Shimoyama say, haemodynamic variables interact with each other. So do the therapies that we can juggle, based on these numbers. Complexities in interpretation may attenuate clinical benefit. Is this analogous to the situation in the 1990s when widespread enthusiasm for the pulmonary artery catheter was tempered by studies that suggested they might trigger more harm than good?\(^3\)

**Declaration of interest**

None declared.

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**Extending epidural analgesia for emergency Caesarean section**

Editor—We were interested to read Hillyard and colleagues\(^1\) meta-analysis of extending epidural analgesia for Caesarean section. We were also somewhat surprised, since our own experience of research in this area\(^2–5\) has convinced us that one cannot compare between studies, only within them, because of the large number of variables involved.

The authors conclusions can be summarized as ‘ropivacaine is best for a good quality block, and lidocaine/epinephrine is best for a fast block’—but since the studies all differed in the patients’ characteristics, the regimen used during labour, the volume of the top-up, the method of injection, the time over which it was given and therefore when ‘time zero’ was, the way the block was assessed, when surgery was allowed to start, what constitutes ‘standard’ surgical practice in the units, when the anaesthetists might give supplementation, and what that supplementation might be, take these conclusions with caution.

It does seem strange to us that Hillyard and colleagues can draw such firm conclusions when there are quite so many variables, especially when those variables are so crucial to the main outcomes. In some ways, this goes to the heart of meta-analysis itself, whose aim is to pool data in an attempt to increase power, and derive ‘core’ data in a standardized format that can be combined safely. At some point, however, including all fruit that is round, in order to get enough fruit in the basket, means one cannot say much about apples vs oranges except that they are both in the basket. (Or, in their words: ‘Such diversity may affect the validity of the meta-analytical techniques applied to this endpoint.’)

Hillyard and colleagues are dismissive of lidocaine/epinephrine/bicarbonate (LEB) solutions, but the two studies,\(^5\)\(^6\) in which this solution was used (one with fentanyl, one without) stand out in their Table 2 as being the fastest of all the studies examined. As a result of previous work,\(^5\)\(^6\) we routinely use LEB to top up labour epidurals for emergency Caesarean section, and the need to convert to general anaesthesia has halved in the year after its introduction, although of course this is an observed change and not a randomized controlled trial. We do find, however, that the speed and quality of block produced by this mixture has changed the way in which we manage patients—for we also find the authors’ suggestion of one top-up solution for speed, and a different one for quality, equally puzzling. Faced with a woman requiring an emergency Caesarean section, our preference is to give the fastest and best-quality top-up solution, not to make a choice as to which feature we think is more important (which may change in minutes anyway). Hillyard and colleagues quote our previous finding that preparing LEB solutions takes time when the anaesthetists are unfamiliar with it,\(^7\) but repeating the study with anaesthetists familiar with its preparation shows that the extra time is under a minute.\(^8\) We would agree with the authors, though, that care needs to be taken when mixing drugs in an emergency, hence, the need for clearly labelled instructions on preparing the LEB solution. Finally, we disagree that there is a need for a multicentre randomized controlled trial to address this question; in our view to deprive women LEB would be ethically unjustified.

**Declaration of interest**

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Reply from the authors

Editor—Drs Malhotra, Yentis, and Lucas have provided some very interesting comments on our recent meta-analysis on the optimal technique for converting labour analgesia to surgical anaesthesia for emergency Caesarean section (CS). Our meta-analysis of the best top-up mixture for extending epidural analgesia for all categories of emergency CS aimed to evaluate both (i) the speed of onset and (ii) the need for intraoperative supplementation. The solutions we studied were lidocaine and epinephrine 1:200 000 with or without fentanyl (LE/F), 0.5% bupivacaine or levobupivacaine (Bup/Levo), and 0.75% ropivacaine (Ropi). In answer to our first evaluation, which was the speed of onset, LE/F demonstrated the fastest onset of surgical block, on average over 4 min faster than either of the other two top-up solutions (mean difference −4.51 min, 95% confidence interval −5.89 to −3.13 min, P<0.00001). Dr Malhotra and colleagues state that when there is a need to extend epidural analgesia for emergency CS that to ‘deprive women lidocaine/epinephrine/bicarbonate would be ethically unjustified’. Undeniably, this mixture achieves a very fast onset of block, indeed Table 2 of our article, which allows comparison of the results of the individual trials, shows that it achieved a block to cold to T4 in 7 min. However, since this is the only trial comparing lidocaine/epinephrine/bicarbonate with levobupivacaine, bupivacaine, or ropivacaine, it was unfortunate that we were not able to add weight to this claim by including it in a meta-analysis. One weakness of meta-analysis is that it may not be possible to include all the available data and thus may not draw firm conclusions when studies are heterogeneous. When converting labour analgesia to surgical anaesthesia, another important consideration is the need for intraoperative supplementation. If a woman complains of intraoperative pain during CS, in most cases, epidural supplementation or i.v. opioids are usually sufficient, but unfortunately conversion to general anaesthesia, with its attendant risks, is sometimes required. Indeed, in their study of the lidocaine/epinephrine/bicarbonate mixture, 19% of the women required intraoperative supplementation, either i.v. opioids or an epidural top-up. In the UK, the most common agents used for emergency CS are bupivacaine 0.5% and levobupivacaine 0.5%. yet these were shown in the meta-analysis to be the least satisfactory as they had the greatest requirement for intraoperative supplementation and were slower in onset. This prompts questions about their continued use for extending epidural analgesia for CS, particularly when a safer agent (ropivacaine 0.75%) is available that precludes the need for mixing drugs, with the attendant risk for drug error. The meta-analysis indicated that ropivacaine had the best profile of all agents with respect to the need for intraoperative supplementation. Dr Malhotra was puzzled that we were recommending one solution for the speed of onset and another for the quality of block. Our meta-analysis did indicate that the LE+F mixture had the fastest onset of action and that ropivacaine provided the best-quality intraoperative anaesthesia. Based on this finding, we are suggesting that anaesthetists could consider different local anaesthetics or local anaesthetic mixtures depending on the clinical circumstances. Anaesthetic technique is frequently tailored to the clinical situation, so why should a one-size-fits-all approach be necessary for emergency CS. The evidence to support the universal usage of lidocaine/epinephrine/bicarbonate, as suggested by Dr Malhotra, for all categories of CS is lacking. It has been shown in two randomized controlled trials to be fast, but neither of these trials was powered to be able to detect a difference in intraoperative supplementation. So we would have to disagree with the comment that it produces the ‘best quality block’, especially since it has been demonstrated to require block supplementation in almost one-fifth of cases in which it is used. Our meta-analysis found no evidence to support their view that to deprive women lidocaine/epinephrine/bicarbonate would be ethically unjustified, and think, based on current evidence, it is unwise to dismiss the need for further investigation into this area. Anaesthetists may/will continue to argue about the best agent for extending epidural analgesia for, in particular, category 1 CS. In practice, the agents or mixture used to achieve anaesthesia will probably be chosen to suit the needs, staffing levels, and geography of any particular obstetric unit. But the argument revolves, at best, around a period of 5–7 min. Alternatively what is needed is a change of practice in maternity departments. When an obstetrician decides that a Category 1 CS is necessary to save the life of either the fetus or the mother, then he/she and the attending midwife should immediately move the patient to the operating theatre while the anaesthetist, theatre staff, and paediatrician are summoned. Arguably, such practice might shorten the decision to delivery interval more than any anaesthetic agent or mixture of agents?

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