wjpmr, 2025, 11(5), 201-209

SJIF Impact Factor: 6.842

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Research Article

ISSN 2455-3301

WJPMR

STUDY OF SWITCH OVER FROM INJECTABLE TO ORAL THERAPY IN THE SURGICAL PATIENTS: A PROSPECTIVE OBSERVATIONAL STUDY

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Article Received on 22/02/2025 **Article Revised on 12/03/2025** **Article Accepted on 02/04/2025**

ABSTRACT

Introduction: The choice of drug administration route is critical for optimizing bioavailability and therapeutic effects. Intravenous (IV) administration is often preferred when oral absorption is challenging, but its overuse can lead to discomfort and infection risks. Rational switching from IV to oral therapy is essential for antimicrobial stewardship, cost minimization, and improved patient outcomes. **Objective:** Assessing the study of effectiveness of therapeutic switching on surgical patients by examining the prevalence, types, timeliness of switch, cost minimization, and length of hospital stay duration and simultaneously evaluating compliance with ICMR guidelines for Antimicrobial Stewardship Program during the transition from parenteral to oral therapy and adherence to ICMR Treatment Guidelines for Surgical Antimicrobial Prophylaxis, 2022. **Methodology:** A prospective observational study was conducted over six months in three general surgical hospitals, enrolling 98 participants. Data on demographics, therapy switching, daily progress, were recorded. Patients were monitored until discharge. **Results:** Out 98 participants, 43% underwent therapeutic switching, with sequential and switch therapy being the most common. As P-value was less than 0.05 which indicated difference in terms of mean length of hospital stay of those patients who were switched within 24 hrs and those who were switched within 24-48 hrs. Cost minimization was evident upon switching from injectable to oral therapy. It was observed that all the antimicrobial switch adhered to the guidelines outlined by ICMR for AMSP and SAP compliance was only 26%. **Conclusion:** Timely switching significantly reduces hospital stay and treatment costs. However, a major gap in adherence to ICMR SAP guidelines was observed, highlighting the need for better antimicrobial stewardship in surgical settings.

KEYWORDS: Switch over, Cost minimization, ICMR Guidelines and Surgical Antimicrobial Prophylaxis.

INTRODUCTION

The choice of drug administration route is crucial for achieving optimal bioavailability, therapeutic effects, and patient tolerance. Factors influencing this choice include drug availability and the patient's clinical status.[1] The intravenous (IV) route is often preferred in acute, unstable, or non-oral absorbable cases and when other forms are ineffective. However, inappropriate use of IV administration indicates poor quality care and can lead to unnecessary discomfort, reduced mobility, secondary infections, and higher hidden costs due to medication errors.[1]

The World Health Organization highlights irrational medication use as a major global issue, with overuse of injections when oral formulations would be safer and more effective being a significant problem. Prolonged IV use beyond clinical necessity exacerbates these issues. Transitioning from IV to oral medications at the right time is crucial for improving rational drug use and reducing unnecessary IV-related complications.[2]

For effective transition from IV to oral therapy, several factors need consideration, which includes medication absorption, ease of administration, timing, and therapeutic equivalency. IV medications provide maximum bioavailability as they enter the bloodstream directly. Drugs with excellent (over 90%) and good (60-90%) bioavailability are suitable for IV to oral conversion. Oral antibiotics must achieve bactericidal activity as compared to IV in terms of their effectiveness.[2]

In medical treatment, switching from injectable to oral therapy provides versatile options to health care providers and patients. Sequential, Switch, and Step-down are three main types of switch overs reported in literature and commonly observed in practice. These strategies provide flexibility and optimization in patient care, focusing on the compound, class, and administration details to ensure effective and individualized treatment. Switching from intravenous (IV) to oral (PO) therapy offers multiple advantages from both healthcare professionals' and patients' perspectives, mainly by mitigating IV-associated risks, infections, and costs.[2]

