% (95% CI, 7–13) and PACU discharge criteria in 20% (95% CI, 14–26) of all observations.

Patient age (2 of 441 cases), ASA-PS (40 of 441 cases), and the type of surgery (4 of 441 cases) were neither documented in the anesthesia record nor mentioned during handover.

Discussion

This study reports that the postoperative handovers in a pediatric PACU were grossly incomplete. The documented fact that miscommunication is responsible for up to 85% of hospital sentinel events and may lead to adverse events (13) make these findings alarming.

Multitasking (14) or lack of time (4) as possible interferences have previously been identified to influence the quality of the handovers. In addition, a chaotic environment, an informal handover structure, and lack of knowledge are other known reasons for communication failure (15). There are several other possible reasons for the results of this investigation. These include items considered not important for handover and which were resolved as part of the anesthetic conduct (difficult IV access, difficult airway leading but tracheostomy *in situ* at start). The assessment of the ASA-PS has a high inter-user variability in pediatric anesthesia (16). Therefore, it might be perceived as inconsequential to report an ASA-PS<3. The handover of preexisting congenital heart defects (CDH) was alarmingly low, however, a closer analysis of the underlying CHD revealed that the majority of these patients presented with an atrial septal defects type II (ASD II) without any expected clinical relevance. Long established PACU standards for postoperative analgesia may have contributed to convey little verbal instructions for analgesia especially when a regional anesthesia was performed. It is, therefore, not possible to determine the reasons why specific items were better communicated than others. This may require interviews of the anesthesiologist.

It is essential to understand that some items are essential for a safe handover and should be considered mandatory. This includes the name of the patient, the weight, and type of anesthesia (3). Administration, dose, and timing of drugs (analgesics, muscle relaxants, and anti-emetics) may require transferring to minimize drug errors and trigger medical interventions (17). Knowledge of preexisting medical conditions (s.a. neuromuscu-

