orthopaedic clinics. The x ray facilities serving the clinics are limited to Northwick Park Hospital and to one other site, which provides services to the patients of general practitioners but is staffed and organised by the Northwick Park radiology department. Five patients out of 491 referred for radiography had a repeat x ray examination because of missing films: a repeat radiography rate of 1%. Furthermore, the Scottish authors expressed their 33% of repeat examinations as a percentage of all patients attending the orthopaedic clinic (whether sent for radiography or not)³; our equivalent figure for repeat radiography for all patients attending our orthopaedic clinics was substantially less than 1%.

The important message from the Scottish survey would seem to be that health centres that have x ray facilities may be associated with a high level of repeat x ray examinations in patients subsequently referred to hospital for an orthopaedic opinion. Clearly, that particular problem needs to be dealt with.

For understandable reasons of brevity the *BMJ* editorial failed to convey the particular background to the Scottish survey.⁴ When *BMJ* editorials, commentaries in the lay press,⁵ or indeed review articles such as Fiona Godlee's refer to unnecessary x irradiation in this particular context the authors might consider that it could be reassuring to their readers, as well as to patients, to note that a repeat rate of less than 1% has been shown to occur in the setting of a district hospital where local health centres do not have x ray facilities. At present this represents a more typical setting for the United Kingdom in general than do the arrangements existing in Scotland.

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Risk of Down's syndrome and amniocentesis rate

SIR,—Charlotte Fleming and David J Goldie observed that most women (60%) who were aware that their risk of bearing a fetus with Down's syndrome was at least 1:200 (derived from their age and serum α fetoprotein concentration) did not undergo amniocentesis.¹ They comment on the serious implications for the potential benefits of introducing population screening for Down's syndrome based on risk.

The national Down's syndrome cytogenetic register for England and Wales recorded 323 prenatal cases and 737 postnatal cases of the syndrome in 1989. After allowance for natural fetal loss, and in the absence of prenatal diagnosis, 973 affected infants would have been expected to be born, 602 to women aged under 35. Thus 236 cases of Down's syndrome were prevented by prenatal diagnosis.²

In the absence of biochemical screening the indications for offering karyotyping to women aged under 35 are a previously affected child, the presence of a balanced translocation, and abnormal findings on ultrasonography. In 1989, 38 cases of Down's syndrome (adjusted for spontaneous fetal

loss) were detected in this age group. Currently the most effective biochemical screening method is the triple test, which, using a cut off of 1:200, has the potential to detect 57% of cases surviving to birth for a false positive rate of 3.9%.³ Assuming that 40% of women with a risk of 1:200 or greater (1.56% of pregnant women) choose to have amniocentesis, then the expected number of cases detected in those aged under 35 would be 137 (0.4×0.57×602). Biochemical screening would have improved the overall detection rate from 24% to 34%, which, though not optimal, remains beneficial.

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Medical abortion

SIR,—Michael Heard and John Guillebaud's editorial on medical abortion avoids certain aspects of the problem.¹ An economic evaluation of the use of mifepristone has been made. Replying to a debate in the House of Commons, the under secretary of state for health, Stephen Dorrell, said, "I emphasise that we do not envisage the use of mifepristone as a cost saving exercise. Even if we did it would be arguable whether it would be a cost-saving approach."² Further evidence is provided by the British Pregnancy Advisory Service, which has announced that it cannot offer medical termination at the same price as early surgical termination. Treatment with mifepristone will cost £240, compared with £195 for early surgical termination.

Persisting pregnancies are reported as occurring in roughly 1% of cases in which the combined method is used.³ They may result either from the woman changing her mind after receiving mifepristone or from failure of the method. As severe teratogenic effects may occur after the drug is used this is extremely important. A particularly serious teratogenic manifestation is sirenomelia, or the mermaid syndrome, in which the legs are fused together. It has already been reported in France.^{4,5} The possibility of 1000 malformations resulting from 100 000 attempted abortions is daunting.

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SIR,—With regard to Michael Heard and John Guillebaud's editorial on medical abortion¹ I wish to draw attention to the Congenital Disabilities (Civil Liability) Act 1976. It was introduced after congenital abnormalities occurred with thalidomide and was designed to resolve the question of who was liable when a woman took a substance that proved to be teratogenic. It reads:

(1) If a child is born disabled as a result of such an occurrence before birth as is mentioned in subsection (2) below, and a person (other than the child's own mother) is under this section answerable to the child in respect of that occurrence, the child's disabilities are to be regarded as damage resulting from the wrongful act of that person and actionable accordingly at the suit of this child.