In the light of evidence based practice, authority of Health care organization and policy makers designed various guidelines for antimicrobial switch over. Especially in India, the ICMR identifies irrational use and lack of awareness about antibiotics as key factors driving antimicrobial resistance and Guideline for SSI Prophylaxis in India.[3] Antimicrobial treatments account for 25% of hospital drug budgets and 1.5-4.5% of overall healthcare costs.[4] Despite stabilization, 83% of hospitalized patients receive unnecessary IV antibiotics after 72 hours, increasing costs and hospital stays.[5] Moreover, ICMR's Antimicrobial Stewardship Program provides criteria for switching from parenteral to oral antimicrobials with comparable bioavailability.[3]

According to This guideline, SSIs significantly extend hospital stays and increase morbidity and mortality rates. Patients with SSIs are more likely to be admitted to the ICU, readmitted to the hospital, and face higher mortality rates.[3] SSIs account for 12%-16% of nosocomial infections in India.[14] They are a key quality indicator in surgical practice due to their preventability. Antimicrobial prophylaxis is commonly used to prevent SSIs, but prolonged antibiotic courses can lead to antimicrobial resistance, super-infections, toxicity, and higher costs.[3]

Most of hospitalized patients receive IV therapy at some point during their admission or course of treatment. Intravenous therapy is observed as significant part of treatment during preoperatively, intraoperatively, and postoperatively to maintain effective concentration of drug especially for analgesics, antimicrobials and anaesthetic and many more. The switching from intravenous (IV) to oral (PO) medication is particularly important, as it ensures continuity of care, minimizes complications, and can lead to cost savings and improved patient outcomes.

This makes the study of IV-to-PO conversion highly relevant in optimizing treatment during the surgical care continuum. Most of studies on switching the mode of therapy IV to Oral so far been restricted to specific medicine[7-11] or condition[10-12] at overseas. Lack of published evidence in switchover of medicine able us to study the Switch over of medicine in surgical ward and its relevance to ICMR guideline.

MATERIALS AND METHODS

Study design and ethical aspects

A prospective observational study was carried out for a period of six months at three sites: Dwija Surgical Hospital, Nidhi Surgical Laparoscopic Hospital of Gandhinagar and HCC Multispecialty Hospital of Ahmedabad, Gujarat India. Prior permission from all the three sites was also obtained before commencement of data collection and the study protocol was approved by K.B. Institute Ethics Committee (KBIEC/2023-24/PD5Y/02).

Study population and sample size

The study population were all the adults admitted at study sites and were receiving Iv medicines during the time of the study were enrolled (N= 101) in the study. We excluded the three participants were excluded who were not in accordance to inclusion criteria.

Study Materials and Data Collection Procedure

The Data was collected/ transcribed in predesigned and was recorded by the investigator. The Data Collection Form consists of three parts: 1) Patient Demographic Details and Information related to Switch over. 2) Daily Progress Chart. 3) Details of Current Therapy including dose, route of administration and per unit cost.

Data was collected on daily/routine basis performing drug therapy monitoring and from main clinical patient file of eligible patient according to selection criteria. Patient was followed up on succeeding days. The treating physician and nursing staff was consulted to clear doubts if any. Based on Treatment review decided Types of Switchovers while timeliness of Switch in days and Length of stay based on date of Admission to date of discharge Recorded. Mean antimicrobial was calculated based on total antimicrobial prescribed.

Outcomes

The Primary outcome of the study was to evaluate the prevalence and types of switch over of medicine, the timeliness of switch (TOS), cost minimization, and length of hospital stay (LOHS). The secondary outcome of this study is to assess compliance with Indian Council of Medical Research guidelines for switching to oral therapy and Surgical Antimicrobial Prophylaxis (SAP) management.

Data Analysis

Switch of medicine from IV to ORAL was classified based on concept published in literature. Descriptive statistics Analysis were performed using Microsoft Excel and SPSS 21. Chi square was used for finding significant difference/association between categorical variables, Statistical significance was set at $P<0.05$, Two tailed.

