responders and responders, the statistical power of this analysis was low, and the authors' main conclusion is based on the responses of only 54 patients. We wonder how many of the 31 non-responders would have had to be unsatisfied with the operation to reverse the results of the statistical analysis. We suspect that it would not be many.

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1 Klassen A, Fitzpatrick R, Jenkinson C, Goodacre T. Should breast reduction surgery be rationed? A comparison of the health status of patients before and after treatment; postal questionnaire survey. *BMJ* 1996;313:454-7. (24 August.)

Interventions requested for psychological reasons should be studied

EDITOR,—We were interested to note that Anne Klassen and colleagues chose to look at breast reduction as an example of a cosmetic surgery procedure that is not being provided by the NHS.¹ They comment that common reasons for referral were physical problems (for example, pain, discomfort, and skin irritation); psychological and social reasons were less common. They conclude that breast reduction is an effective treatment for these women. We question the relevance of this study to the debate on rationing, and particularly whether the findings can be taken to indicate the benefits likely to come from other cosmetic surgery procedures.

South and West Devon Health Authority has operated a policy of restricted access to certain cosmetic surgery procedures, including breast reduction, for over a year. Under this policy requests for breast reduction because of physical symptoms have invariably been approved; such requests constitute a small proportion of the requests for cosmetic surgery (table 1).

Table 1 — Proportion of requests for breast surgery accepted by South and West Devon Health Authority, 1 January to 30 June 1996

Procedure	No of requests	No (%) accepted
Breast reduction:		
Physical symptoms	24	24 (100)
Psychological symptoms	10	6 (60)
Other cosmetic surgery*	84	49 (58)
Total	118	79 (67)

*Including, for example, breast augmentation, removal of cysts and tattoos, rhinoplasty, and apronectomy.

Of greater relevance to the rationing debate is the effectiveness of other procedures, such as breast augmentation, when the reasons for referral are psychological. We hope that future studies will address the issue of effective interventions, including non-surgical management, for such psychological need.

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Authors' reply

EDITOR,—We share Jayant S Vaidya and Nigel Sacks's concern about the response rate in our study. Space did not allow us to report the reasons for 10 patients being excluded from the preoperative assessment. Three respondents had the operation done privately; the questionnaires of two respondents were returned by the post office because they had moved; two respondents had their operation before completing the pre-operative questionnaire; the solicitor of one patient asked that she be removed from the survey because of a legal case pending against the hospital; one respondent proved to be under the minimum age for entry to the study; and one respondent decided that she no longer wanted surgery.

To assess further any possible biases in the results produced by non-response we have performed logistic regression, with whether patients responded to the follow up questionnaire as dependent variable and using a model of all the available health status data from the baseline assessment and demographic and waiting time variables. The model did not fit the data, which suggests that there was no obvious overall bias in terms of follow up. Furthermore, even if every woman who failed to respond to the follow up survey was dissatisfied with the result of her surgery (an implausible assumption), overall 68% (50/74) would have regarded the outcome as excellent or good.

We agree with Margaret Somerville and colleagues that caution is needed in generalising from breast reduction to other forms of cosmetic surgery. Patients awaiting breast reduction surgery represented a quarter of referrals to plastic surgeons for possible cosmetic procedures in Oxford region in 1993. In an assessment of 198 patients having a wider range of cosmetic surgical procedures those who had breast reduction surgery had the worst scores on the physical and pain dimensions of the short form 36 before surgery and, six months postoperatively, showed the most benefit in terms of effect sizes for these dimensions.¹ They also experienced the greatest improvement in psychological wellbeing—as reflected by the 28 item general health questionnaire.

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Fatal methadone overdose

Better understanding of body's handling of methadone is needed

EDITOR,—T J Hendra and colleagues describe a case in which postmortem concentrations of methadone were substantially higher than those in a sample of blood taken, by our calculations, about 28 hours before death.¹ They speculate that this indicates either delayed absorption from the gut or surreptitious consumption of methadone after admission to hospital. We suggest that the liver might have had a role.

Experimental studies show that the liver avidly extracts methadone from blood, stores some of it unchanged, and can release it back into the effer-

ent bloodstream.² Handling of methadone is altered in chronic liver disease,³ and methadone itself may be hepatotoxic.⁴ We have found it impossible to guess what effect these three phenomena might have in concert, but we suspect that, given the correct stimulus, the liver might be capable of releasing substantial amounts of methadone into the bloodstream long after ingestion. Perhaps that stimulus might be the improvement in the patient's general condition engendered by intensive care.

