be made to the incidence of rheumatic fever or suppurative complications.[5] We sugest that much better evidence of benefit is required before the cost of antibiotics prescribed for suspected streptococcal sore throat is increased up to twofold (the *British National Formulary* (March 1993) gives the cost of non-proprietary amoxycillin 250 mg as 3·7p and of phenoxymethylpenicillin 250 mg as 1·7p).

PAUL LITTLE
STEPHEN MORGAN
IAN WILLIAMSON

Faculty of Medicine, University of Southampton,
Aldermoor Health Centre,
Southampton SO1 6ST

1 Shvartzman P, Tabenkin H, Rosentzwaig A, Delginor F. Treatment of streptococcal pharyngitis with amoxycillin once a day. *BMJ* 1993;**306**:1170-2. (1 May.)
2 Del Mar C. Managing sore throat: a literature review. I. Making the diagnosis. *Med J Aust* 1992;**156**:572-5.
3 Banks M, Beresford S, Morrell D, Waller J, Watkins C. Factors influencing the demand for primary care in women aged 20-64 years: a preliminary report. *Int J Epidemiol* 1975;**4**:189-95.
4 Howie J, Foggo B. Antibiotics, sore throats and rheumatic fever. *J R Coll Gen Pract* 1985;**35**:223-4.
5 Del Mar C. Managing sore throat: a literature review. II. Do antibiotics confer benefit? *Med J Aust* 1992;**156**:644-9.

Immunoassays for rapid diagnosis

EDITOR,—P Shvartzman and colleagues used conventional bacteriological culture for group A β haemolytic streptococci to show that once daily treatment with amoxycillin and treatment with phenoxymethylpenicillin resulted in comparable rates of positive cultures after two days.[1] Similar controlled studies should be carried out elsewhere to prove the effectiveness of once daily amoxycillin in preventing the non-suppurative complications of streptococcal pharyngitis.

Although rheumatic heart disease has almost disappeared from industrialised countries, it is still one of the main disorders in Africa[2] and is the main cause of death and disability in the Arab countries of Asia.[3] In most of these regions laboratory facilities for culture and assessing sensitivity are not available and there is a shortage of qualified technical staff. In such areas simplified testing procedures that have one or two steps, do not depend on bacterial culture and identification of colonies, and do not need trained staff would be ideal for determining the local efficacy of once daily amoxycillin.

The polyclonal antibody based immunoassays that permit a specific diagnosis of group A β haemolytic streptococci within five minutes in remote locations are encouraging.[4] This procedure, which does not entail culture, involves extraction of group A antigen from the throat or pharyngeal swab, and the presence of group A β streptococci is indicated by a coloured signal. Introduction of liposomes, the artificial phospholipids, conjugated with antibodies has been useful to detect an antigen. Unlike enzyme immunoassays, in which a substrate is added to detect the colour signal, liposome technology does not require the addition of any substrate. Liposome technology provides a fast test procedure to detect group A β haemolytic streptococci in throat swabs.[5] An instantaneous diagnosis at the practice premises would facilitate advice on once daily amoxycillin treatment even where full laboratory services were not likely to be available for many years.

Shvartzman and colleagues did not estimate the concentrations of antistreptolysin O and antideoxyribonuclease B. Antistreptolysin O concentrations could be estimated with a simplified procedure using sensitised latex particles in areas with negligible laboratory facilities. Initial screening and quantification of antistreptolysin O antibodies are possible during a single step slide agglutination test standardised to indicate antistreptolysin O concentrations of 200 IU/ml (Avitex-ASO, Omega).

Whole saliva specimens have been investigated for the detection of HIV antibodies in epidemiological studies that used a line immunoassay or an immunoblot assay. In high risk groups whole saliva specimens were good alternatives to blood specimens for determining the prevalence of HIV antibody.[6] Similar exercises would be desirable in developing countries in which rheumatic heart disease is hyperendemic to ascertain the usefulness of whole saliva in studies of antistreptolysin O and antideoxyribonuclease B concentrations.

