Storage of vaccines in general practice

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A successful immunisation programme requires vaccines to be stored continually in conditions that maximise their potency—that is, at low temperatures. Vaccines differ in their sensitivity to adverse storage conditions, and manufacturers offer guidelines for storage temperatures, which should be observed to guarantee potency. Stimulated by the introduction of the measles, mumps, and rubella vaccine and the publication of the Department of Health and Social Security's report on immunisation against infectious diseases,¹ I examined the use and storage of vaccines in my practice. My findings prompted me to examine the storage of vaccines in other practices.

Methods and results

I distributed a questionnaire among nurses on two courses for practice nurses. They worked in 36 different practices in south Hampshire and Dorset. The box gives the results of the 36 questionnaires.

Discussion

Manufacturers recommend storage conditions for all of their vaccines. If vaccines are stored outside the specified temperature range they may remain potent, but this cannot be guaranteed. No vaccines should be frozen,¹ and in general they should be stored at 2-8°C. (Polio vaccine should be stored at 0-4°C.) In this study nurses in most (33/36) general practices did not know at what temperature their refrigerators were operating. An inefficient fridge or one with an inadequately adjusted thermostat may operate at close to room temperature. Conversely, the contents of a refrigerator may freeze if the thermostat has not been calibrated with a thermometer and the fridge has been defrosted recently or not opened for a long time. Therefore, practice nurses cannot be sure whether the vaccines they use are potent and whether they will provide adequate protection against lifethreatening diseases.

A specialised refrigerator (for example, an Electrolux RA 122(H)) has a thermostat set between 2° and 6° C and an external "safe zone" temperature gauge. This makes storage conditions far easier to control than those of domestic refrigerators, although a thermometer is still recommended to ensure correct calibration. In all, 33 of the practices in this study used a basic domestic refrigerator.

To maintain their efficiency refrigerators need to be defrosted regularly. Vaccines may deteriorate while this is being done if they are kept at room temperature for several hours, as was the procedure in 11 practices.

Sixteen practice nurses kept phials containing multiple doses of tetanus for more than one session after opening, and six kept them for up to one month. Once a phial has been opened there is a risk of contamination of the vaccine and destruction of its potency. The joint committee on vaccination and immunisation¹ and the manufacturers have strict guidelines on this. The use of phials containing single doses would avoid this problem.

Results of questionnaires by 36 practice nurses

(1) Do you keep a thermometer in your fridge?	
Yes	3
No	33
(2) What type of fridge do you use?	
Domestic	33
Specialised with "safe zone" gauge	3
(One of the specialised fridges contained a thermometer)	
(3) What do you do with vaccines when you are defrosting the fridge?	
Throw vaccines away	0
Use other fridge or ice box	25
Put them to one side and then return to fridge	11
(4) How long do you keep phials containing multiple doses of tetanus vaccine once opened?	
One session only	2
Between one session and one week	10
Between one week and one month	6
Use phials containing single doses	18
(5) Do you give your patients vaccines to store at home?	
Yes	18
No	18
If "yes," which vaccines do you give patients to store at home?	
Typhoid	7/18
Cholera	7/18
Hepatitis B	14/18
Influenza	3/18

Care of vaccines would probably be worse if they were kept by patients and stored in their refrigerators. Yet 18 practice nurses gave patients some vaccines to store at home. Hepatitis B vaccine was the one most commonly stored in patients' refrigerators. This probably reflects the inconvenience to practice nurses of storing the third dose for between six and 12 months if the whole course was originally obtained on one prescription. There is great potential for damage to the vaccine if it is stored for six to 12 months in inadequate conditions, and this may be one reason for the poor antibody response that is sometimes seen.

Guidelines for storing vaccines are not often observed. Yet storage conditions that preserve the potency of vaccines may be achieved simply and cheaply. The following recommendations can be made:

- Every fridge should contain a maximum-minimum thermometer
- Read the temperature twice a day and make adjustments to the temperature control of the fridge when necessary
- Store vaccines with the thermometer in the middle of the fridge
- Keep the storage of other items in the fridge to a minimum: this avoids repeated opening of the door of the fridge
- Defrost the fridge regularly; while doing this store

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the vaccines in another fridge or in a cool box containing ice blocks

- Ideally use a fridge designed for storing vaccines. Such fridges have preset thermostats and external temperature gauges
- When possible use phials containing single doses, and if these are not available discard opened phials containing multiple doses at the end of a session.

The inadequate storage conditions for vaccines reported in this study put the success of an immunisa-

tion programme at risk. The use of low potency vaccines wastes time and money and is potentially dangerous. Simple measures can be taken to guarantee the potency of vaccines and the success of immunisation.

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1 DHSS Joint Committee on Vaccination and Immunisation. *Immunisation against infectious disease*. London: HMSO, 1988.

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