LETTERS TO THE EDITOR

Recovery from sedation in day units

SIR,—There can be little doubt that day units offer advantages to both hospitals and patients for minor surgical and investigative procedures. But there is a danger that pursuit of these advantages could erode standards to dangerous levels. The safety and ease of the progress of the patient through day units depends on the medical and administrative practices implemented in such units.

In the case of patients who attend the day unit of this hospital for gastroscopy, the endoscopist administers an intravenous benzodiazepine as sedation. After the procedure, patients rest in a quiet room and are allowed to leave when they feel adequately recovered. All patients are advised that they will not be fit to drive and should arrange to be accompanied home by a responsible adult.

Recently we monitored a group of consecutive patients attending our day unit. Over five weeks 85 patients attended for upper gastrointestinal endoscopy, 40 women and 45 men, aged 17 to 84 years. We noted the times of their arrival, of the administration of the sedative, and of their discharge, and the dose of the benzodiazepine they had received. We found that the time from the administration of the intravenous sedative to the time the patient left the unit was unexpectedly short (mean 1 hour 23 minutes, range 20 minutes–3 hours). Over one third of the patients left the unit within one hour and over 80% had left by two hours with only 14 patients staying longer than two hours. There was no correlation between the age of the patient and either the dose of sedative or the recovery time ($p>0.05$).

Of the patients surveyed, 29 had received midazolam (mean 8.3 mg, range 2.5–17.5 mg) and 56 received diazepam (mean 11.8 mg, range 2.5–30 mg). For the patients given diazepam there was no correlation between dose and time to discharge ($r=0.009$, $p>0.05$), but there was a significant correlation for those given midazolam ($r=0.41$, $p<0.02$). For the whole sample ($n=85$), however, there was a stronger negative correlation between time to discharge and the time spent in the unit before the procedure (mean 2 hours, range 45 minutes–3 hours 45 minutes ($r=0.3$, $p<0.02$). It seems overall that the time spent in the unit before the procedure is the best predictor of recovery time.

As psychologists concerned in the assessment of impairment after centrally acting drugs we find these rapid departures startling. We would be most interested in comments from your readers.

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¹³C-urea breath test for *Helicobacter pylori* infection

SIR,—We read with interest the recent paper by Dill *et al* on the 'Evaluation of ¹³C-urea breath test in the detection of *Helicobacter*

pylori and in monitoring the effect of tripotassium dicitratobismuthate in non-ulcer dyspepsia' (*Gut* 1990; 31: 1237–41). In this study the authors used 250 mg of ¹³C-urea per patient.

We have recently conducted a study comparing the ¹³C and ¹⁴C-urea breath tests in *Helicobacter pylori* positive patients both before and at least one month after treatment. We found 100% agreement between the two tests and obtained just as good discrimination between positive and negative patients with 125 mg ($n=10$) and 75 mg ($n=13$) of ¹³C-urea as with 250 mg ($n=9$). We agree with Logan *et al*^{1,2} that excellent results can be obtained with 100 mg of ¹³C-urea per test but think that a further saving without jeopardising accuracy can be achieved by administering only 75 mg of the stable isotope per patient.³ Others have had similar experience.^{4,5}

Since the ¹³C-urea test was first described by Graham *et al* in 1987⁶ the analysis of ¹³CO₂ in breath samples collected during the test has proved to be a major drawback to using the test in routine clinical practice. It is necessary to use isotope ratio mass spectrometers (IRMS) to measure ¹³C enrichment in CO₂ because ¹³C changes of less than 1 part per 1000 need to be determined. Before the actual ¹³C measurements take place, ¹³CO₂ must be purified from other breath gases. Previously, this has been achieved by a cryogenic purification unit linked to the IRMS. Breath analysis on such systems is slow (about 20 minutes per sample) and costly (0.5 l of liquid nitrogen per sample) and requires a complex dual inlet IRMS for the final ¹³C measurement.