A further factor that confounds interpretation is the observation that blood methadone concentrations at different sites at necropsy may differ by a factor of over three in a single subject and that no systematic relation exists between the concentrations at different sites.⁵ In addition, methadone is likely to be released by autolysis from those cells that concentrated it during life.² It is thus difficult to interpret blood methadone concentrations at necropsy and to be sure that there was more methadone in the circulation in Hendra and colleagues' patient at death than in the sample of blood taken on the day of admission. Better understanding of the body's handling of methadone is needed.

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Naloxone infusion should have been started earlier

EDITOR,—We wish to make several points about the case of fatal methadone overdose reported by T J Hendra and colleagues.¹ The initial management of the patient causes us particular concern. Flumazenil was relatively contraindicated in the patient because he was known to have epilepsy and there was a high probability of a mixed overdose, given his access to other drugs and his history; such patients are commonly dependent on benzodiazepines.^{2 3}

In opiate poisoning an initial bolus of 0.8-2 mg of naloxone is recommended; this should be repeated to a maximum of 10 mg before other drugs causing depression of the central nervous system are considered.⁴ The naloxone infusion should have been started earlier, given the extended half life of methadone; the use of occasional boluses is hazardous. Once the infusion was started the rate of infusion remained inadequate, with supplemental boluses being required.

After transfer to the general ward the patient died at some point a few hours after the naloxone infusion stopped. The comment that "the naloxone infusion was slow to complete, eventually finishing at 0330" is unfortunate, implying that a course of treatment had been concluded after a notional timescale, without reference to the patient's clinical status. Given the short half life of naloxone, the danger period could have been predicted to occur in the few hours after the

infusion ended, an event better supervised during the normal working day.

We do not agree that all patients with methadone overdose should be admitted empirically for 72 hours or that pulse oximetry should be performed continuously for this time. This would result in unnecessarily protracted admissions and inappropriate use of monitoring equipment. Pulse oximetry will not detect hypoventilation in a patient being given supplemental oxygen.⁵ After an initial bolus, the early introduction of a naloxone infusion titrated to the clinical response is appropriate management; this can be stopped after 12-24 hours with the patient kept under close clinical scrutiny for several hours thereafter, particular attention being paid to the conscious level and respiratory rate and depth. Any deterioration in these variables necessitates resumption of the naloxone infusion with an initial bolus as required.

In summary, in this case flumazenil was inappropriately given and the use of naloxone can best be described as too little, with the infusion being given too late and stopped too soon, apparently without adequate clinical supervision. The clinical toxicology results are interesting, but only in relation to the postmortem discussion. The lessons in this case are not those advanced by the authors.

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Patient may have injected methadone while in hospital

EDITOR,—The case of fatal methadone overdose reported by T J Hendra and colleagues relied for its diagnosis on the ability of hot chocolate to release a large load of methadone from the patient's gut, where it had been stored for some hours.¹ Such an event is possible, but the authors do not convincingly show it to have been the cause of death.

An alternative suggestion for the role of the hot chocolate is that the patient used the request for it to distract a nurse while obtaining a needle and syringe. He could then have injected a dose of methadone intravenously before retiring to bed. This would explain the high serum concentration and the absence of methadone in his gut as well as the timing of his death. Although the patient was in hospital at the time, it is not unknown for inpatients to obtain supplies of illicit drugs. In addition, any injection site would be likely to be overlooked in a patient with multiple venepuncture sites from his time in the intensive care unit.

The authors' conclusion that patients presenting with methadone overdose need to be carefully monitored is justified, but the availability of the means to inject drugs must also be considered.

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Close observation in intensive care unit is required when naloxone infusion ends

EDITOR,—T J Hendra and colleagues report the death of a young man from methadone toxicity.¹ This case provides an important lesson that the authors have missed. The patient, who had a potentially fatal serum methadone concentration, was discharged from an intensive care unit to a general medical ward while receiving treatment with naloxone by intravenous infusion. The infusion stopped at 3 30 am, and 30 minutes later he was sleeping, but no report of his neurological status is given, and he may have been comatose at that time. The authors report no further assessment of the patient until he was found dead 2 hours 55 minutes later.