RESULT AND DISCUSSION

Result

A total of 98 study participants were enrolled and reviewed consequently; out of which, there were 43 study participants in whom switch over was done and 55 study participants in whom switch over was not done (Table 1). The prevalence of switch over done in our study participants was 44%**.** The ratio of the study participants in whom switch over was done to the study participants in whom switch over was not done was found to be 0.78.

Table 1: Gender wise and Age Group wise frequency distribution of study participants.

	Switch over done N=43 (%)	Switch over not done N=55 (%)	Total (N=98)	p-value
Gender				0.042
Male	32 (74.41%)	30 (54.54%)	62 (63.26%)	
Female	11 (25.58%)	25 (45.45%)	36 (36.73%)	
Age Group (In yrs.)				0.85
Below 60	37	48	85	
Above 60	6	7	13	
Age Group (In yrs.)				
20-30	5 (11.62%)	6 (10.90%)	11 (11.22%)	
30-40	13 (30.23%)	19 (34.54%)	32 (32.65%)	
40-50	11 (25.58%)	11 (20%)	22 (22.44%)	
50-60	8 (18.60%)	12 (21.81%)	20 (20.40%)	
60-70	4 (9.30%)	5 (9.09%)	9 (9.18%)	
70-80	2 (4.65%)	2 (3.63%)	4 (4.08%)	

The most common conditions for prescribing medicine are displayed in Table 2. Among the 43 study participants who underwent switch over, surgical procedure was performed on 42 partients.

Out of 42, in whom switch over was done after surgery, Percutaneous Nephrolithotomy (the Urology Category) were more (n=7, 16.67%), followed by Hernioplasty (the Colorectal Category) were 6 (14.28%) while Laparoscopic Cholecystectomy (the Biliary tract Category) were 5 (11.90%) patient.

Out of 55 study participants in whom switch over was not done, Fistulectomy (the Colorectal Category) was the most frequent surgical procedure performed (n=8, 14.55%) followed by Hernioplasty (The Colorectal Category) was 7 (12.73%) while Laparoscopic Cholecystectomy (the Biliary tract Category) was perfumed on 6 (10.91%) patients.

Table 2: Diagnostic Category, Surgical Category and LOS wise frequency distribution of study participants.

Category	Switch over done (N=43)	Switch over not done (N=55)	Total (N=98)	p-value
Diagnostic Category				0.29
Miscellaneous	5	14	19	
Colorectal	14	22	36	
Biliary tract	5	6	11	
Gastroduodenal	3	1	4	
Urology	8	10	18	
Urology + Gastroduodenal	1	0	1	
Miscellaneous+ Colorectal	1	0	1	
Biliary tract + Miscellaneous	0	1	1	
Breast	1	0	1	
Appendectomy	4	1	5	
Non-cardiac thoracic	1	0	1	
Surgical Category				0.29
Miscellaneous	3	8	11	
Colorectal	17	25	42	
Hepatobiliary tract	5	7	12	
Gastroduodenal	2	1	3	
Urology	9	9	18	
Placements of grafts	0	1	1	
Gynecological	0	3	3	

Breast	1	0	1	
Appendectomy	4	1	5	
Non-cardiac thoracic	1	0	1	
Length Of Stay (LOS) in Days				
1 day	3 (6.97%)	47 (85.45%)	50 (51.02%)	<0.01
2	17 (39.53%)	5 (9.09%)	22 (22.44%)	
3	18 (41.86%)	2 (3.63%)	20 (20.40%)	
4	3 (6.97%)	1 (1.81%)	4 (4.08%)	
>4	2 (4.65%)	0 (0%)	2 (2.04%)	

Most of all Switchovers from injectable to oral therapy were observed within 48 hours while none switch over observed after 48 hrs or even at 72 hrs. A difference in Mean Length Hospital Stay observed minimal between switch of medicine done within 24 hrs to switch over done during 24-48 hrs. (Table 3)

Table 3: TOS and Mean LOHS wise frequency wise distribution of study participants.

