

to improve children's health and development and a commitment to accountability through monitoring and evaluation are key to the success of CCT programmes.

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I declare that I have no conflict of interest.

- 1 Rawlings LB, Rubio GM. Evaluating the impact of conditional cash transfer programs. *World Bank Res Obs* 2005; **20**: 29–55.
- 2 Lagarde M, Haines A, Palmer N. Conditional cash transfers for improving uptake of health interventions in low- and middle-income countries: a systematic review. *JAMA* 2007; **298**: 1900–10.
- 3 Dugger CW. To help poor be pupils, not wage earners, Brazil pays parents. *New York Times* Jan 3, 2004. <http://query.nytimes.com/gst/fullpage.html?res=9D02E7DA1731F930A35752C0A9629C8B63&sec=health> (accessed Feb 19, 2008).
- 4 Rockefeller Foundation. Opportunity NYC: recognizing the day-to-day challenges faced by the poor. http://www.rockfound.org/efforts/nycop/opportunity_nyc.shtml (accessed Jan 23, 2008).
- 5 Fernald LCH, Gertler PJ, Neufeld LM. Role of cash in conditional cash transfer programmes for child health, growth, and development: an analysis of Mexico's Oportunidades. *Lancet* 2008; **371**: 828–37.
- 6 Grantham-McGregor S, Cheung YB, Cueto S, and the International Child Development Steering Group. Developmental potential in the first 5 years for children in developing countries. *Lancet* 2007; **369**: 60–70.
- 7 Sen A. *Commodities and capabilities*. Oxford: Oxford University Press, 1985.
- 8 Alkire S. *Valuing freedoms: Sen's capability approach and poverty reduction*. Oxford: Oxford University Press, 2002.
- 9 Gertler PJ. Do conditional cash transfers improve child health? Evidence from PROGRESA's controlled randomized experiment. *Am Econ Rev* 2004; **94**: 336–41.
- 10 de Janvry A, Sadoulet E. Making conditional cash transfer programs more efficient: designing for maximum effect of the conditionality. *World Bank Econ Rev* 2006; **20**: 1–29.
- 11 Lozano R, Soliz P, Gakidou E, et al. Benchmarking of performance of Mexican states with effective coverage. *Lancet* 2006; **368**: 1729–41.

Fast-track colorectal surgery

Perioperative care has been improved with newer anaesthetic and analgesic techniques, development of minimally invasive surgery, and drugs to reduce surgical stress.^{1,2} Fast-track surgery or enhanced postoperative recovery programmes have been developed by combining these techniques with evidence-based adjustments to the use of nasogastric tubes, drains, and urinary catheters, preoperative bowel preparation, and early initiation of oral feeding and mobilisation. The aim of these programmes has been to provide pain-free and stress-free operations with lower rates of organ dysfunction, thereby reducing morbidity and enhancing recovery. If successful, the need for hospitalisation after surgery will be reduced.

Standard elective colorectal resection is usually associated with a complication rate of 20–30% and a postoperative hospital stay of 8–12 days. Limiting factors for early recovery and discharge are pain, paralytic ileus, and other organ dysfunctions. The potential for a multimodal intervention with a fast-track clinical pathway to improve recovery after colonic resection was first reported in the mid-1990s, with a reduction of hospital stay to 2–3 days under standard discharge criteria.¹ Efforts have since been made in several countries to develop and document the results of standardised and evidence-based programmes of perioperative care after colorectal procedures. A systematic review of controlled and randomised controlled studies supports the use of fast-track colorectal surgery.^{3,4}

Effective analgesia that allows early mobilisation is a prerequisite for improved recovery;¹ and in open colorectal surgery, thoracic epidural analgesia followed by multimodal non-opioid analgesia is the most effective evidence-based method.¹ Epidural analgesia might not be necessary in laparoscopic colorectal surgery and can be replaced by opioid-sparing multimodal analgesia,^{1,2} including oral paracetamol, non-steroidal anti-inflammatory drugs, gabapentanoids, systemic local anaesthetics, or continuous infusion of the wound with local anaesthetic.² Traditional care in colorectal surgery includes preoperative bowel preparation, but a systematic review of randomised trials showed this approach to be unnecessary and with the potential to increase morbidity, at least in segmental resections.⁵ However, more safety data are needed for very low mesorectal resections. Avoidance of preoperative bowel preparation might also hinder preoperative dehydration. There has recently been an increased focus on perioperative fluid management, and several large randomised trials in major abdominal surgery, including colorectal procedures, showed that fluid excess increases morbidity.^{1,6} Additionally, results from several trials, including four colorectal studies, show that perioperative optimisation of haemodynamic function—by the goal-directed approach with individualised optimisation of stroke volume by small colloid challenges—reduces morbidity and hospital

stay.⁶ Individually tailored fluid therapy is therefore a main component of modern fast-track colorectal surgery.

