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Barriers involved in Intravenous to Oral Antimicrobial Conversion Therapy and their rectifiable methods: A Review

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ABSTRACT

Barriers to an early antimicrobial conversion from parenteral to non-parenteral routes are an important problem in the current scenario. Barriers such as a lack of appropriate guidelines for conversion therapies, a lack of culture sensitivity tests for selecting sensitive antibiotics, a lack of supervision by healthcare professionals on converted regimens, a lack of awareness among the patient population about the effectiveness of conversion therapy, and a lack of oral variant antibiotics for its intravenous agents on the market must be identified and resolved. The majority of barriers could be resolved by means of educational, interventional, and structural organizational changes. This may reduce the duration of parenteral antibiotic therapy and the consequent length of stay in hospital. This article review focuses on barriers involved in intravenous to oral antimicrobial conversion therapy and their rectifiable methods. Antibiotics are the most powerful weapons for infectious diseases and could be used in the most appropriate manner by resolving the barriers involved in such conversion therapies and improving the quality of life.

Keywords: Intravenous (IV), Antibiotic, Parenteral, Non-parenteral.

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INTRODUCTION

Conventionally, parenteral refers to the administration of drugs by injection, which takes the drug directly into the tissue fluid or blood without having to cross the enteral mucosa. In the case of parenteral to non-parenteral conversion, proper identification of patients, diagnosis, medications, and contraindications to non-parenteral therapy are all essential aspects for a successful conversion programme³. It is also very important that the pharmacist conduct a thorough and complete review of these areas. So only the most appropriate patients are converted. Doing so is a benefit to both patient care and professional credibility. Barriers to an early anti-microbial conversion from parenteral to non-parenteral are an important problem in the current scenario². The increasing use of antibiotics since their discovery is not without its penalties⁵. Assessing each and every section of barriers in early parenteral to non-parenteral conversion and implementing further solutions to these issues may automatically improve the patient condition, thus improving the quality of life of patients. The aim of the article is to identify the different barriers to this conversion from all aspects, including doctors, nurses, and pharmacists, and to explore their possible solutions to overcome these barriers¹. As defined by the WHO, the rational use of medicine requires that “patients receive medications appropriate to their clinical needs, in doses that meet their own requirements, for an adequate time and at the lowest cost to them and their community”³.

Parenteral To Non-Parenteral Conversion Therapy

Parenteral to non-parenteral conversion therapy consists mainly of three types: sequential therapy, switch therapy, and step-down therapy. Sequential therapy refers to the act of replacing a parenteral version of a medication with its oral counterpart. An example is the conversion of IV Azithromycin 500 mg QD to Azithromycin 500 mg tablet QD. There are many classes of medications that have oral dosage forms that are therapeutically equivalent to the parenteral form of the same medication. Switch therapy refers to the conversion from an IV medication to a PO equivalent that may be within the same class and have the same level of potency but is a different compound. An example is the conversion of IV Ceftriaxone 1 g QD to Cefixime tablet 200 mg BD. Step-down therapy is the conversion from an injectable medication to an oral agent in another class or to a different medication within the same class where the frequency, dose, and spectrum of activity may not be exactly the same. An example is the conversion from Ampicillin-Sulbactam 3g IV Q6H to Amoxicillin-Clavulanate 875 mg PO Q12H.

Properties of IV to Oral Switch Program

The oral dosage form should have excellent bioavailability (ideally >80%), be well tolerated upon administration, and its use should be supported by clinical data³. Other optimal properties include

the availability of multiple oral dosage forms and dosing frequency equivalent to or less than that of IV formulations.

Barriers Involved In Parenteral To Non- ParenteralAntimicrobial Conversion Therapy

BARRIERS TO AN EARLY ANTIMICROBIAL CONVERSION

Conversion from parenteral to non-parenteral antimicrobials was found to be unnecessarily delayed in a significant proportion of patients hospitalized with moderate to severe infection due to a range of different barriers ³. Addressing these issues has the potential to reduce inappropriate antimicrobial use and resistance ³.

Key recommendations for antibiotic use in hospitals

Initiation of treatment: The prescription of an empirical antibiotic regimen adherent to the guidelines and timely initiation of antibiotic therapy ⁷.

The re-evaluation and change of treatment: To accommodate decreased renal function, antibiotic dosage and dosing intervals are adjusted. The switch from IV to oral antibiotic therapy according to the existing criteria and the streamlining of empirical therapy into pathogen-directed therapy on the basis of culture result ⁷.

Routine diagnostic procedures include the culturing of blood samples and the culturing and gram-staining of sputum samples ¹.

Barriers to an early antimicrobial conversion include

Physician-related factors include supervisor opinion, lack of knowledge, lack of practice experience, and resident delay ⁵. **Patient characteristics:** patient-related factors are absorption orally not secured, comorbidity conditions, elderly patients above 75 years of age, and non-adherence to therapy. When admitted, the patient was very sick; the patient is still sick; the patient feels sick; fever; dyspnea/oxygen required; hemodynamically unstable. Other diagnostics include elevated CRP levels, a high leukocyte count, chest radiographic abnormalities, confusion/delirium, emphysema, pleural effusion, abscess, and secondary infection ^{1, 5}. The hospital staff factor is also notable in relation to the barrier assessment. Effective antimicrobial stewardship programmes are vital in an environment of emerging resistance to existing antimicrobials and the limited availability of new antimicrobials. There are institutional barriers to the successful implementation of these programmes ¹⁰. The key barriers were perceived to be a lack of access to education, resources, and specialist support ¹².