Timeliness of switch (In hrs.)	No. of patients (N= 43)	Mean LOHS (In days)	Standard Deviation
Within 24 hrs.	22 (51.16%)	2.318182	0.838727
24-48 hrs.	21 (48.83%)	3.142857	1.424279
48-72 hrs.	0 (0%)	0	0
>72 hrs.	0 (0%)	0	0

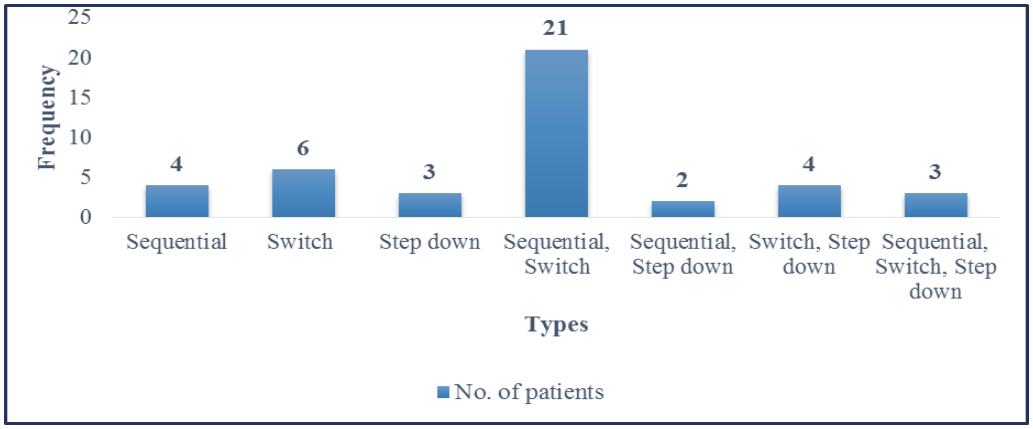


Chart 1: Types of switch over.

Out of 43 participants who underwent a switch, 21 (48.83%) experienced a combination of Sequential and Switch types, while the Sequential and Step-down combination was the least common, observed in only 2 (4.65%) participants. (Chart 1)

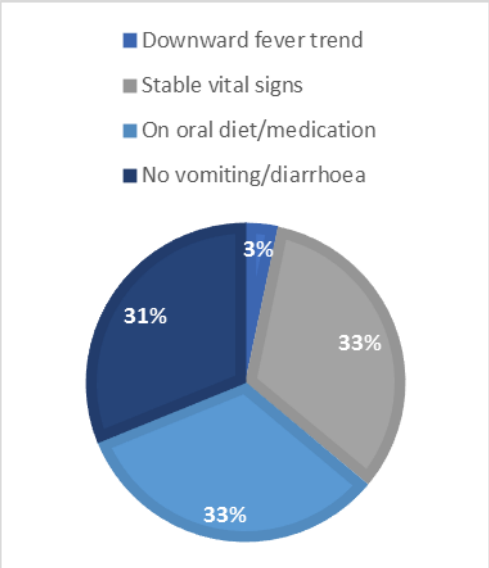
On the basis of drug and drug classes in which switch over has been done, the combination of Step down and Switch types of switch over was least in number N=3, 3.06%). It was performed only in Inj. Cefoperazone and Sulbactam belonging to class Cephalosporin and Beta lactamase inhibitors.

Inj. Diclofenac of NSAIDs class observe most common drug for which switch over was done for the maximum number of times (N=26, 26.53%). Within these 26 switch over of Diclofenac, the predominant type was Switch, implemented a substantial 20 times. The combination of Step down and Switch types of switch over was the least observed (n=3, 3.06%) and it was performed only to Tab. Amoxicillin and Potassium Clavulanate. Tab. Aceclofenac, Paracetamol and Serratiopeptidase of NSAIDs and Analgesic/Antipyretic were the most common drug to which switch over was done for the maximum number of times with a frequency of 19 (19.38%). Within these 19 occurrences, the most opted time drug was switched in switch type of switchover, implemented a substantial 12 times.