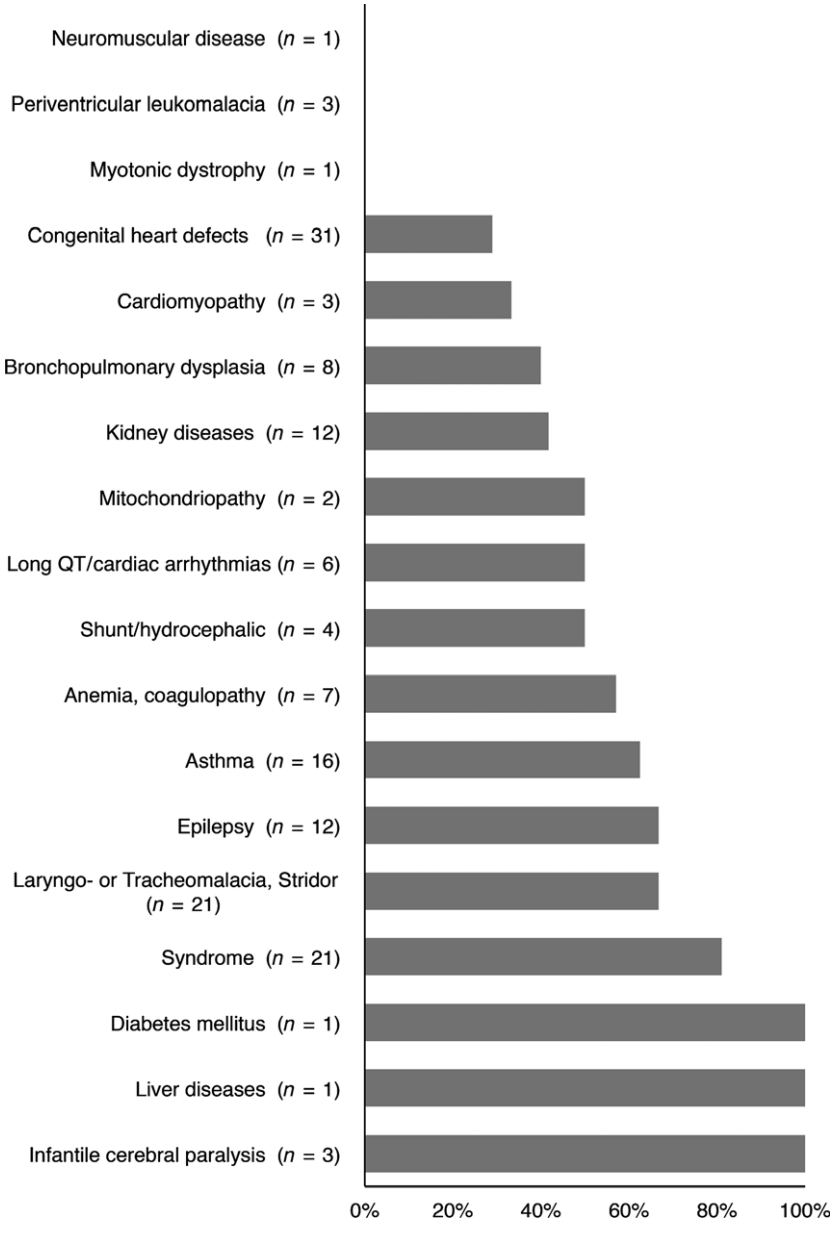

Figure 2 Preexisting diseases documented and verbally communicated during handover, *n* = observed number of cases.

lar disease, diabetes, cerebral palsy) ensures a high level of patient safety.

A minimum standard handover content should be defined and opportunities for improving quality of local handovers should be offered. One way of increasing reported items during handovers significantly might be the implementation of a checklist (12,18,19). However, the use of such a list does not automatically provide seamless handovers but does result in a significant rise of reported items (18,19). A checklist as in this study including 55 items might not be practical for clinical use. Even in complex situations, checklists may have to be short (20).

The occurrence of an event without checking its content has been reported in previous studies. Quality improvement, however, requires not only the presence of information but also accuracy of its content. This current study analyzed not only the presence of an item during verbal handover but also its accuracy. Some items such as type of surgery or ASA-PS were neither documented nor verbally transmitted resulting in complete communication failure of important information. These items may represent only the tip of the iceberg, as other items could not be as easily identified.

Electronic devices working with prompts or predefined fields may aid communication (21). Engaging