Preoperative carbohydrate administration shows promising results in the reduction of insulin resistance and attenuation of catabolism, and its use is supported by the results of small randomised trials.⁷ However, large studies that include the fast-track method are needed to define the role and type of preoperative carbohydrate loading in colorectal surgery. Routine use of drains has also been part of traditional care, but data from randomised trials have shown that drains should not be used routinely.⁸ Nasogastric tubes are also not used routinely because they can increase pulmonary morbidity and slow recovery of gastrointestinal function.⁹ Duration of paralytic ileus can be reduced to 48–72 h in more than 90% of patients with multimodal fast-track programmes, compared with about 96–120 h with traditional care.^{1,2,4} Early initiation of oral nutrition reduces catabolism and morbidity.¹⁰ Finally, provision of a detailed nursing-care programme for each postoperative day is mandatory, and details about the care programme and expected hospital stay and discharge criteria are given to patients (and

relatives) in outpatient clinics when indication for surgery is settled.

The benefits of fast-track surgery—improved recovery, shortening of hospital stay, decreased duration of paralytic ileus, and reduction of deterioration in vital organs (cardiopulmonary, gastrointestinal, and muscular)—have been established by several studies, including more than six randomised trials.^{1,3,4} Overall hospital stay, with the same discharge criteria as in traditional care, is reduced from about 8–12 days to 2–5 days for colonic procedures. Most importantly, the decreased duration of paralytic ileus avoids discomfort, abdominal distension, impairment of pulmonary function, and insufficient oral nutrition.

Increased risk of readmission is one concern about fast-track surgery,^{1,3,4} but recent data suggest that planned discharge on or about the third day after segmental colonic resection can reduce readmissions to generally acceptable levels.¹¹ Another concern with early discharge has been the potential transferral of health-care burden to home nurses and family doctors. However, available data suggest that postoperative fatigue is reduced by early resumption of normal activities after fast-track colonic resection, without an increased need for support from other health-care institutions¹² but with an overall improvement in organ functions (panel).^{13,14} Several studies have shown cost reductions resulting from decreases in hospital stay, morbidity, and convalescence,^{1,3,4} but overall conclusions on the quantitative gains are difficult to make because of different health-care structures and characteristics of patients. Fast-track colorectal surgery could require additional nursing staff, but the few available data suggest that the need for nursing care during hospitalisation can be reduced because of early restoration of organ functions and recovery.¹³ Although most data are available from segmental colonic resection, several series have also included more complex colorectal procedures¹ with similar positive results.

The introduction of the laparoscopic approach in colorectal surgery might improve early postoperative outcome but, unfortunately, although randomised trials have shown moderate short-term benefits with reduction of hospital stay from 6–9 days to 5–7 days, none have included perioperative fast-track care.^{15,16} Nevertheless, where expertise is available, there might be further reduction of morbidity and the need for

Panel: Methods and results of fast-track colorectal surgery

Evidence-based methods

- Obtain preoperative information on patients and optimise organ dysfunction^{1,2}
- Epidural analgesia or non-opioid multimodal analgesia^{1,2}
- Avoidance of fluid excess or use of goal-directed therapy^{1,6}
- No preoperative bowel clearance⁵
- No routine use of drains⁸
- No routine use of nasogastric tubes⁹
- Early oral feeding and mobilisation^{1,10}
- Consider preoperative carbohydrate administration⁷
- Well-defined daily care maps or discharge criteria^{1,2}

Results of fast-track compared with traditional surgery^{1–4,11–14}

- Reduced duration of ileus
- Improved muscle strength, exercise capacity, or lean body mass
- Improved oral energy and protein intake
- Decreased cardiopulmonary morbidity
- Reduced hospital stay
- No effect on rate of readmissions
- Decreased period of postoperative convalescence
- Reduced costs

hospitalisation by use of a laparoscopic approach with fast-track programmes, multimodal non-opioid analgesia, and pharmacological stress reduction.^{1,2,14} In more complex procedures, such as pouch surgery or rectal amputation, the laparoscopic approach could improve outcome.

Despite substantial evidence on the benefits of fast-track colorectal surgery, European and US surveys show a disappointingly slow change in surgical practice to current evidence.^{17–19} There are several possible reasons for this slow response, including: the lack of multidisciplinary collaboration between anaesthesiologists, surgeons, and surgical nurses;^{1,2} a lack of awareness of evidence-based data; failure to accept the published data; a need for more data; a lack of belief that the institution can do fast-track surgery; external barriers, such as time limitation; unavailability of outcome data; or environmental barriers, such as insufficient expertise and staff support, reimbursement problems, and liability issues. A UK survey²⁰ concluded that only about a third of surgeons used principles of fast-track surgery, but these surgeons reported lower perceived lengths of stay than those surgeons defining themselves as non-fast-trackers, which highlights a gap between perception and realisation of the benefits of fast-track methods. The disappointingly slow implementation of evidence-based perioperative-care principles will therefore require a focus on provision of information, and education, and discussion about current care principles used in the institution, about current outcome data, and about barriers to the implementation of fast-track methods.

