Taskforce of the Therapeutic Goods Administration, facilitated engagement with the key supply chain stakeholders, including Medicines Australia, the National Pharmaceutical Services Association (NPSA) and the Generic and Biosimilar Medicines Association (GBMA) amongst others. Data on medication availability was made available by the pharmaceutical companies. Data on usage in private hospitals was made available from private hospital providers. All our States and Territories were instrumental in providing medication usage data on all ventilated COVID-19 patients. This facilitated the development of a national demand model for these critical medications – pivotal to informing efforts to facilitate access to these medicines.

This work is only one example of many in which the existing collaborations, expertise and dedication – of and between both individuals and institutions across this country – has made an impact on the response to the pandemic.

There are no doubt many things we could be doing better. There are more lessons still to be learnt, as there always is.[9,10] As we continue to work together through this pandemic, we will continue to benefit from the collaborations that we all have – and which we have strengthened – during this time.

Conflicts of interest statement

The author declares that he has no conflicts of interest.

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OPTIMISING MEDICATION MANAGEMENT DURING THE COVID-19 PANDEMIC

Optimising the management of medications during the current COVID-19 pandemic has become a priority, both in ensuring the protection of staff who are administering drugs from contracting the virus, and in ensuring the appropriate use of medicines that may have, or could be at risk of, limited supply. Here we discuss how to deprescribe unnecessary medications and simplify medication management in the effort to reduce opportunities for transmission of COVID-19 between patients and staff. Streamlining medication regimens and their administration, as well as the associated drug-related monitoring of patients, may also increase the time that staff members have available for other direct care activities for both COVID and non-COVID patients.

Guidance for medication optimisation and simplification in response to COVID-19 have recently been issued from Australian,[1] US[2] and international[3] sources. While our focus is on the care of patients in hospital with confirmed or suspected COVID-19 under infectious precautions, our recommendations can apply equally in the outpatient or 'virtual hospital' care, residential aged care, or primary care settings. In all cases, we include the disclaimer that the following statements are intended to be used to assist (not dictate) decision-making, and need to be consistent with the formulary, policies, procedures and guidelines of local drug and therapeutics committees.

Deprescribing Medications

Even without a pandemic, polypharmacy, particularly in older, multi-morbid patients, is associated with a high

prevalence of potentially inappropriate medications (PIMs) that exposes patients to drug–drug and drug–disease interactions, and predisposes them to adverse drug-related events such as falls and delirium.[4,5] Deprescribing involves ceasing medications for which the current risk of harm outweighs the benefit of their use. In the pandemic environment, additional harm from transmission of SARS-CoV-2 to staff needs to be incorporated into the harm–benefit analysis and may necessitate the temporary withholding of some medicines. The process of deprescribing, and evidence of its safety and effectiveness, has been well documented.[6]

Candidate medications for discontinuation in a pandemic are those that provide no benefit or do not treat an active acute disease or deficiency, can be stopped abruptly, and do not necessitate extensive patient monitoring after discontinuation. Examples may include iron and vitamin supplements, herbal medications, glucosamine, low-dose fish oil, probiotics, and appetite stimulants. Long-term preventive medications such as statins, anti-platelet agents, anticoagulants and antihypertensive agents should have their ongoing indications reviewed. This is especially relevant to patients for whom conservative, comfort-oriented goals of care have been clearly clarified and agreed upon after discussions with them and their family and carers. Particular attention should be paid to ceasing drugs with psychoactive or anticholinergic effects that predispose patients to delirium, agitation and falls[7] – events which then necessitate close physical contact between patients and staff in de-escalation or recovery responses.

Medications which may be appropriate but can be safely suspended (or paused) may include calcium, magnesium, bisphosphonates, vitamin D analogues, and vitamin B12. Proton-pump inhibitors (PPI) and other gastric acid suppressants, paracetamol, opiate analgesics, and prophylactic antibiotics – medications often overprescribed – may be tapered and ceased depending on risk of symptom rebound.