SUBHASH C ARYA

Centre for Logistical Research and Innovation,
M-122 (of part 2), Greater Kailash-II,
New Delhi—110048,
India

1 Shvartzman P, Tabenkin H, Rosentzwaig A, Dolginov F. Treatment of streptococcal pharyngitis with amoxycillin once a day. *BMJ* 1993;**306**:1170-2. (1 May.)
2 Ekra A, Bertrand E. Rheumatic heart disease in Africa. *World Health Forum* 1992;**13**:331-3.
3 Al-Sekait MA, Al-Sweilem AA, Tahir M. Rheumatic fever and chronic rheumatic disease in the school children in Saudi Arabia. *Saudi Medical Journal* 1988;**8**:245-7.
4 Dobkin D, Shulman ST. Evaluation of an ELISA for group A streptococcus antigen for diagnosis of pharyngitis. *J Pediatr* 1987;**110**:566-8.
5 Gerber MA, Randolph M, DeMeo KK. Liposome immunoassay for rapid identification of group A streptococci directly from throat swab. *J Clin Microbiol* 1990;**28**:1463-4.
6 Van den Akker R, van den Hoek AR, van den Akker WMR, Kooy H, Vijge E, Roosendaal G, *et al.* Detection of HIV antibodies in saliva as a tool for epidemiological studies. *AIDS* 1992;**6**:953-7.

Paediatric resuscitation

Chart needs evaluating in different specialties

EDITOR,—Derek P Burke and David F Bowden suggest[1] that Oakley's paediatric resuscitation chart[2] should be modified. They note, correctly, that the original chart is in widespread use but fail to acknowledge that it is used by specialties other than accident and emergency. In the original paper testing was undertaken with staff of several different grades in several specialties. In view of the widespread use of the chart this should perhaps be repeated before consideration is given to replacing it.

It is astonishing that senior house officers in accident and emergency fail to calculate the dose of a drug which presumably they use frequently in their daily practice. The toxic dose of lignocaine is expressed in mg/kg, and I can assume only that they are therefore unable to, and do not, calculate what constitutes a dangerous dose for their patients.

The most dangerous assumption made in the modified chart is that all drugs come in a fixed single concentration. Adrenaline is also widely available in a concentration of 1/1000 and therefore potentially may be used in a lethal overdose, by a factor of 10. Atropine is provided in hospitals in many different concentrations from 0·1 to 1 mg/ml; indeed, in the light of the Resuscitation Council's recent guidelines a single dose of 3 mg will soon be available. Sodium bicarbonate should probably be used in a concentration of 4·2% to resuscitate children and is widely available in this concentration for this purpose. Calcium gluconate is a widely used alternative to calcium chloride and is not substituted on a one for one basis. Diazepam is available in other concentrations and, in particular as Stesolid, which is often used for rectal administration, as either 2 or 4 mg/ml, with no 5 mg/ml preparation available. Lignocaine is available in concentrations other than 1%. Salbutamol is available in a variety of concentrations from 0·25 to 1 mg/ml and is not actually available in a concentration of 0·05 mg/ml.

If the medical staff who tested the modified chart are unable to calculate a dose of lignocaine, are not the dangers of prescribing and giving a lethal volume of a drug of variable concentration worse than those of spending 30 seconds calculating the correct dose? Paediatricians and anaesthetists at all levels are well used to calculating drug dosages and should in any case be present, if at all possible, for paediatric resuscitation.

There is, I believe, a strong case for concluding that the modified chart should not be introduced into practice. The standard chart is due for modification as it is now some five years old, but it would benefit from simple measures such as correct printing to ensure that the graph lines up with the table, as I am sure was originally intended.

PETER CURRY

Department of Anaesthesia and Intensive Care,
Queen Elizabeth Hospital,
Birmingham B15 2TH

1 Burke DP, Bowden DF. Modified paediatric resuscitation chart. *BMJ* 1993;**306**:1096-8. (24 April.)
2 Oakley PA. Inaccuracy and delay in decision making in paediatric resuscitation and a proposed reference chart to reduce error. *BMJ* 1988;**297**:817-9.

Don't use 50% dextrose

EDITOR,—The revision of the paediatric resuscitation chart is a welcome development to minimise confusion surrounding dose calculations in emergencies.[1] We are concerned, however, that both the original and the modified schedules advocate the use of 50% dextrose solution to correct hypoglycaemia. Following the death of children after the use of large volumes of 50% dextrose to treat hypoglycaemia induced by the insulin tolerance test[2] we believe that this advice is potentially dangerous. Indeed, guidelines previously published in the *BMJ* suggested that 10% dextrose solution at a dose of 2 ml/kg was adequate to treat hypoglycaemia.[2] Other potential complications such as cerebral infarction are associated with the administration of hypertonic dextrose solutions.

In view of the potential medicolegal consequences and the morbidity associated with such practice we suggest that the use of 50% dextrose should be stopped and the resuscitation chart modified to an appropriate dosage of 10% dextrose.