The fast-track methods to improve outcome in colorectal surgery are supported by multi-institutional and multinational studies, and therefore implementation should be more widespread. Due to the improved postoperative recovery, the fast-track method could have major implications for the organisation of health care, for waiting lists, and for costs, and could provide important improvements in the quality of care. The results achieved so far are conclusive for colorectal surgery, but similar results have been shown in other procedures.^{1,2} Further improvements can be expected with increased surgical expertise in large units and when minimally invasive surgery, multidisciplinary collaboration, efficient multimodal, non-opioid analgesia, and pharmacological stress reduction have been further developed. All those factors will hopefully fulfil the ultimate goal of an

operation with reduced risk and pain and with minimum requirements for postoperative hospitalisation and rehabilitation after discharge.

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- 1 Kehlet H, Dahl JB. Anaesthesia, surgery, and challenges in postoperative recovery. *Lancet* 2003; **362**: 1921–28.
- 2 White PF, Kehlet H, Neal JM, Schricker T, Carr DB, Carli F. The role of the anesthesiologist in fast-track surgery: from multimodal analgesia to perioperative medical care. *Anesth Analg* 2007; **104**: 1380–96.
- 3 Wind J, Polle SW, Fung Kon Jin PH, et al. Systematic review of enhanced recovery programmes in colonic surgery. *Br J Surg* 2006; **93**: 800–09.
- 4 Khoo CK, Vickery CJ, Forsyth N, Vinall NS, Eyre-Brook IA. A prospective randomized controlled trial of multimodal perioperative management protocol in patients undergoing elective colorectal resection for cancer. *Ann Surg* 2007; **245**: 867–72.
- 5 Guenaga KF, Matos D, Castro AA, Atallah AN, Wille-Jorgensen P. Mechanical bowel preparation for elective colorectal surgery. *Cochrane Database Syst Rev* 2005; **1**: CD001544.
- 6 Bundgaard-Nielsen M, Holte K, Secher NH, Kehlet H. Monitoring of peri-operative fluid administration by individualized goal-directed therapy. *Acta Anaesthesiol Scand* 2007; **51**: 331–40.
- 7 Noblett SE, Watson DS, Huong H, Davison B, Hainsworth PJ, Horgan AF. Pre-operative oral carbohydrate loading in colorectal surgery: a randomized controlled trial. *Colorectal Dis* 2006; **8**: 563–69.
- 8 Petrowsky H, Demartines N, Rousson V, Clavien PA. Evidence-based value of prophylactic drainage in gastrointestinal surgery: a systematic review and meta-analyses. *Ann Surg* 2004; **240**: 1074–84.
- 9 Nelson R, Edwards S, Tse B. Prophylactic nasogastric decompression after abdominal surgery. *Cochrane Database Syst Rev* 2007; **3**: CD004929.
- 10 Andersen HK, Lewis SJ, Thomas S. Early enteral nutrition within 24h of colorectal surgery versus later commencement of feeding for postoperative complications. *Cochrane Database Syst Rev* 2006; **4**: CD004080.
- 11 Andersen J, Hjort-Jakobsen D, Christiansen PS, Kehlet H. Readmission rates after a planned hospital stay of 2 versus 3 days in fast-track colonic surgery. *Br J Surg* 2007; **94**: 890–93.
- 12 Jakobsen DH, Sonne E, Andreassen J, Kehlet H. Convalescence after colonic surgery with fast-track vs conventional care. *Colorectal Dis* 2006; **8**: 683–87.
- 13 Jakobsen DH, Sonne E, Kehlet H. Nursing workload and fast-track colonic surgery. *J Adv Periop Care* 2006; **2**: 177–81.
- 14 Senagore AJ, Delaney CP. A critical analysis of laparoscopic colectomy at a single institution: lessons learned after 1000 cases. *Am J Surg* 2006; **191**: 377–80.
- 15 Kehlet H, Kennedy RH. Laparoscopic colonic surgery—mission accomplished or work in progress? *Colorectal Dis* 2006; **8**: 514–17.
- 16 Noel JK, Fahrback K, Estok R, et al. Minimally invasive colorectal resection outcomes: short-term comparison with open procedures. *J Am Coll Surg* 2007; **204**: 291–307.
- 17 Kehlet H, Büchler MW, Beart RW, Jr, Billingham RP, Williamson R. Care after colonic operation—is it evidence-based? Results from a multinational survey in Europe and the United States. *J Am Coll Surg* 2006; **202**: 45–54.
- 18 Lassen K, Hannemann P, Ljungqvist O, et al. Patterns in current perioperative practice: survey of colorectal surgeons in five northern European countries. *BMJ* 2005; **330**: 1420–21.
- 19 Maessen J, Dejong CH, Hausel J, et al. A protocol is not enough to implement an enhanced recovery programme for colorectal resection. *Br J Surg* 2007; **94**: 224–31.
- 20 Walter CJ, Smith A, Guillou P. Perceptions of the application of fast-track surgical principles by general surgeons. *Ann R Coll Surg Engl* 2006; **88**: 191–95.