Challenges and solutions in handling medications by visually impaired patients

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For universal health coverage to be successful, all patients should benefit from available medication. However, patients such as the visually impaired are prone to experiencing medication errors as they may not use their medicines safely or as intended. This is either due to difficulties in reading critical information related to their medication or difficulties in handling the products [1].

These patients may miss out on the information such as name, dose or storage instructions due to small text size or poor colour contrast of labels. These patients may also struggle to handle their medication, being unable to differentiate their containers or can knock them over making them difficult to find. They may struggle in opening medications in blister packs, administering eye drops, and measuring liquid doses without spilling. Patients who take regular injections such as insulin may struggle to safely and accurately measure doses for injecting themselves. In some cases, they also lose track of the number of doses they have taken [2,3]. They may also rely on people with normal vision for administering their medication. This means that they also rely on those caregivers' understanding of their medication or their own memory for information shared during consultations/dispensing. This can be a source of anxiety for patients who would rather be self-dependent and maintain confidentiality [4–8].

These factors can lead to visually impaired patients taking the wrong medication, incorrect doses, duplication of dosages, not completing their prescription course, not properly following dose regimens or taking medicines that have expired or not properly stored. These can lead to medication errors and increased adverse effects or inadequate treatment.

To ensure access and use of correct dosage, simple tips and techniques can be shared or used while dispensing medications to visually impaired patients to help them handle their medications better. To help them identify/differentiate their medicines, palpable Braille-inspired marks can be made on their medication's packs/containers. They may use 3D markers, non-toxic white glue, rolled adhesive tape. In Europe, it is a regulatory requirement for all medications to have the name and strength of the active ingredient on the packaging in Braille [9–11].

Similarly, rubber bands may be wrapped around the packs. Patients may use a different number of bands to identify their medicines (e.g. 1 band for medicine A, 2 bands for medicine B), remember their dose (e.g. 1 band for one tablet, 2 bands for 2 tablets), frequency (e.g. 3 rubber bands for thrice daily dosing) or to keep track of the doses they have taken (e.g. for thrice daily dosing, one may place 3 rubber bands on a pack, taking off one after each dose and replacing all bands before sleeping for the next day) [12,13]. For patients who struggle with blister pack packaging and lose capsules/tablets after popping them out, they can be advised to place a large bowl or tray underneath the blister pack that can capture pills before they fall. A tray whose colour contrasts against that of the medicine would make it easier to find [13)]

Audio recordings of consultations can also help the patients. They may record dosage instructions, listen to reminders and independently manage their medication. When making a recording for a patient, the healthcare provider needs to make clear, audible and well described instructions [12]. To improve the ability of the patients to read prescriptions comfortably, labels/patient information leaflets may also be reprinted. Points to keep in mind include using a non-condensed, san-serif font, such as Arial in 18-point bold font, using a durable, non-glossy paper, and a high contrast between the text and background such as black text on white or pale-yellow paper [12].

Assistive technology products can also be used to improve these patients' handling of medication. Locally, the National Council for Persons with Disabilities has a provision for assistive devices for patients with special needs. Many products can also be purchased online. Newer, more advanced technology tend to be expensive though local innovations in this area of research has received great support recently [14,15].

To help avoid mix-ups, pill organizers can help patients access their medicines according to their regime. Compartments separate the pills for each intake and some pill boxes are available with Braille writing for identifying the different compartments while others are accompanied by audio devices. Automatic pill dispensers are also available that can be set up independently or by using a mobile application. These can be used to dispense complicated regimens over the course of a month and provide alarm cues for patients not to miss a dose [13].

Although many liquid preparations come with graduated dosing cups, many visually impaired patients are unable to measure the exact volume of the liquid medication or tend to spill the medicine. This may be because the measuring scale of the dosing cup is too small to be identified or that

the patient lacks the coordination needed to avoid a spill [3,8]. One novel approach to packaging oral liquid products is AutoMed+ that involves having the dosing cup under the bottle. The bottle has an interactive LED screen and a touch sensitive panel that patients can use to pour a specified dose into the cup, which is then removed to drink the dose. Bright lines will continue to appear to display the progress until the product is finished or audio cues can be produced to alert the patient (16). For large volume liquids, audible/vibratory liquid level indicators are available that can hang off the side of a cup/holder. Sensors on the inside of the cup create alerts when liquid reaches the specified level [17].

Eye drop guides and dispensers are available to assist patients with visual impairment or coordination difficulties. They can have different designs, but usually consist of a plastic cylinder that opens lengthways to accommodate an eye drop bottle. The cylinder is placed over the patient's eye while a guide on top of the cylinder holds the eye open and guides eye drops into the patient's eye when large buttons on the sides of the cylinder are pressed or the cylinder is squeezed [18].

To assist patients take regular injections such as for insulin, some devices hold the medicine vial and syringe in alignment so that the needle of the syringe is easily and correctly inserted. The device may be pre-set to draw a fixed number of insulin units in each use. Examples include the Inject-Aid and Safe Shot delivery devices. Others such as Count-a-Dose and Syringe Support can draw different doses by turning a wheel which makes a distinct click that can be both heard and felt with each unit of insulin drawn into the syringe. Some can hold two insulin vials so that different types of insulin can be mixed [19,20].

Magnifiers are also available so that patients may be able to read the gauge on the syringes better. Examples include Ezy-Dose's Syringe Magnifier that clips onto the side of syringes and doubles the size of the markings. The BD Magni-Guide snaps onto an insulin vial, guides the needle into the vial, and magnifies the syringe markings 1.7 times. There are pre-filled disposable pens available for some brands of insulin and this means that one does not have to re-load the pen when a cartridge runs out. This can be easier for people with visual impairment. Magnifiers are also available that fit onto the pen [19,20].

Visually impaired patients face several challenges in their use of medications, which may lead to medication errors with serious consequences. However, a large range of solutions are available for these patients that can help tackle their different causes of concern. By creating awareness of both the challenges they face and solutions available to them, it is hoped that visually impaired and blind patients can experience safer, more effective treatment and be able to fully benefit from the medications available to them under universal health coverage.

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