A P WINROW
B ADLER
R P A RIVERS

Department of Paediatrics,
St Mary's Hospital,
London W2 1NY

1 Burke DP, Bowden DF. Modified paediatric resuscitation chart. *BMJ* 1993;**306**:1096-8. (24 April.)
2 Shah A, Stanhope R, Matthew D. Hazards of pharmacological tests of growth hormone secretion in childhood. *BMJ* 1992; **304**:173-4.

Dosage inaccuracies may be dangerous

EDITOR,—Derek P Burke and David F Bowden's conclusions that their modified paediatric resuscitation chart should supersede Oakley's existing one are both presumptuous and unfounded.[1]

Firstly, there are two inaccuracies in their reproduction of Oakley's chart: the endotracheal tube sizes suggested for an 8 year old (6·0 mm) and a 6 year old (6·5 mm) have been reversed in error. The bottom line of the chart suggests that 1 ml of calcium chloride at 1 mmol/ml is equivalent to 1·5 ml 10% calcium chloride+4·5 ml 10% calcium gluconate. This obviously should be an equivalent sign. I assume that these inaccuracies were not present in their comparison of their own and Oakley's charts during the study.

Oakley's chart shows that a child's age and weight are not related in a linear fashion graphically, and this makes it far easier to calculate a dose when the child's length and weight lie between the given columns of doses. Burke and Bowden's chart, however, does not take account of this, and there is a notable gap between the ages of 1 and 3½

years, which is worrying. There is a similar gap between the ages of 6 and 10 years. While a child's weight and therefore doses of drugs may vary considerably with age, the size of an endotracheal tube varies far less. The authors' chart should at least show a full range of endotracheal tube sizes.

Before the meeting of the European Resuscitation Council in November last year the recommended endotracheal dose of adrenaline, atropine, and lignocaine was twice the intravenous or intraosseous dose. Since the meeting the American Heart Association has suggested that the initial endotracheal dose of adrenaline should in fact be 10 times the intravenous dose—that is, 100 µg/kg. It is likely that this will soon be accepted by the European Resuscitation Council as the standard. Thus Burke and Bowden's chart has at best a twofold and at worst a tenfold dosage error.

I understand that Oakley is currently revising his chart in accordance with the European Resuscitation Council's guidelines and is taking account of all these points. I look forward to seeing his new chart.

In conclusion, Burke and Bowden's chart has serious flaws and may even be dangerous. It should not replace the existing or updated Oakley chart.

M R WATERS

Department of Accident and Emergency Medicine,
Countess of Chester Hospital NHS Trust,
Chester CH2 1BQ

1 Burke DP, Bowden DF. Modified paediatric resuscitation chart. *BMJ* 1993;**306**:1096-8. (24 April.)
2 Oakley PA. Inaccuracy and delay in decision making in paediatric resuscitation and a proposed reference chart to reduce error. *BMJ* 1988;**297**:817-9.

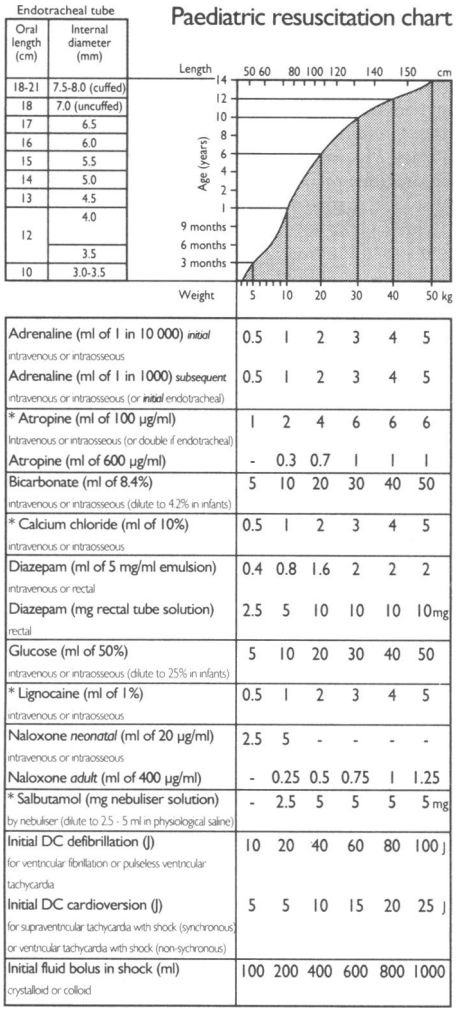
Updated standard reference chart

EDITOR,—In preparing the revised version of the standard reference chart for paediatric resuscitation[1] we have recognised the value of reading volumes rather than doses directly off the chart. The study by Derek P Burke and David F Bowden has confirmed this.[2] Nevertheless, caution must be exercised in forming overall conclusions about chart design on the basis of this study as no examples of the questions asked in the survey are provided and it is hardly surprising that a chart designed so that volumes can be read off is quicker to use than others. Furthermore, great care must be taken in basing a chart on volumes as many drugs are available in a variety of concentrations.

