infections are due to *E. faecalis*, with an estimated 5–10% due to *E. faecium*; and there are few reports of neonatal infection due to *E. faecium*.

Both our cases had gastrointestinal pathology, representing the likely source of infection, and neither had a central venous catheter. Standard antibiotic treatment on many neonatal units consists of penicillin, flucloxacillin and an aminoglycoside. Both infants initially received penicillin or flucloxacillin with netilmicin and metronidazole, which is not effective treatment for *E. faecium* infection.4

Enterococci should be considered as a possible cause of septicaemia and meningitis in newborn infants with gastrointestinal pathology. Isolates should be identified to species level and antibiotic sensitivities performed to detect resistance to standard treatment regimens.


A variable dextrose delivery system for neonatal intensive care

**EDITOR**—Optimising glucose delivery and reducing fluctuations in blood glucose are important goals in the care of the sick newborn baby. Traditionally, neonates requiring intravenous treatment have received infusions of 10% dextrose. However, when water requirements are particularly high, as in the preterm baby with large insensible water losses or when water requirements are low, as in the baby in renal failure, the requirements for fluid volume and glucose delivery may clash, resulting in either hypoglycaemia or hypoglycaemia. In addition, both glucose tolerance and glucose requirements may show wide variation in the sick neonate, necessitating frequent changes in glucose concentrations. We describe a simple method allowing variable glucose delivery, independent of infusion volume, which also avoids the need to change solutions.

Two continuous infusions, containing 5% and 50% dextrose respectively, are administered via a Y connector close to the baby. Mixing of the two concentrations in different proportions delivers a variable amount of glucose in a fixed volume or a fixed amount of glucose in a variable volume.

When 5% and 50% dextrose solutions are used the following equations describe the volume of each solution required per hour:

**X=0.11[(A×B)+1.2−Z]**

where X=rate of 50% dextrose infused in ml/hour, Y=rate of 5% dextrose infused in ml/hour, Z=total hourly infusion volume of 5% and 50% dextrose in ml/hour, A=required dextrose infusion rate in mg/kg/min, and B=patient’s weight in kg.

This formula is derived in the following way:

As 50% dextrose=500 mg dextrose per ml and 5% dextrose=50 mg dextrose per ml

[1] \[500X+50Y = \text{total mg dextrose required per hour} \]

[2] \[= \text{(total mg dextrose required per minute)} 60 \]

[3] \[= \text{volume in ml of 50% and 5% dextrose infused per hour} \]

\[= Z \]

Equations [1] and [2] are simultaneous equations containing the same variables. Therefore dividing equation [1] by 50 gives:

\[10X+Y = (A+B)1.2 \]

and multiplying equation [2] by -1 gives:

\[Z = (X+Y) \]

Adding equations [3] and [4] together gives:

\[9X = (A+B)1.2-Z \]

therefore

\[X = \frac{0.11[(A+B)1.2-Z]}{9} \]

but

\[Z = X+Y \]

and so

\[Y = Z-X \]

Therefore from a knowledge of desired glucose infusion rate in mg/kg/min (A), the baby’s weight in kg (B) and the total hourly infusion volume in ml/hour (Z), the respective infusion rates of 5% and 50% dextrose may be calculated, thus allowing independent alteration of glucose delivery and fluid volume. In our unit the calculations are run on a computer terminal situated in the intensive care area. The operator is required only to enter in the values for A, B, and Z. The computer screen displays the calculated flow rates for the 5% and 50% dextrose lines and also informs the operator of the concentration of the mixed solution. Although we were initially concerned that high glucose concentrations might lead to an increase in the number of intravenous lines requiring replacement, we did not in fact see this. This may be due to a streaming effect of mixing glucose solutions close to the site of venous entry.

We use a 500 ml bag of 5% dextrose running via a giving set and volumetric pump and 50% dextrose administered through a syringe pump. The system is easy to set up and after an initial introductory period was well understood by nursing and medical staff. Changes can be easily and quickly achieved simply by changing the rate of either or both infusions, without the need to change lines or solutions.

**METHOD** (see figure)

**Step 1**—A 4/0 silk suture is looped through the skin of the cord close to the line to be secured. A knot is tied at the cord and the suture is cut leaving two threads about 5 cm in length parallel to the line.

**Step 2**—A 1 cm×1 cm length of adhesive tape is used to approximate the line and parallel threads.

**Step 3**—The two ends of thread are folded down over the first piece of tape and a second similar piece of tape is used to fix the threads once more. Once the final position of the line is ascended the tape and the line are pinched together to ensure security.

This method has proved useful for securing umbilical arterial and venous lines in particular but has also been used for the safe fixation of chest drains and dialysis catheters. It has the advantage of only requiring a single stitch, of avoiding tape adhered direct to the prema-
ture infant’s skin, and of being easily adjusted should radiograph checks require this. The method has been widely used on this unit with babies of 23 weeks’ gestation upwards and has proved consistently reliable.

**STEP 1**

**Step 2**

**Step 3**
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Arch Dis Child Fetal Neonatal Ed 1994 70: F79
doi: 10.1136/fn.70.1.F79

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