(2) An occurrence to which this section applies is one which: . . . b) affected the mother during her pregnancy, or affected her or the child in the course of its birth, so that the child is born with a disability which would not otherwise have been present.

Mifepristone is highly teratogenic in rabbits, producing skeletal abnormalities and abnormalities of the central nervous system, and Pons and Papiernik recently drew attention again to the circumstances in which a child with major skeletal deformities was born after exposure to it.²

Should a woman change her mind after taking mifepristone she would run the risk of having a deformed infant. Most women abort only after the second visit, when a gemeprost pessary is inserted; as a multicentre trial showed, 6% will still not abort.³ Women travel from their home districts to abortion centres, especially the privately licensed ones, and the risk of pregnancies continuing to term after exposure is real.

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The Hillsborough tragedy

SIR,—In the light of James Wardrope and colleagues' article on the tragedy at Hillsborough football stadium¹ we report on one of the survivors of the disaster who suffered isolated traumatic rupture of the mitral valve due to crushing of the chest.

A 45 year old man was in the section of Hillsborough football ground behind the goal when the crushing took place. He lost consciousness but recalls being pulled from the crowd and laid on the football pitch. He recovered rapidly and walked away from the stadium. He was aware of a small superficial scalp laceration and left sided chest pain but did not have bruising or evidence of external injury. He had previously been fit and did not have a history of rheumatic fever or hypertension. No cardiac murmurs had been detected during an employment medical examination four years earlier.

In the next week routine examination by his general practitioner showed a loud mitral regurgitant murmur, and he was referred for a cardiological opinion. An electrocardiogram showed broad P waves in leads I and II and slight increases in voltage in the left ventricular leads compatible with early left ventricular hypertrophy. A chest radiograph showed slight cardiac enlargement with a normal pulmonary vascular pattern. Echocardiographic study showed a prolapsing posterior mitral valve leaflet with moderate mitral regurgitation and good left ventricular contractility. Since then, electrocardiographic changes compatible with left ventricular hypertrophy have become more pronounced, but the patient has remained fit with a normal exercise tolerance.

Non-penetrating crush injury can cause myocardial contusion, valve disruption, and rupture of the great vessels or cardiac chambers. The right heart, being closer to the sternum, is more often affected than the left. Channer *et al* reported six cases of acute right heart strain in people crushed during the disaster at Hillsborough football

ground.² Damage to the mitral valve may occur when the heart is violently compressed at the end of diastole, when the left ventricle is full.³ This may cause rupture of the chordae tendineae or papillary muscles or damage to the valve leaflets themselves.⁴ In severe cases symptoms may occur directly after the injury, but in some cases they may be delayed for several years.⁵

Our patient's posterior mitral valve prolapse was probably due to damage to the chordae tendineae sustained during the crush at the football ground. Such cases have medicolegal implications as mitral valve surgery may become necessary.

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SIR,—I must correct an error in James Wardrope and colleagues' article on the Hillsborough tragedy, which claimed that the South Yorkshire Metropolitan Ambulance and Paramedic Service gave no notification to the Northern General Hospital that a major incident was taking place.¹ The hospital was notified of a major incident at about 1525 hours, before any casualties arrived. That information was given, in person, by an ambulance-man to a member of the hospital staff, who appeared to act on it. Any suggestion that the hospital had not received notification is therefore incorrect.

With regard to the part of the discussion headed "implications for disaster planning," this service made formal representations at Lord Justice Taylor's inquiry and was instrumental in introducing legislation to increase the emergency provision in football stadiums.

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Low blood pressure, low mood?

SIR,—John A Pilgrim and colleagues' paper looking at the relation between low blood pressure and low mood¹ and Anthony Mann's accompanying editorial² prompted me to examine data from a study investigating the relations of aspects of pregnancy with psychological and psychosocial

factors. The study is of women expecting their second child and includes completion of a hospital anxiety and depression scale³ at 20-22 weeks' gestation. This scale correlates well with the general health questionnaire used in the Whitehall II study.⁴ Measurements of blood pressure taken around this time are available from hospital case notes. I defined low blood pressure as the lowest quartile of both systolic and diastolic blood pressures (systolic <110 mm Hg and diastolic <65 mm Hg) and low mood as a score of >7 on either subscale of the hospital anxiety and depression scale.