Any medication whose administration generates aerosols, such as bronchodilator nebulisers for acute exacerbations of asthma or chronic obstructive pulmonary disease, and nasal sprays for allergic rhinitis, can substantially increase risk of COVID-19 transmission from infected patients, and should be avoided as much as possible. Hand-held metered dose inhalers (MDI) combined with spacer devices are just as effective as nebulisers.[8] Emergency management of acute episodes of bronchospasm can be managed with alternative MDI regimens. Similarly, administering intravenous (IV) or subcutaneous medications may involve potentially infectious contact with patients or with intravenous lines. Where feasible and safe, IV antibiotics, heparin and PPI infusions, and insulin and low molecular weight heparin injections should be substituted by oral antibiotics, anticoagulants, PPIs and hypoglycaemic agents. As an example, patients with stable type 2 diabetes and receiving less than 20U of daily insulin, and who are unable to self-inject, could be converted to, or have an increase in current doses of, oral agents.

Simplifying Medication Regimens

Medication regimens are often unnecessarily complex.[9] Their administration can be time-consuming and involve frequent patient contact at different times of the day, and increasing complexity is associated with a higher likelihood of errors and poor health outcomes.[10] Simplification involves administering more medications at the same time, using long-acting formulations where available, and, where possible, switching from multiple single-ingredient to combination formulations. Interventions to reduce medication complexity in older people have been successful in both hospital[11] and residential aged care[12] settings. A simplification process, MRS GRACE, has been validated in aged care.[13]

In older patients with diabetes, short-acting insulins often confer little clinical benefit, require frequent insulin administration and blood glucose monitoring, and impose risk of hypoglycaemia, compared to once or, at most, twice daily longer-acting insulins. While insulin changes may require individualisation and heightened short-term monitoring, over the longer term the medication administration burden and staff contact may be substantially reduced. Immediate release formulations of medications such as metformin, gliclazide, metoprolol, carvedilol, diltiazem, opioids, and gabapentin that require frequent dosing may be converted to once-daily modified release preparations. Short-acting bronchodilators (e.g. salbutamol and ipratropium) can be switched to long-acting agents (e.g. salmeterol and tiotropium). Conversion tables are available from various sources (e.g. www.deprescribing.org or www.lexi.com).

Medication-related monitoring can be reduced among patients with stable prior values and resolution of acute COVID-19 illness. For example, pulse rate and blood pressure monitoring may be reduced to twice a day, and a fingerstick prick to monitor blood glucose could be performed once per day or every two days for patients receiving oral hypoglycaemic agents only, and once or twice per day for those on once daily basal insulin. Self-monitoring of blood glucose should be encouraged for patients who regularly do it at home and are cognitively capable.

The frequency of drug administration by nursing staff should be consolidated to a minimum number of set times, preferably once, and no more than twice a day. Outlier administration times should be restricted to ‘as

required' medications or those requiring more frequent dosing (such as antibiotics or anti-Parkinsonian medications). Where possible, all drugs scheduled for a particular time should be administered concurrently, except where risk of drug–drug interactions necessitate temporal spacing (e.g. antacids and fluoroquinolones) or where drugs must be given before or after meals (e.g. insulin).

Informing Stakeholders of Changes to Medication Regimens and Monitoring for Unintended Adverse Effects

When altering medication regimens, good communication about the reasons behind the changes – including any local need to manage drug shortages during the pandemic – is essential. Staff need to explain to patients and families how and why changes are being made, and to understand and address their concerns. Suggestions to discontinue long-standing medications or change long-standing timing of doses can induce cognitive conflict and concerns of being abandoned or having care rationed.[14] Similarly, prescribers may fear loss of patient trust and potential harms caused by medication changes.[15]

