

20. Nessim C, Sid ris L, Turcotte S, et al. The effect of fluid overload in the presence of an epidural on the strength of colonic anastomoses. *J Surg Res* 2013; **183**: 567–73
21. Reed H. The development of an extended care facility in the recovery unit: the post-anaesthesia care unit. *J Perioper Pract* 2011; **21**: 210–4
22. Hu JC, Chughtai B, O'malley P, et al. Perioperative outcomes, health care costs, and survival after robotic-assisted versus open radical cystectomy: a national comparative effectiveness study. *Eur Urol* 2016; **70**: 195–202
23. Pham CT, Gibb CL, Mittinty MN, et al. A comparison of propensity score-based approaches to health service evaluation: a case study of a preoperative physician-led clinic for high-risk surgical patients. *J Eval Clin Pract* 2016; **22**: 761–70

British Journal of Anaesthesia **118** (1): 5–6 (2017)

doi:10.1093/bja/aew408

The egg-and-chicken situation in postoperative enhanced recovery programmes

K. Slim^{1,2} and J. Joris^{2,3}

¹Department of Digestive Surgery, University Hospital Estaing, Place Lucie Aubrac, 63003 Clermont-Ferrand, France,

²The Francophone Group for Enhanced Recovery after Surgery (GRACE), Allee du Riboulet, 63110 Beaumont, France and

³Department of Anaesthesia, University Hospital Avenue de l'Hopital, 4000 Li ge, Belgium

Corresponding author. E-mail: kslim@chu-clermontferrand.fr

Nowadays, enhanced recovery programmes (ERPs) are well established and used in the daily practice for different surgeries in many specialties. They involve pre-, intra-, and postoperative measures or elements. Among the postoperative measures, early mobilization and early oral intake are commonly cited. Accordingly, these two postoperative elements are included in all published ERPs and were shown to be the most used and reported interventions in ERPs in a recent systematic review (including 50 trials).¹ Some authors, however, considered that those postoperative elements are markers of both protocol compliance and recovery.² In our daily practice of ERP, every patient is taught (using oral or written information, or both) about the importance of postoperative early eating and mobilization. But it is difficult to figure out (considering only the postoperative period) whether a given patient had better recovery because he was eating and ambulating early or whether he tolerated early eating and walked early thanks to rapid recovery without complication. A similar reasoning can be applied to early termination of i.v. fluid infusion; is it a key element for enhanced recovery or is it a marker of early recovery facilitated by optimal preoperative and intraoperative strategies? These aspects of ERP evoke the egg-and-chicken situation and highlight the need for further well-conducted studies to improve our knowledge of the physiopathology of ERPs.

We think that early mobilization and early (liquid or solid) oral intake, generally considered as components of ERPs, should be also considered as outcomes of ERP, in the same manner as the length of stay or the overall morbidity. A fully informed patient who is free of pain and nausea, without drains and tubes, is probably willing to eat and ambulate early. In a recent survey by Hughes and colleagues,³ the patients rated some elements of ERPs as important and relevant outcomes; notably, to be able to eat and drink as soon as possible and to be independently mobile in hospital as soon as possible.

Some authors reported that enforced mobilization is an independent factor for duration of hospital stay.^{4 5} But this statistical

correlation does not explain whether it is a cause or consequence. Indeed, mobilization, even enforced, cannot be achieved if the other postoperative elements of the ERP are not fulfilled (i.e. adequate analgesia, prevention of nausea and vomiting, avoidance of tubes, etc). In an appropriately informed patient, early mobilization and eating are simply the results (and the markers) of the adherence to the other ERP elements or the efficiency of the ERP, or both. Accordingly, a recent systematic review failed to show an impact of early mobilization on outcomes after abdominal and thoracic surgery,⁶ probably because it is itself an outcome.

If we consider those 'elements' as 'outcomes' of ERP, the inability to eat or walk early, despite adherence to the other protocol elements, should therefore be considered as a failure of the ERP or the result of medical or surgical complications.⁷ Indeed, postoperative pain and opiate tolerance can vary widely among patients despite adequate perioperative pain management.⁸ Likewise, postoperative nausea and vomiting can still occur despite multimodal prophylaxis and independent of ileus.⁹ These side-effects will therefore affect the adherence to early feeding and mobilization. In contrast, surgical and medical complications can also result in severe pain and ileus, precluding success of the ERP.

This thinking highlights the importance of pre- and intraoperative elements, which become the true determinants of the success of the ERP. These intraoperative elements include the invasiveness of the surgery,¹⁰ maintenance of homeostasis, fluid balance, and anaesthetic and analgesic techniques.¹¹ Accordingly, a study assessing the relationship between the adherence to protocol and the duration of hospital stay¹² reported that the lower the adherence to pre- and intraoperative measures (carbohydrate loading, antiemetics, magnesium, and non-opioid analgesics), the longer the duration of stay.