Sequential type of switch over was observed with a frequency of 47 (47.95%). Among these, Inj. Amoxicillin and Potassium clavulanate belonging to the drug class Penicillin and Beta lactamase inhibitor was most frequently switched to Tab. Amoxicillin and Potassium clavulanate counted 8 (17.02%). Switch was the second most opted for type of switch over after Sequential type with a frequency of 43 (43.87%). Among these, Inj. Diclofenac of NSAIDs class was most frequently switched to Tab. Aceclofenac, Paracetamol and Serratiopeptidase NSAIDs and Analgesic/Antipyretic observed 12 (27.90%).

Mean (SD) Cost Savings/Unit on Sequential type of Intravenous to Oral switch over across all the drugs was

found to be 154.53 (210.17) INR. Mean (SD) Cost Savings/Unit on Switch type of Intravenous to Oral switch over across all the drugs was 61.23 (87.92) INR whereas Mean (SD) Cost Savings/Unit on Step-down type of Intravenous to Oral switch over across all the drugs was observed to be only 23.66 (27.06) INR.



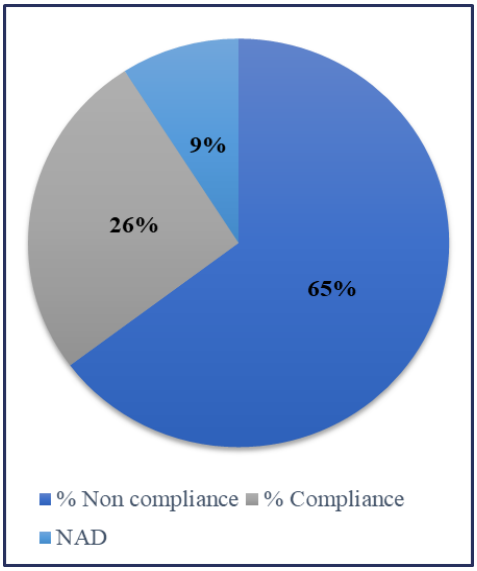


Chart 2: Compliance to AMSP switch Chart 3: Compliance to SAP guidelines guidelines.

All participants were switched according to the switch criteria laid down in AMSP guideline. : downward fever trend, downward WBC count, stable vital signs, oral diet/medication, and no vomiting/diarrhea. The most commonly complied criteria were stable vital signs and being on an oral diet/medication, each at 32.78%. No participants met the downward WBC count criterion as lab tests were not done post-surgery (Chart 2).

Out of 98 participants, antimicrobials were not prescribed in 9 participants. As a result, the data for 88 patients has been presented. Of the 88, compliance to ICMR guideline ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes, 2022 has been observed in Twenty three 23 (26%) while 8 (9%) participants had surgeries categorized as miscellaneous with no relevant data in the ICMR guidelines (Chart 3).

Table 4: Surgical category wise compliance to SAP.

Surgery Category	Frequency of Compliance, n (%) (N= 23)	Frequency of Non-compliance, n (%) (N= 57)	Total (N= 80)
Colorectal	10 (43.48%)	29 (50.88%)	39
Biliary tract	8 (34.78%)	4 (7.02%)	12
Gastroduodenal	2 (8.70 %)	1 (1.75%)	3
Urology	0 (0%)	16 (28.07%)	16
Placement of all grafts	0 (0%)	1 (1.75%)	1
Breast	0 (0%)	1 (1.75%)	1
Gynecologic	0 (0%)	2 (3.51%)	2
Appendectomy	3 (13.04%)	2 (3.51%)	5
Non cardiac thoracic	0 (0%)	1 (1.75%)	1