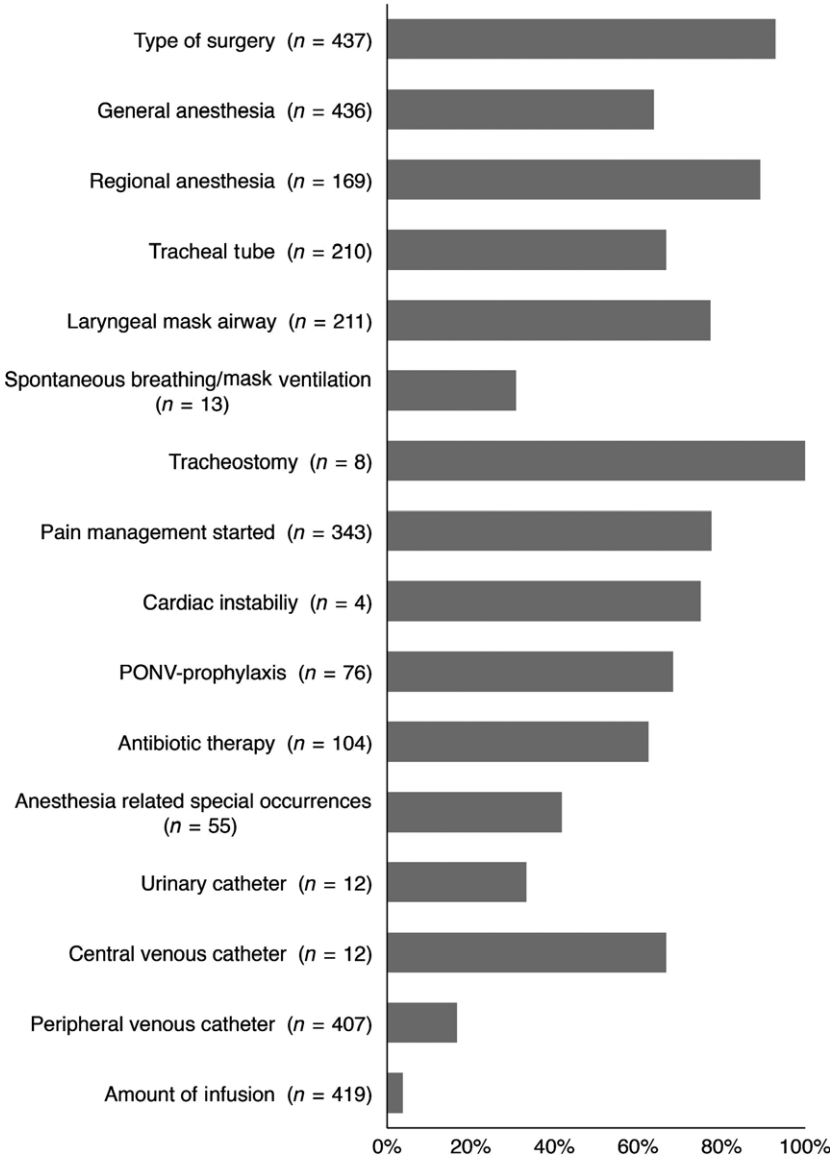

Figure 3 Intra-operative data documented and verbally communicated during handover, *n* = observed number of cases.

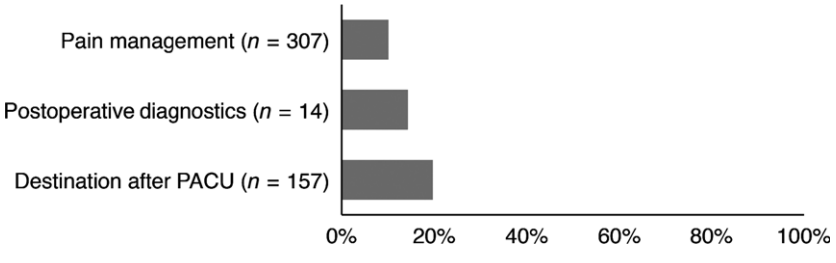

Figure 4 Postoperative data documented and verbally communicated during handover, *n* = observed number of cases.

health-providers in developing process of local handover lists may address problems with low compliance (20).

There are several limitations of this study. The observing investigator was physically present during the handovers, which might have influenced the handover quality (Hawthorne effect) (22). However, a study observation period of 15 weeks and a potential habituation may have reduced this effect. In addition, the observer only recorded whether an item was mentioned during the handover to the PACU staff, but did not

record if this information was understood. Other items not documented in the anesthesia record but potentially relevant and, therefore, not transferred during handover could not have been observed.

The need to develop a universal anesthesia handover protocol is further illustrated by a comparable implementation of a standardized handover protocol in an adult intensive care unit. This was associated with a decrease in postoperative complication and an improvement in the patient outcome and reduced patient stay (23,24). This, however, was not investigated in this pediatric study and should be addressed in further investigations.

Conclusion

The observed handovers to PACU staff in this study were incomplete and missing important information. Relevant known information was regularly not conveyed, even if the item can be assumed to be relevant for patient safety. Further studies are desirable to investigate the clinical impact of those handovers. Studies investigating if team training or the implementation of a standardized universal mandatory handover protocol following pediatric anesthesia can provide an improvement of the handover quality in pediatric anesthesia are required.

Funding

This study was supported by Internal Department of Anesthesiology funding only.

Conflict of interest

No conflict of interests declared.

Disclosures

This study was approved by the Ethics Committee (IRB) of the University of Witten/Herdecke, Germany (contact information: Ethics Committee of the University of Witten/Herdecke, Alfred-Herrhausen-Str. 50, Germany – 58448 Witten, http://www.ethik-kommission-uwh.de/Kontakt/kontakt.html) and registered at the ClinicalTrials.gov Register (Ref: NCT02114866).

Supporting information

Additional Supporting Information may be found in the online version of this article:

Data S1. Handover checklist.