Naloxone's elimination half life may be as short as 30 minutes, and recurrence of coma after treatment is stopped is well recognised. This is especially likely when long acting opioids are involved. Patients requiring a naloxone infusion should be managed in an intensive care unit and closely observed for recurrence of toxicity after the infusion stops. The likely sequence of events in this case is that the naloxone infusion ended while the patient was in a darkened general medical ward in the middle of the night and he then lapsed into a coma induced by methadone, had an unwitnessed respiratory arrest, and died.

The shortfall in resources for intensive care in Britain is well known internationally.² If the crisis has reached such proportions that simple lifesaving measures such as naloxone infusions cannot be managed in intensive care units then explicit instructions must be given to ward nursing staff for close observation and formal neurological assessment of patients when naloxone infusions end. This is particularly so if the infusion is to stop in the middle of the night, when casual observation of deterioration is least likely. If these measures are not taken this tragic incident will be repeated. In the hospital where I work all deaths in hospital of patients who have been treated in the intensive care unit are reviewed at a monthly meeting attended by the intensive care specialists and a representative of the hospital's quality assurance programme. Had this death occurred in my hospital it would have been classified as preventable, and the management of the patient after the naloxone infusion finished would have been considered substandard.

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Authors' reply

EDITOR,—We agree with Emyr W Benbow and colleagues' suggestion that tissue redistribution may partly explain the postmortem increase in blood methadone concentration seen in our patient. In another recent case one of us (ARWF) found that a postmortem blood sample contained 71 µg methadone/l, whereas a sample obtained shortly before death contained 38 µg/l. One potential mechanism for the possible increase in blood methadone concentrations associated with food intake is that food increases mesenteric and portal blood flow, causing release of methadone from the liver. Whatever the explanation, the implication of Benbow and colleagues' letter is that, as we proposed, methadone overdose requires prolonged monitoring in hospital.

We accept N Nichol and colleagues' point about the use of flumazenil but do not agree with

their comments about naloxone in this patient. The initial doses of naloxone were small but sufficient to produce the desired effect; the infusion was titrated against the clinical response, with the dose given being sufficiently small to make the late occurrence of further problems unexpected and indicative of another mechanism. We agree that pulse oximetry will not detect hypoventilation in the absence of hypoxia but believe that it has a place in the inpatient management of this problem.

The point by Aidan J Byrne about surreptitious use of drugs on the ward is well made, particularly when a patient's condition unexpectedly deteriorates, though in this instance no syringes or other paraphernalia of drug misuse were found in the patient's possession after his death.

Simon Finfer's statement that all patients requiring a naloxone infusion should be managed in an intensive care unit may not be sustainable in many hospitals owing to competing clinical demands and limited resources. In retrospect, stopping the naloxone infusion in the middle of the night without monitoring the patient by pulse oximetry was not optimal management—which was the point of our report.

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Methadone treatment

Methadone treatment is not the only option

EDITOR,—The recent editorial and three papers about methadone raise many points of interest and controversy.¹⁻⁴ The editorial's message—that methadone works, and so we should get on and use it—conceals not only the issue of deaths in drug users² but also several other issues: drug users in prison, social inequalities and poverty relating to drug users, the spread of HIV from drug users to the heterosexual population, the fact that drug users are a national pool of infection with hepatitis B and C viruses, and many other issues that decades of experience in North America, Australia, and the rest of Europe have shown do not disappear with methadone treatment. More worrying still, the problems that politicians have recently experienced over comparatively uncontroversial drug issues make one wonder what has happened to politics and politicians in the past 20 years that makes it so much less possible than it was in the 1960s to consider radical solutions to these issues.

The arguments about the efficiency of methadone in the well resourced American system are well rehearsed; in contrast, the various European systems have a shorter history and have developed along the more comprehensive harm minimisation approach. The contrast between Europe and North America was evident at the recent AIDS conference in Vancouver, where it became apparent that the United States still has major problems in implementing strategies such as needle exchange that have been accepted in Europe for 10 years.

Although methadone is undoubtedly the pharmacological mainstay, it is not a panacea. Other options tried have been injectable methadone, injectable heroin, and shorter acting drugs such as buprenorphine. Our experience with dihydrocodeine over 15 years has been that this is a safe alternative for the many drug users who do not wish to give up the use of a short acting drug.⁵ Unlike buprenorphine, dihydrocodeine is