Although a higher proportion of women with low blood pressure experienced low mood, the association was not significant ($\chi^2=0.87$, df=1). There were, however, apparent associations of low blood pressure and low mood with low birth weight and preterm birth (table). The odds ratios for the cells for low blood pressure and low mood in the table were 4.76 (95% confidence interval 1.36 to 16.72) for low birth weight and 5.33 (1.71 to 16.69) for preterm birth.

These associations may be multiply confounded—for example, by smoking—and analysis of these data is continuing. Nevertheless, these observations in a relatively young sample of pregnant women (average age 25.6 (SD 3.2) years) provide a further argument for better understanding of the relation between low blood pressure and low mood.

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Unexpected problems with patient controlled analgesia

SIR,—Patient controlled analgesia has become a routine part of the management of postoperative pain. After new equipment was introduced into this hospital we audited the patient controlled analgesia service. Twenty one patients receiving patient controlled analgesia after elective surgery were visited in the recovery room and daily in the ward until the analgesia was stopped. Although most of the patients were satisfied with their analgesia, several unexpected problems were found.

A 58 year old woman, who initially used her analgesia pump without any problems, was later found to be comatose, unresponsive to sternal pressure, and with fixed, dilated pupils and a respiratory rate of 8 breaths/minute. After treatment with naloxone she recovered. She later explained that she had believed the demand button for patient controlled analgesia to be the nurse call device and had been pressing it repeatedly. Patient controlled analgesia was stopped, and she recovered uneventfully.

After the syringe is changed the settings on the analgesia pumps (Lifecare, Abbott Laboratories) need to be confirmed. In three cases the four hour limit was incorrectly set at 1 mg (twice by a house officer, once by junior nursing staff). Patients therefore received inadequate analgesia despite repeatedly pressing the demand button.

During the postoperative period patients are moved about, and on these occasions the machine is unplugged from the mains. In three cases the mains supply was not reconnected and the back up battery supply was later found to be almost exhausted.

These problems indicate the need for careful monitoring and supervision of patients receiving patient controlled analgesia. Measures have now been taken to improve staff's and patients' understanding of patient controlled analgesia and its equipment. Clearly, the introduction of a patient controlled analgesia service demands more than simply buying the equipment.

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Ocular injuries from boxing

SIR,—In his editorial on ocular injuries from boxing David McLeod mentions that the Boxing Board of Control has visual standards below which no one is allowed to hold a professional licence.¹ Another part of the same regulation excludes any boxer who has suffered any intraocular pathology, including a retinal hole, tear, or detachment. This exclusion has been vigorously opposed by, among others, McLeod, who has stated that a repaired retina is stronger than even a normal retina and someone with a repaired retina is not predisposed to any other intraocular injury, such as has occurred with a professional boxer who has recently been treated. I can find no papers to confirm McLeod's assertions and would be interested to hear of any.

McLeod asks whether the boxing board has the courage and clout to stage a longitudinal study of the effectiveness of any preventive measures. As the board's chief medical officer I would be pleased to cooperate in any study aimed at preventing eye injuries in the ring and at establishing the correct procedure for dealing with the results of eye damage provided that funds—which, sadly, the Boxing Board of Control does not have—were made available.

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Diagnosing Alzheimer's disease

SIR,—Minerva¹ reports the findings of Burns *et al* that around a fifth of patients with Alzheimer's disease are misclassified by computed tomography.² In their paper Burns *et al* wrote, "Although single photon emission tomography and magnetic resonance imaging can give more detailed information about cerebral function and structure, these are more arduous for the patient and [computed tomography] remains the most applicable in the clinical practice of old age psychiatry." They state this even though 40 of 178 patients with Alzheimer's disease were unable for various reasons to have computed tomography.

We have just completed a pilot study looking at the ability of magnetic resonance imaging and single photon emission tomography to differentiate

Proportions of women giving birth to low birthweight babies and preterm babies by blood pressure and mood

	Low mood		Not low mood		All patients	
	No (%) with low birth weight	No (%) with preterm birth*	No (%) with low birth weight	No (%) with preterm birth*	No (%) with low birth weight	No (%) with preterm birth*
Low blood pressure	3/26 (11.5)	4/25 (16.0)	0/28 (0.0)	0/28 (0.0)	3/54 (5.6)	4/53 (7.6)
Not low blood pressure	6/151 (4.0)	7/150 (4.7)	6/232 (2.6)	8/231 (3.5)	12/383 (3.1)	15/381 (3.9)
All patients	9/177 (5.1)	11/175 (6.3)	6/260 (2.3)	8/259 (3.1)	15/437 (3.4)	19/434 (4.4)

*Gestational age was not ascertained in three cases.