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How Unavailability of some Medications can affect Clinical Pharmacists' Interventions and Physicians' Prescribing Pattern : A Case Report

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Introduction

Clinical pharmacists are integral members of multidisciplinary teams needed to provide care for critically ill patients. They make valuable contributions to improve clinical, economic, and humanistic outcomes of patients.¹ they could have many valuable interventions in terms of providing drug information, suggesting alternative therapies, identifying drug interactions, and therapeutic drug monitoring.¹ those interventions can play an important role in optimizing medication therapy and hence, improving patients' clinical outcome.

One of the most common critical care medical problems are cardiac diseases. Our case report is about cardiac diseased patient suffering from aortic dissection.

As a matter of medical management, Patients with suspected aortic dissection should be admitted

to an intensive care unit as soon as possible after confirmation of the diagnosis for pain control with morphine, and reduction of systolic blood pressure to 100 to 120 mmHg^{2,3}.

Controlling blood pressure remains the most critical issue in managing patients with aortic dissection and the medications recommended for blood pressure control should include an intravenous beta-blocker to reduce the heart rate below 60 beats/min. The associated fall in both blood pressure and the rate of rise in systolic pressure will minimize aortic wall stress. Labetalol can be given as a bolus (20 mg initially, followed by 20 to 80 mg every 10 minutes to a total dose of 300 mg) or as an infusion (0.5 to 2 mg/min)³. Verapamil or diltiazem are alternatives in patients who cannot tolerate beta-blockers². The patients can be switched to oral beta-blocker therapy, after heart rate control has been achieved.

If, after beta blockade, the systolic blood pressure remains elevated, nitroprusside can be added. to achieve a systolic blood pressure of 100 to 120 mmHg. Nitroprusside should not be used without, first controlling the heart rate with beta blockade since vasodilation alone induces reflex activation of the sympathetic nervous system leading to enhanced ventricular contraction and increased aortic wall shear stress. Nitroprusside is the preferred agent while angiotensin converting enzyme (ACE) inhibitors or intravenous Nicardipine, Verapamil or Diltiazem can also be used as alternative therapeutic choices in lowering blood pressure³.

Direct vasodilators such as hydralazine should be avoided, as they tend to increase stroke volume and left ventricular ejection rate. These effects augment the pulsatile flow and accentuate the sharpness of the pulse wave. This increases mechanical stress on the aortic wall and may lead to further dissection⁴

Case presentation

A 44 years Pakistani man presented to emergency department in a tertiary hospital in Saudi Arabia, then, he was admitted to cardiology care unit and was diagnosed as a case of

uncomplicated aortic dissections confined to the descending thoracic aorta (Stanford type B). Patients with which are best treated with medical therapy.^{2,5,6}

As initial hypertension management, the patient prescribed IV labetalol 4 mg/min over 24 hours and hydralazine infusion 5mg / hour then later labetalol oral 400 mg every 6 hours was added to the treatment regimen.

After three treatment days, the goal blood pressure was not achieved and critical care clinical pharmacist did a subsequent review of the treatment regimen. By reviewing the prescribed medications, the critical care clinical pharmacist was able to identify three main therapeutic problems in this regimen:

1. The total daily IV dose of labetalol should not exceed 300 mg while our patient is receiving 5760 mg as a total dose per 24 hours.
2. There is no clear recommendation about combining oral and intravenous forms of labetalol in the same regimen, especially when the patient is already receiving more than maximum total dose of one form (IV form).
3. Prescribing hydralazine is not an appropriate choice as illustrated above. As it may worsen condition of aortic dissection.

Discussion

Two problems were resolved by discontinuing the intravenous labetalol infusion and by keeping the patient on the maximum oral labetalol dose (2400 mg per day) plus adding diltiazem oral therapy (60 mg TID), but the goal blood pressure was still not achieved by this oral combination therapy and hence a vasodilator was indicated.

Hydralazine remains the unresolved therapeutic problem although the responsible physicians realized that hydralazine is not the appropriate therapeutic choice in this patient. The issue behind using hydralazine is not the physician's ignorance about the place of hydralazine as a

antihypertensive treatment in patient with aortic dissection but is the unavailability of other vasodilator therapeutic choices which have been recommended to be combined with beta-blocker in a patient of aortic dissection, e.g. Sodium Nitroprusside. Although it is listed in hospital drug formulary and there was no shortage of this medication from the manufacturing company itself.

In fact, many factors can affect drug prescribing such as education, advertising, control and regulation measures, demands from society and patient and doctor's characteristics⁷.

Our case report is aiming to focus on the control and regulatory measures that may exist in each health care setting and provide restrictions on procurement of certain medications because of its low consumption rate.

One example of these regulatory measures is the work of medical supply unit, the unit responsible for assuring availability of various medications that have been listed in the hospital formulary. Its work can affect directly the appropriate physicians' prescribing pattern and limit the applicability of clinical pharmacist intervention, which by the role may affect the overall health care outcomes in many aspects. For example:

- The clinical outcome aspect can be affected as the patient is receiving a discouraged medication, which has a probability of worsening the patient's clinical condition.
- The economic outcome aspect can also be affected, although it may seem apparent that the medical supply unit has saved the hospital's finances by not buying all the infrequently used medications (e.g. Sodium Nitroprusside) that have a low consumption rate. But a deeper insight illustrates that this act is associated with loss of financial resources as the patient was already given another medication (hydralazine), not preferred in this case, which was associated with a comparable financial cost, and can be

considered as a loss of hospital's financial resources. By considering the probability of worsening disease condition, the cost of using hydralazine may exceed the proposed direct cost of buying Sodium Nitroprusside injection and making it available despite its low consumption rate.

Conclusion

The work of other hospital units e.g. medical supply unit can affect negatively the essential role of critical care pharmacists among critical care team. Consequently, it can limit critical care pharmacists' contributions to medication safety, improved patient outcomes, and reduced drug costs.⁸

Along with affecting clinical pharmacist role, the medical supply unit can also affect drug prescription pattern. Although patient and doctor-related factors are the most common determinants for drug prescribing, our case report aims to address another less common but more crucial factor which is related to the availability of essential infrequently used medications which have not been exposed to a manufacturing shortage. Actually, this factor is quite critical for the medical management in critical care settings and it can be considered as the base for:

1. Evaluating the physicians' prescribing pattern, as we cannot assess the prescription pattern without the availability of all the required medications.
2. Applying clinical pharmacist intervention, as clinical pharmacist's recommendations cannot be translated into an action plan without the availability of the recommended medication.
3. Achieving the overall health care outcome aspects.

Finally, this case report recommends doing review process to all essential critical care medications listed in hospital formulary to assure its availability, apply clinical pharmacist interventions and improve clinical and economic health care outcomes.

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Authors Column



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