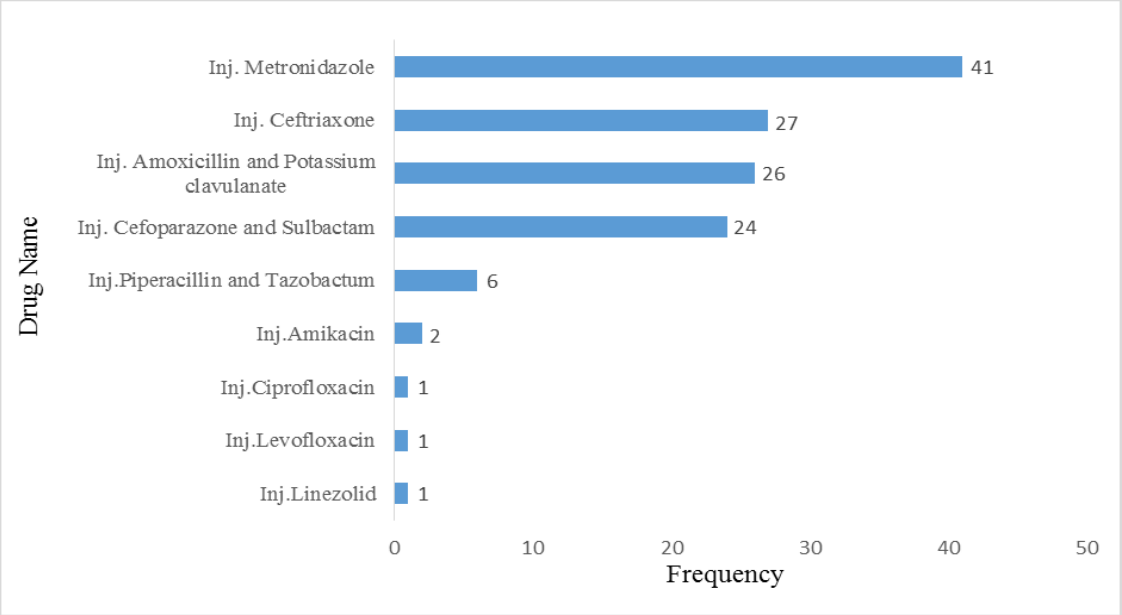


Chart 4: Antimicrobial usage.

Out of 98 participants, antimicrobials were not administered in 9 participants. As a result, the data for 88 participants is presented among them; Inj. Metronidazole 41 (31.78%) and Inj. Ceftriaxone 27 (20.93%) were the most commonly used antimicrobials, though both were non-compliant with ICMR Surgical Antimicrobial Prophylaxis guidelines. The mean antimicrobial usage was 14.3 (Chart 4).

DISCUSSION

Numbers of drug are avail in different form to treat patient. The selection of drug administration is influenced by factors such as optimal bioavailability, patient's clinical status and drug availability. In clinical situations, the intravenous route is frequently employed, particularly when patients are unwell, unstable, or face hurdles in oral medication absorption. The early switching from injectables to oral therapy is often neglected, pertaining to the false belief and misconception that intravenous therapy is always superior to the oral therapy. However, improper use of intravenous administration can result in irrational practices, leading to discomfort. Excessive reliance on intravenous medications not only escalates costs but also heightens the risks of errors. It is essential to transition from intravenous to oral medication within an appropriate timeframe to promote judicious and suitable injection usage.

Preliminary level with observation only this study has been carried out to initiate and explore switch over concept in our setting.

This six-month study, of sample size of 98 participants, aimed to assess the impact of therapeutic switching on surgical patients. The study focused on evaluating the prevalence and types of therapeutic switches, the timeliness of these switches, their effects on cost minimization, and the duration of hospital stays.