In conclusion, we propose a paradigm shift regarding some postoperative elements of ERPs. Providing there is good patient counselling and information, the early tolerance of oral intake

and early mobilization should no longer be considered as markers of protocol adherence but rather as markers of postoperative recovery. This approach would have a practical impact in terms of risk management and postoperative surveillance; a patient not willing to eat and ambulate early should also be subjected to close attention and surveillance.

Authors' contributions

Conceived and wrote the manuscript: K.S.
Corrected and revised the manuscript: J.J.

Declaration of interest

K.S. and J.J. are members of GRACE, the Francophone Group of Enhanced Recovery after Surgery. K.S. has received honoraria from Merck Sharp & Dohme France, Fresenius, Sanofi, and Takeda for lectures and expert advice.

References

- Day RW, Fielder S, Calhoun J, Kehlet H, Gottumukkala V, Aloia TA. Incomplete reporting of enhanced recovery elements and its impact on achieving quality improvement. *Br J Surg* 2015; **102**: 1594–602
- Hendry PO, Hausel J, Nygren J, et al. Enhanced Recovery After Surgery Study Group. Determinants of outcome after colorectal resection within an enhanced recovery programme. *Br J Surg* 2009; **96**: 197–205
- Hughes M, Coolsen MM, Aahlin EK, et al. Attitudes of patients and care providers to enhanced recovery after surgery programs after major abdominal surgery. *J Surg Res* 2015; **193**: 102–10
- Vlug MS, Bartels SA, Wind J, Ubbink DT, Hollmann MW, Bemelman WA; Collaborative LAFA Study Group. Which fast track elements predict early recovery after colon cancer surgery? *Colorectal Dis* 2012; **14**: 1001–8
- Yip VS, Dunne DF, Samuels S, et al. Adherence to early mobilisation: key for successful enhanced recovery after liver resection. *Eur J Surg Oncol* 2016; **42**: 1561–7
- Castelino T, Fiore JF Jr, Niculiseanu P, Landry T, Augustin B, Feldman LS. The effect of early mobilization protocols on postoperative outcomes following abdominal and thoracic surgery: a systematic review. *Surgery* 2016; **159**: 991–1003
- Kehlet H, Jørgensen CC. Advancing surgical outcomes research and quality improvement within an enhanced recovery program framework. *Ann Surg* 2016; **264**: 237–8
- Kalkman CJ, Visser K, Moen J, Bonsel GJ, Grobbee DE, Moons KG. Preoperative prediction of severe postoperative pain. *Pain* 2003; **105**: 415–23
- Eberhart LHJ, Kranke P. Postoperative nausea and vomiting: is everything now solved or still more questions than answers? *Eur J Anaesthesiol* 2016; **33**: 878–80
- Oh HK, Ihn MH, Son IT, et al. Factors associated with failure of enhanced recovery programs after laparoscopic colon cancer surgery: a single-center retrospective study. *Surg Endosc* 2016; **30**: 1086–93
- Scott MJ, Baldini G, Fearon KC, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 1: pathophysiological considerations. *Acta Anaesthesiol Scand* 2015; **59**: 1212–31
- Bakker N, Cakir H, Doodeman HJ, Houdijk AP. Eight years of experience with enhanced recovery after surgery in patients with colon cancer: impact of measures to improve adherence. *Surgery* 2015; **157**: 1130–6

British Journal of Anaesthesia **118** (1): 6–7 (2017)
doi:10.1093/bja/aew334



Making sense of propofol sedation for endoscopy

J. R. Sneyd

Plymouth University Peninsula Schools of Medicine and Dentistry, The John Bull Building, Research Way, Plymouth Science Park, Plymouth PL6 8BU, UK

E-mail: robert.sneyd@pms.ac.uk

Gastrointestinal endoscopy is one of the commonest hospital investigations and was associated historically with significant morbidity and mortality.¹ The shortfalls in patient selection, sedation, and monitoring identified by Quine and colleagues¹ and subsequent studies precipitated sustained interest in standards and training that led to the development of guidelines. Contemporary practice is dominated by midazolam–opioid combinations used by non-anaesthetists and propofol with or without opioid or midazolam given by anaesthetists.² Administration of propofol by non-anaesthetists is constrained by regulatory considerations, guidelines, and intense pressure from anaesthetists. Importantly, sedation practice is non-stationary, with improvements in training, new equipment (processed EEG monitoring and capnography), and a developing literature that describes emerging patterns of practice

against a background of extreme cost pressure. Systematic audit of sedation practice and its outcomes is therefore essential as we refine our clinical teams and their pharmacological approaches.

Leslie and colleagues³ documented 2132 adult patients undergoing anaesthetist-managed sedation at a group of hospitals in and around Melbourne, Victoria, Australia. Their investigation comprises a well-structured prospective audit of events and outcomes in a patient population relevant to many international situations. Using intensive recruitment from multiple hospitals across a short period, a large cohort was swiftly recruited in a mere 28 days, a principle also demonstrated in an earlier snapshot sedation audit by anaesthesia trainees during a 2 day period in six UK hospitals.²