Understanding the Medicines Management Pathway
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ABSTRACT
The medicines management pathway describes the cognitive and physical steps involved in the use of medicines, with a focus on the consumer. There are 9 steps and 3 background processes. The steps and processes are interdependent and influence each other. Documentation of the pathway provides a framework to identify how the steps are related, the potential for any errors and safety system improvements. The pathway is applicable to all medicines, independent of the setting, health professionals involved and funding source. An understanding of the pathway and human factors associated with each step are necessary to ensure safe, effective and efficient use of medicines. The pathway can assist consumers and health professionals to understand their role and how their actions can improve medicine safety. Hospital pharmacists have an established role at all steps. With more professional services being offered via community and other pharmacy practice settings, the medicines management pathway concept will play an increasingly greater role across the continuum of care.

INTRODUCTION
Medicine misuse, underuse, overuse and adverse reactions annually result in an estimated 140 000 hospital admissions in Australia; most of these adverse drug events are preventable. The Australian Council for Safety and Quality in Health Care has noted that ‘in order to recognise what can go wrong with the use of medicines, we need to understand the processes that are involved’. There are many steps involved when consumers take medicines and understanding these requires the documentation of a ‘process map’—from the decision to prescribe a medicine, through to monitoring the impact of that medicine. The report also described a ‘Pathway for medicines in hospitals’ to illustrate how the steps in the process are related and lists eight examples of common reasons for error occurring within the cycle and potential improvements. While the steps in the medicines management pathway have been described previously, this paper explores the cyclical nature of the pathway for an episode of care, and how one cycle in an episode of care relates to another episode.

The general concept of the medicines management pathway is independent of:

- the setting (home, residential care, hospital) and the independence of the consumer;
- the type of health professional involved in prescribing, dispensing or administering the medicine;
- the type of medicine; and
- the funding source for the medicine.

THE PATHWAY
There are nine steps (cognitive and physical) and three background processes (Figure 1). The consumer is the central focus with direct involvement in some or all of the steps. The steps and processes are interdependent and influence each other. The pathway is a closed loop, and feedback on the effect of the medicine and transfer of information regarding the previous steps influences future treatment decisions in the next cycle. The pathway is applicable to all medicines, independent of the setting, health professionals involved and funding source. Documentation of the pathway provides a framework to identify how the steps are related, the potential for any errors, and safety system improvements.

Steps
Steps may sometimes occur in parallel rather than in sequence, e.g. an electronic prescribing system with decision support may ‘review the medicine order’ at the same time as the ‘record of medicine order’ step. On occasion the steps may not occur in sequence, e.g. when medicine information is provided as the medicine is ordered rather than when it is dispensed. The same person may be responsible for subsequent steps. Generally, each step will be undertaken when medicines are used although how they are undertaken may vary depending on the setting.

Decision to Treat and Prescribe
In accordance with the quality use of medicines (QUM) strategy, once treatment is considered necessary the initial step is a decision on appropriate treatment. The prescriber needs access to accurate, complete and up-to-date consumer-specific information and consumer input to ascertain the most appropriate treatment option, considering the best available evidence and the consumer’s treatment goals. If the most appropriate option is the use of a medicine, the decision becomes the choice of the most appropriate, safe and cost-effective medicine. The decision may be influenced by treatment protocols, cost effectiveness and acceptability to the consumer, as well as the funding source.

Record Medicine Order
The intention of the prescriber needs to be conveyed to others involved in the pathway in a way that enables the next person in the chain to safely and effectively conduct the subsequent step. The medicine order needs to meet legal requirements, be clear and unambiguous, and contain enough information to support the use of the medicine as intended. Communication is required with the consumer, person issuing the medicine (pharmacist), person administering the medicine (nurse, consumer/carer) and the person assessing the impact of the use of the medicine.

Review of Medicine Order
Review of the medicine order provides valuable safeguards for consumers and prescribers. Orders may be reviewed to ensure compliance with legislative...
requirements, funding by a third party (e.g. Pharmaceutical Benefits Scheme), optimise medicine use, verify and confirm intention, consider clinical appropriateness prior to dispensing or administration. For example, when dispensing, the pharmacist may consider interactions with medicines ordered by another prescriber, a nurse may assess blood pressure readings or other clinical signs before administration, or indeed, decide to withhold the medicine, if unsafe. If an issue is identified, clarification is sought with the prescriber, and any proposed changes discussed and documented.

Issue of Medicine
Issuing of medicines includes the processes of dispensing, manufacturing or supplying, and is usually undertaken by pharmacists or other endorsed providers (e.g. endorsed rural nurses). The correct medicine should be manufactured or selected, labelled fully and clearly, and a record of the issue made. Consumer-specific instructions may be included to assist the person administering the medicine to understand the prescriber’s intent.

Provision of Medicine Information
Provision of consumer-specific medicine information, including how to store and correctly use medicines, improves safety and the QUM. Additionally, information on the preparation and administration of the medicine should be provided to those involved in administering or managing the medicines.

Distribution and Storage of Medicine
Once issued, medicines are distributed to care delivery areas (e.g. ward) within a residential or healthcare facility or for local storage by the consumer (e.g. home). The method of storage (e.g. imprest system, bedside locker) depends on the needs of the consumer, and financial, physical, regulatory and safety constraints.

Administration of Medicine
This step encompasses reassessment of need, selection of the correct medicine, preparation and administration to the correct person on each occasion. The need for a medicine may be reassessed before administration, e.g. pain relief or symptom control. Where required, a record of the administration of the medicine is made.