To the best of our knowledge, this study is the first of its kind of study in our setting to study Swtichover and compliance to ICMR Guideline for Antimicrobial Stewardship Program during the transition from parenteral to oral therapy in terms of the switch criteria. The prevalence of switch over in the surgical patients of this study was found to be 44%. The predominant focus of previous studies conducted on switch over from injectables to oral therapy has been within the medicine ward, primarily cantered on antimicrobials. Our study encompasses surgical patients and has taken into consideration all the drug classes.

Result reveal, more switch over in male as compared to male, can be more number, than female. These findings were opposite to those reported by Tefera et al.[6] while age related switchover is in line with published study.[6] and it can be attributed to a different study population and focus on a specific drug class.

Systematic distribution of study participants, revealed that Urinary tract calculi was the most frequently diagnosed condition with the highest occurrence of switch over among others. When the study participants were distributed on the basis of diagnostic categories, Colorectal had the highest occurrence resulting in the highest frequency of switch over and the p-value indicated that there was no significant difference among the diagnostic categories in which switch over was done in this study. Systematic distribution of study participants on the basis of their surgery revealed that Hernioplasty was the most frequent surgical procedure performed, whereas Percutaneous Nephrolithotomy witnessed the highest occurrence of switch over among others.

A study by Shrayteh ZM et al.[13] reported no alteration in the LOHS by using IV to PO conversion strategy. In contrast, in our study it was found that there is a significant difference in LOHS of those patients in whom switch over was done**.** These findings can be ascribed to variations in study population and emphasis on drug class across both the studies. Similarly, a study conducted by Yannamani Satya Tejaswini et al.[15] showed a significant decrease in LOHS following IV to PO conversion. Other study conducted by Tamilselvan T et al.[16] also reports a shorter mean LOHS for converted cases from IV to PO than non-converted cases. Tamilselvan T et al.[16] reported a reduced duration of LOHS with early switching and similar results were observed by Shalu Varghese et al., oosterheert J J et al. and Pardo RD et al.[18] Likewise, in our study it was found that the mean LOHS was 2.31 days in the case of study participants who were switched within 24 hrs. which was shorter as compared to study participants who were switched within 24-48 hrs. having a mean LOHS of 3.14 days. The average number of days of therapy for patients converted was 1.53 days shorter than that of patients who were not converted to PO therapy showed in a study conducted by Przybylski KG et al.[17] Our study shows that the Mean LOHS was 0.83 days shorter in the case of study participants who were switched within 24 hrs.

The combination of Sequential and Switch types of conversion were the most opted for in the surgical patients of our study. Inj. Diclofenac of NSAIDs observed most common drug to switch IV to PO with maximum frequency to Tab. Aceclofenac, Paracetamol with Serratiopeptidase.

The management of preoperative antibiotics is always been the research focus, and effectiveness of appropriate prophylactic antibiotics use to prevent surgical site infections in certain surgical procedures has been well established additionally antibiotics use as per need to protect patient. As far as various patterns of IV to oral are concerned, administered antibiotics courses of treatment that were switched to oral dosage forms were very few and involved antibiotics are shown in chart 4, mostly fluroquonolones and metronidazole. Reasons can be; available both in IV and oral formulation with acceptable tolerability and bioavailability, sequential therapy and switch therapy are easiest way to follow while unavailability of oral formulation of some good medicine discontinued with step down approach. For instance, ceftriaxone with no oral equivalent formulation therefore its conversion to oral dosage form was done using step down conversion which is occasionally observed in routine practice.

In case of IV to PO switch over in antimicrobials, Sequential was the most opted for type of switch over, followed by Step down, Switch and then combination of Step down and Switch therapy respectively.

