

greatly improves pulmonary function; subsequently, effective physiotherapy and incentive spirometry have their parts to play.

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### Obesity, pain, and sedation are important

EDITOR,—John C Hall and colleagues stratify their patients as high risk only on the basis of American Society of Anesthesia grade (>1) and advanced age (>60 years) and then imply that other putative risk factors are similar in the two (high and low risk) groups. They seem to ignore one major risk factor for the development of postoperative respiratory complication—namely, obesity. Although the two groups are apparently well matched with respect to most criteria of comorbidity, no mention is made of the two groups' body mass indices. If populations are not weight matched it is impossible to make a valid comparison.<sup>2</sup>

In addition, Hall and colleagues' treatment of the role of postoperative analgesia in the development of pulmonary sequelae is superficial. Simply to classify the mode of pain relief as epidural or narcotic dosage is inadequate: what is more important is the quality of the analgesia delivered.<sup>3</sup> In the context of postoperative pain relief, the narcotic dosage alone is a meaningless concept.<sup>4</sup> Visual analogue scores are the optimal technique for assessing pain and can readily be used at the bedside. The quality of analgesia is of the utmost importance in this study. If patients' pain was inadequately relieved it is difficult to see how they could comply fully with physiotherapy, deep breathing, or incentive spirometry.

Similarly, although the authors refer to the importance of postoperative somnolence in the development of basal atelectasis and subsequent infection, this does not seem to have been assessed. This is a pity, since simple and reliable sedation scoring systems are available. It is of concern that sedation was not recorded in patients receiving epidural or narcotic infusions.<sup>5</sup>

In conclusion, we do not know whether the methods of prophylaxis against respiratory complications are equivalent. The results may be similar because one group was too fat, too sedated, or in too much pain to breathe deeply or comply with physiotherapy and so clear the secretions whose retention predisposes to chest infection.

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### Adequate pain relief is also necessary

EDITOR,—John C Hall and colleagues draw our attention to some of the ways of preventing postoperative pulmonary complications.<sup>1</sup> Pain and trauma of surgical procedures, particularly upper abdominal operations, leads to splinting of the ribs and diaphragm, which in turn leads to further collapse of basal lung units. It has generally been realised that effective analgesia improves patient cooperation during physiotherapy, enabling deeper breathing and better coughing, thus minimising the sputum retention.<sup>2</sup> In Hall and colleagues' study, only 20% of the high risk patients received epidural analgesia, and another 40% received opioid infusion during the perioperative period. Only 80% of the patients had documentation of pain relief after laparotomy, and little reference was made to the quality of postoperative analgesia.

Thoracic epidural analgesia is known to reduce the respiratory complications after repair of abdominal aortic aneurysm. Its routine use has been shown to reduce the incidence of respiratory complications from 30% to 13% during oesophagegastrectomy.<sup>3</sup> Intravenous opioid infusion also provides good pain relief but sometimes is ineffective during movement and physiotherapy. Effective epidural analgesia has the advantage of enabling easier ambulation and avoiding the depressive effects of analgesics and sedatives. Early ambulation also encourages better distribution of air in the lungs. In comparing the efficacy of incentive spirometry with deep breathing exercises, the authors could have adopted a policy of providing uniform analgesia. It would have been useful to have analysed the incidence of respiratory complications in the patients receiving epidural analgesia in comparison to those receiving opioid infusions, and to have measured the quality of pain relief by a pain score. Perhaps the benefits seen by incentive spirometry may be even greater when analgesia is optimal.

No significant reduction in postoperative pulmonary complications was reported previously with several prophylactic measures—incentive spirometry, intermittent positive pressure breathing, or deep breathing exercises.<sup>4</sup> Hall and colleagues also failed to show a reduction in pulmonary complications with incentive spirometry compared with conventional chest physiotherapy in their previous study of a much larger group of patients.<sup>5</sup> We therefore believe that other factors are involved in the development of postoperative respiratory failure which must be addressed before the effectiveness of incentive spirometry is concluded.

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### Laparoscopic surgery leads to better postoperative pulmonary function

EDITOR,—We applaud the efforts of John C Hall and colleagues in drawing attention to the importance of postoperative chest physiotherapy,<sup>1</sup> but would point out that prevention is better than cure.

Upper abdominal wounds typically cause a reduction by 50% or more of preoperative forced expiratory volume at one second and forced vital capacity, despite adequate analgesia.<sup>2</sup> These changes are caused by a decrease in lung volume due to basal atelectasis and an alteration of chest and abdominal wall mechanics, respectively.

Although laparoscopic surgery is currently the *bête noire* of surgery, chiefly as a result of the inadequate training and arrogance of a minority, there is now good evidence that when it is both possible and sensible to use this approach, it leads to better postoperative pulmonary function than open surgery.<sup>2-5</sup> The inescapable conclusion is that although all patients stand to benefit from minimal access abdominal surgery (where applicable), those who stand to benefit the most are those in whom lung function is already compromised and in whom a reduction of lung function variables of 50% might be disastrous.

The counter argument of the theoretically increased risk of hypercarbia in these patients remains only a theoretical argument if a competent anaesthetist and a modern ventilator are used.

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### Authors' reply

EDITOR,—It is interesting that a clinical trial evaluating postoperative respiratory complications has drawn comment mainly from anaesthetists. I can reassure them that the patients included in our study at Royal Perth Hospital were treated by a pain control team staffed by anaesthetists.

Our study was pragmatic in nature and did not evaluate the pathophysiology of atelectasis. Some time ago, Schwartz and Lellouch pointed out that there are essentially only two types of clinical studies, explanatory and pragmatic.<sup>1</sup> Explanatory studies look at underlying processes, while pragmatic studies provide management recommendations that are relevant to clinical practice.

Few readers would be surprised at the fact that anaesthetists and surgeons tend to concentrate on different aspects of a problem. In my mind, there is overwhelming evidence that good pain control, including pre-emptive therapy, improves postoperative respiratory function. However, there is a