In our own study³ we have used an automated breath ¹³C analyser (ABCA) utilising fast and simple chromatographic purification and a single inlet IRMS. The ABCA consists of a Roboprep-G purification system linked to a Tracermass stable isotope analyser (Europa Scientific, Crewe, UK). Briefly, each breath sample is automatically injected into the purification unit by a continuous flow of helium. Water vapour is removed by a magnesium perchlorate trap. A gas chromatograph (75°C) then separates CO₂ from N₂ and O₂ before the CO₂ is swept by the helium gas into the stable isotope analyser for measurement of ¹³C enrichment. Breath samples were measured against a reference gas (5% CO₂, balance N₂) which had a delta ¹³C value of −41.60 per 1000 (*v* PDB). The ¹³C enrichments of breath samples were expressed as ¹³C change (per 1000) over the patient's own baseline (0 min) delta ¹³C value. This technique for analysing ¹³C breath samples proved to be easy to use, fast (5 minutes analytical cycle time), and low consumable cost (GC grade helium).

Patients fasted overnight before the test. A nutrient dense drink (20 g Calogen LCT emulsion, 15 g Maxipro HBV powder, 40 g Caloreen glucose polymer, 15 g Crushe syrup, and 300 ml water) was taken followed by the dose of ¹³C-urea in 50 ml water. Breath samples were collected at 0, 20, 40, and 60 minutes after drinking the ¹³C-urea solution by using an alveolar breath collection bag. At each breath collection 2×20 ml aliquots of breath were drawn from the bag to fill two septum capped evacuated tubes. These samples were then sent to Europa Scientific for analysis of ¹³C enrichment. The ¹³C-urea breath tests were performed within 48 hours of the ¹³C-urea breath test^{7,8} and the personnel at Europa Scientific had no knowledge of the result of the former when making their own analysis.

All pretreatment *H. pylori* positive patients (positive by the ¹³C-urea breath test) showed a ¹³C change of >5/1000 in the mean of the 40

and 60 minute breath samples ($n=16$) regardless of whether the patient had initially received 250, 125, or 75 mg of ¹³C-urea. In contrast, the one month (or greater) post-successful eradication breath tests of previously *H. pylori* patients ($n=16$) showed a ¹³C change of <5/1000, regardless of the dose of ¹³C-urea given.

It has been our previous experience with the ¹⁴C-urea breath test that within as little as 24–48 hours of completing a course of colloidal bismuth subcitrate⁹ the organism which has been temporarily suppressed to undetectable levels rapidly multiplies to levels that again permit its detection using a urea breath test. These rapid returns to positivity have been shown by restriction endonuclease DNA analysis to be due to recrudescence and not reinfection.¹⁰ Logan *et al*¹ repeated the endoscopy, biopsy, and ¹³C-urea breath test 48–72 hours after completing the course of 28 days of colloidal bismuth and found a 'clearance' rate of only 5/28 (18%). When the same group more recently reported their results for 'clearance' of *H. pylori* after one, two, or four weeks of colloidal bismuth, figures of 10/15 (66%), 8/12 (75%), and 17/20 (83%) respectively were obtained when the breath tests were performed within 24 hours of stopping treatment. *H. pylori*, however, recurred in all but one patient within one week of stopping treatment. Had 'clearance' been assessed at this stage a figure of 1/47 (2.1%) would have been recorded.

In our view the word 'clearance' should be avoided in the context of anti-*H. pylori* treatment. We suggest that instead if research workers wish to study patients either while on a particular treatment or within 24 hours of discontinuing it they talk about 'suppression' and not 'clearance.' We entirely agree with Dill *et al* and Logan *et al*¹ that if one wishes to study *H. pylori* 'eradication' then it is necessary to wait at least one month after completing any given course of treatment before repeating tests. We suggest that assessing the *H. pylori* state more than 24 hours and less than 28 days after treatment has little or no clinical relevance.

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