References

1 Kohn L. To err is human: an interview with the Institute of Medicine's Linda Kohn. *Jt Comm J Qual Patient Saf* 2000; **26**: 227–234.
2 Joint Commission on Accreditation of Healthcare Organizations. The Joint Commission releases Improving America's hospitals: The Joint Commission's annual report on quality and safety 2007. *Jt Comm Perspect* 2007; **27**: 1, 3.
3 Nagpal K, Arora S, Abboudi M *et al*. Postoperative handover: problems, pitfalls, and prevention of error. *Ann Surg* 2010; **252**: 171–176.
4 Smith AF, Pope C, Goodwin D *et al*. Interprofessional handover and patient safety in anaesthesia: observational study of handovers in the recovery room. *Br J Anaesth* 2008; **101**: 332–337.
5 Nagpal K, Abboudi M, Fischler L *et al*. Evaluation of postoperative handover using a tool to assess information transfer and teamwork. *Ann Surg* 2011; **253**: 831–837.
6 Milby A, Bohmer A, Gerbershagen MU *et al*. Quality of post-operative patient handover in the post-anaesthesia care unit: a prospective analysis. *Acta Anaesthesiol Scand* 2014; **58**: 192–197.
7 Siddiqui N, Arzola C, Iqbal M *et al*. Deficits in information transfer between anaesthesiologist and postanaesthesia care unit staff: an analysis of patient handover. *Eur J Anaesthesiol* 2012; **29**: 438–445.
8 Black AE. Medical assessment of the paediatric patient. *Br J Anaesth* 1999; **83**: 3–15.
9 von Ungern-Sternberg BS, Boda K, Chambers NA *et al*. Risk assessment for respiratory complications in paediatric anaesthesia: a prospective cohort study. *Lancet* 2010; **376**: 773–783.
10 Hardman JG, Wills JS. The development of hypoxaemia during apnoea in children: a computational modelling investigation. *Br J Anaesth* 2006; **97**: 564–570.
11 Patel R, Lenczyk M, Hannallah RS *et al*. Age and the onset of desaturation in apnoeic children. *Can J Anaesth* 1994; **41**: 771–774.
12 Boat AC, Spaeth JP. Handoff checklists improve the reliability of patient handoffs in the operating room and postanesthesia care unit. *Pediatr Anesth* 2013; **23**: 647–654.
13 Joint Commission on Accreditation of Healthcare Organizations. Sentinel Event Data: Root Causes by Event Type. 2004–June 2013. Available at: http://www.jointcommission.org/assets/1/18/Root_Causes_by_Event_Type_2004-2Q2013.pdf. Accessed 16 March, 2015.
14 Segall N, Bonifacio AS, Schroeder RA *et al*. Can we make postoperative patient handovers safer? A systematic review of the literature. *Anesth Analg* 2012; **115**: 102–115.
15 Ong MS, Coiera E. A systematic review of failures in handoff communication during intrahospital transfers. *Jt Comm J Qual Patient Saf* 2011; **37**: 274–284.
16 Aplin S, Baines D, Del J. Use of the ASA Physical Status Grading System in pediatric practice. *Pediatr Anesth* 2007; **17**: 216–222.
17 Hamid SK, Selby IR, Sikich N *et al*. Vomiting after adenotonsillectomy in children: a comparison of ondansetron, dimenhydrinate, and placebo. *Anesth Analg* 1998; **86**: 496–500.
18 Salzwedel C, Bartz HJ, Kuhnelt I *et al*. The effect of a checklist on the quality of postanaesthesia patient handover: a randomized controlled trial. *Int J Qual Health Care* 2013; **25**: 176–181.
19 Catchpole KR, de Leval MR, McEwan A *et al*. Patient handover from surgery to intensive care: using Formula 1 pit-stop and aviation models to improve safety and quality. *Pediatr Anesth* 2007; **17**: 470–478.
20 Thomassen O, Brattebo G, Softeland E *et al*. The effect of a simple checklist on frequent pre-induction deficiencies. *Acta Anaesthesiol Scand* 2010; **54**: 1179–1184.

21 Cheah LP, Amott DH, Pollard J *et al.* Electronic medical handover: towards safer medical care. *Med J Aust* 2005; **183**: 369–372.
22 McCambridge J, Witton J, Elbourne DR. Systematic review of the Hawthorne effect: new concepts are needed to study research participation effects. *J Clin Epidemiol* 2014; **67**: 267–277.
23 Agarwal HS, Saville BR, Slayton JM *et al.* Standardized postoperative handover process improves outcomes in the intensive care unit: a model for operational sustainability and improved team performance*. *Crit Care Med* 2012; **40**: 2109–2115.
24 Bittner EA, George E, Eikermann M *et al.* Evaluation of the association between quality of handover and length of stay in the post anaesthesia care unit: a pilot study. *Anaesthesia* 2012; **67**: 548–549.