Monitor for Response
Consumers often monitor their response to medicines, especially when self-medicating. Health professionals often seek information from the consumer regarding their response to the medicine or, if the response is not self-evident, monitor symptom control or investigative tests. Responses to medicines may be both positive and negative (an adverse drug event).

Transfer of Verified Information
Information on the medicine and associated treatment plan is crucial to assess effectiveness, assist with future decisions about therapy, and enable safe transfer of care, especially when another healthcare provider is involved in ongoing care. This includes information on the:
• current medicine regimen (list of all medicines), including dosage, active ingredient, brand, strength, reason for use and intended duration of therapy;
• quantity of medicine that was issued at transfer; and
• changes to therapy during the episode of care (including ceased medicines).
Ideally, the list of medicines at the start of the episode of care should also be provided so as to inform decisions regarding changes in medication therapy and management.

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Figure 1. Overview of the medicines management pathway cycle
This communication step is crucial when care is shared between health professionals and across the continuum of care. Appropriate quality assurance steps need to be in place to ensure that accurate, complete and timely information is provided to the next healthcare provider, and that continuum of care is achieved.

Background Processes
These processes occur on a system-wide basis and impact across the whole pathway. Their ultimate aim is to ensure the QUM for consumers.

Medicines Procurement and Materials Management
The timely access to quality medicines at a cost the consumer and community can afford is crucial. Medicines must be procured (according to formulary, if applicable), stored and distributed appropriately to ensure the safety of consumers and the environment (e.g. refrigerated medicines) and to ensure the effective use of resources.

Reporting and Quality Safety Audit Review
Data on all aspects of the cycle are collected for reporting on a system-wide basis. Data on prescribing, issuing and administration of medicines are collected for audit activities to support the QUM and to monitor medicine safety. This process may also include the collection of data required for funding by third parties. This data should be reviewed so as to inform decisions to improve the system or medicines management pathway.

Communication
Communication of accurate, comprehensive and complete information is fundamental to achieve optimum outcomes for consumers along the pathway. For example, communication is needed to ensure that prescribers are aware of formulary prescribing policies, consumers have medicines information and knowledge of the treatment plan, and verified information is accurately communicated to the next healthcare provider.

DISCUSSION
QUM is defined as the judicious, appropriate, safe and effective use of medicines. Australia’s National Medicines Policy recognises that government, health professionals, consumers and the pharmaceutical industry all have a role to play. The principles inherent in the QUM and the National Medicines Policy apply equally to prescription, over-the-counter and complementary medicines.

Although safety of medicines and their use is fundamental, failures within the system or a breakdown in processes occur as a natural consequence of the complexity of the processes, i.e. many steps and many individuals involved. These opportunities for consumer harm should be identified and prevented with barriers built into the system, making it resilient to the impact of errors. As a general principle, multiple mechanisms are required to make the system resilient or ‘fault-tolerant’. The system needs to contain many defensive layers. When an adverse event occurs, it is important to identify why the defences built into the system failed, as opposed to attributing fault to an individual.

James Reason developed the ‘Swiss cheese’ model to demonstrate that adverse events happen when gaps in the barriers (an ‘opportunity for error’) align, allowing a hazard to come into potentially damaging contact with the consumer (Figure 2).6,7 By placing protective strategies (barriers) earlier in the cycle, an adverse event occurring later in the cycle might be prevented. An example is preventing the administration of a medicine to which the consumer has a known allergy by ensuring this information is available at the time of prescribing.

The system of how medicines are used must be understood to identify how opportunities for error eventuate, and to implement system changes to prevent their occurrence. The recent alert on the use of IV potassium chloride considered several components of the pathway in which undiluted potassium chloride is prescribed, supplied, stored and administered. This led to multiple recommendations of system changes to prevent incorrect administration resulting in harm or death.7 The rapid administration of undiluted potassium chloride may be prevented by alerts in prescribing systems, education of nursing staff, or by removing ampoules from the ward. Although most adverse events and fatalities have occurred due to the incorrect administration of undiluted potassium chloride, removing systems that allow access to, and choice of, the incorrect medicine are the focus of proactive, preventive measures. In the potassium chloride case, system changes are being used effectively to ensure safety at the ‘administration of medicine’ step.

The medicines management pathway concept offers a framework to: identify weak or error-prone processes; pinpoint strategies to reduce the opportunity for error in previous steps; and proactively evaluate the potential limitations associated with any proposed changes. By understanding this process, failure modes-and-effects

Figure 2. ‘Swiss cheese’ model of how defences, barriers and safeguards may be penetrated by an accident trajectory6,7
analysis can then be undertaken prior to implementing new system changes. This allows us to assess the downstream effect of the change in any part of the process or other steps subsequent in the cycle.

A thorough understanding of the pathway is essential to support the safe, effective and efficient introduction of many impending initiatives, for example:

• Interpreting the impact and applicability of medicine safety projects.
• Transferring medicine information across the continuum of care.
• Designing electronic prescribing systems with decision support within health services.
• Developing barcode and other technologies to support safety improvements.

Hospital pharmacists have an established role at all steps of the pathway and in overseeing the integration of the steps. They have a thorough working knowledge of the steps and background processes and should lead the identification and implementation of system improvements. With more professional services being offered via community and other pharmacy practice settings, the pathway concept will play an increasingly greater role across the continuum of care and will further involve all health professionals.

With an increasing interest from health professionals and consumers in the QUM and medicine safety, it is timely to explore the medicines management pathway concept. A shared general understanding of the pathway is fundamental in the design of improved service delivery models in all Australian healthcare settings, from the home through to hospital-based care, if QUM is to be achieved.

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References

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