Other barriers include barriers regarding antibiotics like no oral variant for IV agents, allergy/toxicity oral variant, recent changes in antibiotic regimens, and short duration of IV therapy. Regarding microbiology culture results, still not known, the causative pathogen is atypical.

The patient's staying admitted or needing IV medication for certain reasons is an admission-related factor ⁴.

Barriers to Physician Adherence to Practice Guidelines In Relation To Behavior Change

Physician adherence is critical in translating recommendations into improved outcomes. However, a variety of barriers undermine this process. Lack of awareness and lack of familiarity affect physician knowledge of a guideline. In terms of physician attitudes, lack of agreement, self-efficacy, outcome expectancy, and the inertia of previous practice are also potential barriers. Despite adequate knowledge and attitudes, external barriers can affect a physician's ability to execute recommendations.

Barriers include:

Knowledge:

Awareness of the guidelines is the key barrier for physician adherence to practice guidelines in conversion therapy. Sometimes physicians may have a perception that oral antibiotics are inferior ⁵. Lack of familiarity with issues such as the volume of information, the time required to stay informed, and the accessibility of guidelines are also significant barriers. Attitude: low priority, seniority of decision, reassurance of IV antibiotics, more complex situation than is covered by guidelines, general attitude towards guidelines ^{5,2}.

The above mentioned are internal barriers.

Patient Behavior:

Patient factors include instability to reconcile with patient preferences and guideline recommendations. The presence of contradictory guidelines, lack of time, resources, and reimbursement, organizational constraints, and a perceived increase in malpractice liability are environmental factors. Lack of communication between healthcare professionals is also a barrier ⁵.

The above mentioned are external barriers.

Other concerns about barriers

Appropriate review dates for IV antibiotics are not documented on the medication chart. Patients are not always reviewed appropriately at the weekends. Intravenous antibiotics are not always reviewed daily on ward rounds. The staff are not aware of intravenous to oral switch guidelines and they are unable to access the necessary guidelines. There is no guideline to enable pharmacists to switch intravenous antibiotics to the oral route. Prescribers are not aware of how to find information on suitable oral antibiotics following intravenous courses. There is insufficient monitoring information available to make an informed decision to switch to oral antibiotics. Doubt about the extent of oral absorption prevents an IV to oral switch and doubt about the safety of a

patient's swallow. The pharmacy staff are not confident enough to encourage the IV to oral switch⁸. Clinical staff are worried that oral antibiotics will not treat the infection effectively. The criteria for reviewing the suitability of a patient for IV to oral switching are not specific enough. Clinical judgement variability in interpreting trends in monitoring parameters⁵.

Solutions for Barriers

Awareness of intravenous to oral switch guidelines must be improved. The guidelines should be made more accessible on the wards. A switch criteria complete with tick boxes should be attached to the medication chart to facilitate a decision. Allow pharmacists to order blood tests to facilitate intravenous to oral switches. All IV antibiotics will be automatically switched to the oral route at 48 hours. If they are to continue on IVs after this time, doctors must document it. Educate on the benefits of IV to oral switching and conduct education sessions using case studies. When clinically appropriate, case-specific advice from microbiology should include suggestions for a suitable oral option. Encourage speech and language therapy referrals if in doubt about the patient's swallowing. Set out minimum monitoring guidelines for patients on IV antibiotics to ensure that all the information needed to switch from IV to oral is available. Minimize outliers so that doctors only have to take responsibility for patients on their own ward. This will allow doctors more time to review IV antibiotics and have guidelines to prevent unnecessary prescribing of IV antibiotics in the first place. Allow medical/surgical teams to document antibiotic switch plans to facilitate IV to oral switches out of hours⁵.

Solutions to improve guideline adherence

Point of switch reminders can be used in visual or verbal ways. Raising primary guideline awareness provides confidence and ideas to health care professionals about conversion therapy. Change guidelines if appropriate for IV to oral conversion therapy. Engage users of the guidelines. Highlight patients on IV antibiotics. Appropriate review dates for IV antibiotics should be documented on the medication chart⁵.

CONCLUSION

The preliminary findings of this review provide a road map for further exploration of practice and perceived barriers for effective implementation of IV to oral conversion at hospitals. Clinical pharmacists and treating physicians should come together to work hand-in-hand to improve the practice of antimicrobial therapy. Barriers to an early switch strategy include mainly misconceptions, practical considerations, and organizational factors. Behavioral regulations and knowledge must be inculcated to avoid several barriers must be include^{9,11}. Barriers to physician adherence to practice guidelines include lack of awareness and familiarity with the guidelines^{5,2}.

As a result, it is likely that the majority of barriers could be reduced through educational intervention and structural organizational changes. This may reduce the length of IV antibiotic treatment and, as a result, the length of hospital stay in patients, thereby improving quality of life ⁶. Active integration of the guideline into daily practice by a ward pharmacist is essential ⁴.

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