In Burke and Bowden's chart, constraining the doses to discrete columns may lead to considerable inaccuracy. For example, there is a 50% step up in many of the drug doses between the adjacent columns 5 and 6 in their chart. Given the potential error in initial estimation of age, this could lead to a 50% error in drug dosage. Similarly, there are large steps in the sizes of endotracheal tube, and the 4·5 mm diameter tube is omitted completely. As is evident from the original chart, this is the first choice for children between the ages of 1 and 2 years. As a result, no toddler will receive the best estimate of tube size the first time. When the importance of airway and ventilation in paediatric resuscitation is considered this is a considerable oversight.

The lack of a definite estimate of weight in Burke and Bowden's chart makes calculations of doses of second line resuscitation drugs, such as aminophylline, inotrope infusions, and emergency anaesthetic drugs, more difficult. We believe that the age-weight graph should be on the chart as it facilitates such calculations as well as allowing interpolation of doses.

The standard reference chart has now been revised in accordance with the new advanced paediatric life support (United Kingdom) guidelines (figure); the advanced paediatric life support course has been approved by the Resuscitation Council. In the revised chart all drug doses have been converted to volumes, but with clear guidance on what to do when alternative drug concentrations are used. Adrenaline has been split into initial and subsequent doses in accordance with the new guidelines. Naloxone and nebulised salbutamol have been added. The initial fluid bolus has been doubled, and the dose of glucose has been halved.[3]



Endotracheal tube

Oral length (cm)	Internal diameter (mm)
18-21	7.5-8.0 (cuffed)
18	7.0 (uncuffed)
17	6.5
16	6.0
15	5.5
14	5.0
13	4.5
12	4.0
	3.5
10	3.0-3.5

Paediatric resuscitation chart

Length 50 60 80 100 120 140 150 cm
Age (years) 14 12 10 8 6 4 2 1 9 months 6 months 3 months
Weight 5 10 20 30 40 50 kg

Adrenaline (ml of 1 in 10 000) *initial* intravenous or intraosseous	0.5	1	2	3	4	5
Adrenaline (ml of 1 in 1000) *subsequent* intravenous or intraosseous (or *initial* endotracheal)	0.5	1	2	3	4	5
* Atropine (ml of 100 µg/ml) Intravenous or intraosseous (or double if endotracheal)	1	2	4	6	6	6
Atropine (ml of 600 µg/ml)	-	0.3	0.7	1	1	1
Bicarbonate (ml of 8.4%) intravenous or intraosseous (dilute to 4.2% in infants)	5	10	20	30	40	50
* Calcium chloride (ml of 10%) intravenous or intraosseous	0.5	1	2	3	4	5
Diazepam (ml of 5 mg/ml emulsion) intravenous or rectal	0.4	0.8	1.6	2	2	2
Diazepam (mg rectal tube solution) rectal	2.5	5	10	10	10	10 mg
Glucose (ml of 50%) intravenous or intraosseous (dilute to 25% in infants)	5	10	20	30	40	50
* Lignocaine (ml of 1%) intravenous or intraosseous	0.5	1	2	3	4	5
Naloxone *neonatal* (ml of 20 µg/ml) intravenous or intraosseous	2.5	5	-	-	-	-
Naloxone *adult* (ml of 400 µg/ml)	-	0.25	0.5	0.75	1	1.25
* Salbutamol (mg nebuliser solution) by nebuliser (dilute to 2.5 - 5 ml in physiological saline)	-	2.5	5	5	5	5 mg
Initial DC defibrillation (J) for ventricular fibrillation or pulseless ventricular tachycardia	10	20	40	60	80	100 J
Initial DC cardioversion (J) for supraventricular tachycardia with shock (synchronous) or ventricular tachycardia with shock (non-sychronous)	5	5	10	15	20	25 J
Initial fluid bolus in shock (ml) crystalloid or colloid	100	200	400	600	800	1000

*** Caution!** Non-standard drug concentrations may be available:
Use **atropine** 100 µg/ml or prepare by diluting 1 mg to 10 ml or 600 µg to 6 ml in physiological saline.
Note that 1 ml of **calcium chloride** 10% is equivalent to 3 ml of **calcium gluconate** 10%.
Use **lignocaine** (without adrenaline) 1% or give twice the volume of 0.5%; give half the volume of 2% or dilute appropriately.
Salbutamol may also be given by slow intravenous injection (5 µg/kg), but beware the different concentrations available (eg, 50 and 500 µg/ml).