Engaging all parties, including respected peers, in partnerships around medication changes, providing reassurance that close monitoring for any unintended adverse effects will be undertaken, and stating that ceased, dose-reduced or time-altered medications can be resumed if the need arises, clearly affirm patient safety as superseding all other considerations. Treating clinicians and pharmacists should maintain lists of all medications discontinued or altered and the rationale for each change, periodically re-evaluate the appropriateness of each change, and inform patients of symptoms of disease relapse to monitor where medications have been stopped or reduced. Resources to support clinicians and patients with deprescribing in hospitals have been developed[16] and are freely available.[17] When discharging patients home from hospital, they and their family, general practitioners and community pharmacists should be informed of changes in medications that could or should be maintained, and of changes which should be reversed over time. Medications necessary to prevent decompensation of chronic diseases for which guidelines recommend specific dosing and timing schedules should be reinstituted. This strategy also obviates the need for hospitals to dispense a fresh supply of altered medications at discharge, instead allowing patients to convert back to their previous medications with which they are familiar and are likely to have a home supply.

Conclusion

Deprescribing unnecessary medicines, simplifying administration schedules and monitoring requirements, as well as adjusting formulations, are strategies for minimising the risk of transmission of infection to hospital staff during the COVID-19 pandemic. They align with the principles of medication review and continuity of medication management enshrined in current national quality standards[18] and require integration into multidisciplinary workflows within hospitals.

Conflicts of interest statement

The authors declare that they have no conflicts of interest.

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ANTICOAGULATION IN THE IMMEDIATE POSTNATAL PERIPARTUM PERIOD: MORE EVIDENCE NEEDED TO BALANCE RISKS

Pregnancy-associated thrombosis is one of the leading causes of maternal mortality in the developed world. It is well established that pregnancy is associated with a hypercoagulable state due to the physiological changes that prepare women for labour, including increased fibrinogen and coagulation factors II, VII, VIII and X.[1] In this regard, women with an acute venous thromboembolism (VTE) during pregnancy or with a history of unprovoked VTE are considered at high risk of recurrent thrombosis during pregnancy and the postpartum period. Additionally, women with mechanical heart valves are considered at very high risk of valve thrombosis or systemic thromboembolism during pregnancy, and their obstetric management requires input from a specialised multidisciplinary team. The management of anticoagulation in pregnancy is further compounded by the lack of available oral options, with the overwhelming majority of women requiring parenteral anticoagulation for the duration of their pregnancy.

The rates of pregnancy-associated thrombosis are markedly increased in the postpartum period compared with age-matched non-pregnant women.[2] Thus, timely recommencement of anticoagulation in the immediate postnatal peripartum period is critically important. However, the use of anticoagulation to prevent the recurrence of thrombosis may be offset by the increased risk of bleeding, which will be further impacted by individual patient risk factors as well as the mode of delivery. Many of the treatment recommendations for pregnant women are extrapolated from a non-pregnant population and, to date, there are few published research articles detailing the optimal treatment strategy for recommencing anticoagulation in the postpartum period.

In this issue of the *Journal of Pharmacy Practice and Research*, North *et al*. describe the results of an online questionnaire evaluating the clinical practice of clinicians and pharmacists involved in the management of anticoagulation in the postnatal peripartum period.[3] The study reports on 48 responses received from medical centres across Australia and New Zealand evaluating preferences for recommencing postpartum anticoagulation for prevention of recurrent VTE and management of mechanical heart valves, with the majority of responses from specialist obstetricians and gynaecologists, as well as pharmacists experienced in managing anticoagulation in pregnancy. The questionnaire explores the clinical practice for prescribing anticoagulation post vaginal delivery or caesarean section, including type and dose of anticoagulation, in addition to the timeframe for recommencing prophylactic or therapeutic anticoagulation following delivery, but no evaluation of bleeding rates.

The study demonstrates that there is significant variability in prescribing practices for both type and time to recommencing prophylactic and therapeutic anticoagulation in the postnatal peripartum period. Additionally, these differences in treatment are seen in both prevention of recurrent VTE and management of mechanical heart valves. Approximately 60% of the respondents would commence thromboprophylaxis for patients at low risk of recurrent VTE or systemic thromboembolism within six hours of delivery following a caesarean section, which is

