The use of technology to help patients with self-medication

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A high proportion of health and social care staff work with patients who have problems remembering to take medication. This article describes how assistive technology can be used to enable patients to manage their own medication despite the challenges of memory or visual impairment.

The term ‘non-compliance’ is often used to describe when patients fail to take their medication. This term can be misleading as it fails to distinguish between those who cannot take medication due to a sensory or memory impairment and those who refuse to take medication.

Two types of memory errors with regard to medication have been described:

- *Schedule errors* – medication is not taken at the correct time, such as taking tablets at 9am instead of 10am;
- *Episodic error* – a patient forgets whether or not medication has been taken, which can result in doses being missed or taken more than once.

These terms clarify errors of omission and identify that memory problems may not only result in doses being missed but could also lead to accidental overdose (Baas and Allen, 1985).

The fact that memory problems can lead to difficulty remembering to take medication has been recognised for some time. Smith (1986) described a range of attempts to help a female patient to remember to take her tablets. The article was written before assistive technology began to appear but describes practical solutions to overcome memory problems. These included placing tablets in clearly marked containers with the time and/or day of administration indicated. These systems are commonly used by patients supported by the intermediate care services. However, their use requires a complex blend of cognitive, visual and dexterity skills (Box 1).

A proportion of patients supported by intermediate care teams have deficits in some or all of these areas. These will present challenges for them in managing their own medication. For example, a dossette box that indicates tablets are to be taken at breakfast time is only effective if the patient knows when it is breakfast time.

**Effects of medication errors**

The impact of medication errors should not be underestimated. Logue (2002), Dixon (2001) and Fuller (1995) describe a range of significant problems that can be caused by medication errors. Problems caused by medication errors can include:

- Adverse health problems;
- Hospital admission;
- Treatment failure;
- Disease progression;
- Nursing home placement;
- Death.

With the development of intermediate care, which aims to prevent avoidable admissions and facilitate speedy discharge (Department of Health, 2001), a growing proportion of health and social care professionals now work with patients who need to manage their own drugs but have problems remembering to take medication.

**Assistive technology**

A variety of items have been developed to help people to maintain a degree of independence despite sensory, physical or cognitive problems. The potential for such assistive or enabling technology to help people who have dementia has caused growing interest over the last few years.

The example mentioned by Smith (1986) of placing tablets in marked containers with a time of day clearly written on each is very similar to the principles of a conventional dossette box or blister pack. There are many types of dossette boxes on the market, which vary in quality and price. They tend to be similar in design and have separate areas containing tablets with the time and/or day of administration indicated. These systems are commonly used by patients supported by the intermediate care services. However, their use requires a complex blend of cognitive, visual and dexterity skills (Box 1).

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**New devices**

Clearly, conventional dossette boxes do not meet the needs of a proportion of patients who require help managing their medication. However, there are devices available that can help maintain independence for some of these patients, particularly people with mild to moderate dementia.
Automatic pill dispensers such as the Swedish-designed Carecousel incorporate an alarm clock. When the alarm sounds the dispenser delivers a prefilled dose of medication and the patient has to tip the tablets into her or his hand to silence the alarm. The dispenser can deliver up to four doses a day and has capacity for a total of 28 doses. It is lockable and uses a universal key. Although it is covered, it is not airtight.

In the US there is a wide range of assistive technologies for medication (Logue, 2002) but the choice in the UK remains small. Some research has been conducted into their use – most notably the Enable Project (2004), which looked at a selection of assistive technologies in five countries. It reported that the dispensers improved the well-being of both patients and carers. The project also assessed the reliability of the product and made recommendations for improvements.

An evaluation of the technology
The intermediate care services team in Bristol ran a small-scale pilot using a limited number of automatic dispensers to help people with memory problems manage their own medication. It soon became apparent that those with visual impairment would also benefit from the technology.

To date the pilot has provided 14 patients with dispensers. Twelve trials have been successful and enabled people with memory or visual impairment to maintain their self-esteem and dignity and to continue living at home. However, two trials were unsuccessful. One was aborted following an apparent jamming of the device (it was unclear whether this was deliberate or due to the volume and size of the medication), and the other after the patient decided the device was not for her.

Cost-effectiveness
The automatic pill dispenser offers an alternative to commissioning a home care package to provide medication prompts. In this context it is cost effective. However the initial cost remains an issue at approximately £100 a unit. Many people referred to intermediate care are on low incomes or receiving benefits. Very few of these people or their carers can afford to buy their own. Within the pilot we identified funding and also sought donations from charitable organisations. Since these sources are finite, easier access to funding for this technology would be beneficial.

Safety and risk
The dispenser is locked when in use and is tamperproof, reducing the risk of accidental overdose. This has had positive benefits for both patients and carers.

The device can reduce anxiety for carers, although they must take responsibility for its daily running and replacing batteries at least every six months. This was also identified by the Enable Project and requires the nominated carer to visit at least weekly. Not all service users have family or carers living nearby.

We were unable to identify any service that is willing to provide ongoing support for dispensers and similar issues were raised within the Enable Project. We have had to rely on team members and carers to continue ongoing monitoring.

Administration
Within our geographical area the majority of community pharmacists were happy to fill the cartridges and deliver them for free. However, some community pharmacists favour specific dosette systems and charge for providing this service, while some are reluctant to fill the cartridges.

Tablet size and type has been an issue. We have had one occasion when a tablet apparently jammed the device, which caused a malfunction. In addition polypharmacology can also lead to patients having large numbers of tablets prescribed and although there are deep segments to accommodate each dose there is a limit to the available space. Care must be taken with storage requirements as some medications degrade when kept in a non-aitght dispenser.

The device can be beneficial to service users who either lack the ability to see conventional dosette boxes or lack the manual dexterity to open them. However, the colour of the dispenser is an ‘off white’ and a number of commonly prescribed medications are white. This means there is little contrast between medication and dispenser. This problem could be resolved by releasing a darker-coloured version of the dispenser.

References


This article has been double-blind peer-reviewed.

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