Modified paediatric resuscitation chart

PETER OAKLEY

North Staffordshire Trauma Centre,
Stoke on Trent ST4 7LN

BARBARA PHILLIPS

Booth Hall Children's Hospital,
Manchester M9 2AA

ELIZABETH MOLYNEUX

Royal Liverpool Children's Hospital (Alder Hey),
Liverpool L12 2AP

KEVIN MACKWAY-JONES

Hope Hospital,
Salford,
Lancashire M6 8HD

1 Oakley PA. Inaccuracy and delay in decision making in paediatric resuscitation and a proposed reference chart to reduce error. *BMJ* 1988;**297**:817-9.
2 Burke DP, Bowden DF. Modified paediatric resuscitation chart. *BMJ* 1993;**306**:1096-8. (24 April.)
3 Shah A, Stanhope R, Matthew D. Hazards of pharmacological tests of growth hormone secretion in childhood. *BMJ* 1992; **304**:173-4.

Authors' reply

EDITOR,—We are grateful for the opportunity of replying and particularly thank Peter Oakley and colleagues and M R Waters, all of the Advanced Life Support Group, for their comments.

The aim of our study was to compare the design and layout of both charts, not to recommend revisions to drug dosages. To this end we used the same drugs and dosages in our chart as are used in the standard chart. We recognise that there have been changes in the recommended dosages since our paper was submitted (October last year). Both charts require modification.

We specifically studied senior house officers because they are least experienced at resuscitation but the most likely to be called on in the crucial early stages.

We believe that the use of several drug concentrations on a chart would lead to confusion. We are surprised that the obvious solution has not been recommended by any group—that is, a nationally agreed standard paediatric resuscitation box containing drugs in a single form and fixed concentration to comply with those on the chart. A simpler solution to the problem would be to have prefilled syringes calibrated for weight, age, and length: this would remove the need for a chart. We approached International Medical Systems in November 1991 with this proposal, but it thought that this would not be economical.

The design of both charts allows "overdoses," the maximum being 50%. The standard chart also allows underdosage—in the worst case, 60% of the appropriate dosage being recommended. We know of no studies suggesting that a 50% increase in drug dosage during resuscitation has any adverse effect.

We are surprised that Waters is worried by the gap between the columns for a 1 and a $3^{1/2}$ year old child as this represents a difference in weight of only 5 kg. Drugs are ideally administered on a weight basis.

The exclusion of a 4·5 mm endotracheal tube was an omission on our part; these sizes, however, are only guidelines, and larger or smaller tubes are often required and should always be immediately available.

All the drugs mentioned on the chart are available in the stated concentrations.

DEREK P BURKE

Accident and Emergency Department,
Royal Hospital,
Wolverhampton WV2 1BT

DAVID F BOWDEN

Accident and Emergency Department,
Dudley Road Hospital,
Birmingham B18 7QH

Drug misuse in Lothian

EDITOR,—We recently reported a decrease in the self reported history of injecting and frequency of recent injecting among attenders at our clinic, having compared 50 referrals in 1988 with 50 referrals in 1990.[1] Mervyn London and colleagues raise four principal reservations on which we wish to comment.[2]

Firstly, they suggest that the findings might be explained by a change in referral pattern, with our newly established service attracting more severe cases in 1988 and the people referred in 1990 being "less involved in injecting" and "in less difficulty." We considered this possibility and sought to exclude it by looking at the recent injecting frequency of a subsample of frequent past injectors in both years. Among this notionally severe group, recent injecting frequency was much lower in 1990 ($\chi^2=19{\cdot}9$, df=2, $p<0{\cdot}0001$). This finding was reported in our paper.

Secondly, London and colleagues suggest that injectors in 1990 may have been less prepared to report recent injecting, being more likely to consider injecting undesirable behaviour. We are aware of the limitations of self reported data. We accept this as a cautionary element in interpreting data. Had we reported increased injecting, how-