In resemblance, a study conducted by Yannamani Saty Tejaswini et al.[15] showed that Sequential therapy was observed more frequently than Switch and Step-down therapy. In contrast to our findings, a study conducted by Tamilselvan T et al.[16] demonstrated that among all the converted cases, Step-down was the most frequent type of conversion followed by Switch and then Sequential and this can be attributed to the latter's inclusion of patients from all the departments such as pediatrics, medicine and surgery, whereas our study encompasses the surgical ward patients only. On the other hand, a study by Shalu Varghese et al.[18] also concludes that the Step-down type of conversion is the most common type practiced, which differs from our findings as their study focused on specific antimicrobials such as Cephalosporin, Fluroquinolones, Aminoglycoside, Glycopeptides, Imidazole, Penicillin and Tetracycline.

In this study, in the switched cases, the most commonly used antimicrobial drug class was Cephalosporin antibiotic; whereas the least commonly used drug class was Quinolone antibiotic. Compared to these findings, study by Tamilselvan T et al[16] showed Cephalosporins and Fluoroquinolones as the most common antibiotics used in the converted cases. Similar findings were observed earlier in study conducted by S M Biradar and Pathi Indu et al.[23] In our study, Tab. Amoxicillin and Potassium clavulanate belonging to drug class Penicillin and Beta lactamase inhibitor was the most common oral antimicrobial to which switch was performed. Study by A Kang and R Beuttler et al.[19] showed Beta-lactam agents as the second most commonly utilized oral agents after Fluoroquinolones. The practice of IV to PO conversion not only prioritizes the drug and drug class, but also emphasizes on choosing the most cost-effective option based on the patient's condition. In our study, the mean cost savings per unit on intravenous to oral switch over across all the drugs and types was noted to be 134.89 INR. The highest mean cost savings per unit was seen in Sequential followed by Switch and Step-down types respectively. In addition, IV to oral switch can be the good opportunity for pharmacist to play an active role in patient outcome by optimizing the medicine use. It also saves time of pharmacist and nursing by decreasing the number of Iv medicines preparation and administration and disadvantages cum risk of parenteral route mentioned in literature.

Compliance to ICMR Antimicrobial Switch Criteria and Surgical Antimicrobial Prophylaxis Guidelines

Indian Council of Medical Research (ICMR) states that one of the key causes of antimicrobial resistance in India is the inappropriate use of broad-spectrum antibiotics, as well as a lack of education and understanding on responsible antibiotic use. As a result, the ICMR's Antimicrobial Stewardship Program (AMSP) Guidelines established a systematic set of criteria for converting antimicrobials from parenteral to oral with equivalent bioavailability.

In our analysis, stable vital signs and on oral diet/medication emerged as the two most complied switch criteria of ICMR's AMSP, relying on which most of the IV antimicrobials were successfully converted to PO form.

The incidence of Surgical Site Infections (SSIs) is a serious problem associated with surgery reported in literature. Antimicrobial prophylaxis is one of the most commonly used approaches to addressing this problem. The SAP should not negatively impact the patient's microbiome and therefore, in this study, we have evaluated the adherence to Surgical Antimicrobial Prophylaxis (SAP) using the ICMR Treatment Guidelines for Surgical Antimicrobial Prophylaxis, 2022 as it is constructed in accordance with the overall Indian healthcare setup.[3]

In our study, the compliance to ICMR's SAP guidelines was observed to be 26% for prophylactic antimicrobial selection and 100% for the route of administration. Meenalotchini P. et al.[20] reported the choice of SAP to be inappropriate in 75.38% of the cases. In a study conducted by Reshma Begum et al.[14] the compliance to ASHP guidelines was found to be 11% for prophylactic antibiotic selection and 100% for route of administration. In our study, the highest compliance to ICMR's SAP guidelines in terms of IV drug selection, was observed in Colorectal surgical category, followed by Biliary tract surgical category. The drug of choice for SAP given in the ICMR 2022 guidelines for Urology, Placements of grafts, Breast and Gynaecologic surgical categories is Cefazolin. However, Cefazolin was not administered in a single case. The exactly same observation was reported by Meenalotchini P. et al.[20] and was attributed to the unavailability of Cefazolin at the institute during the surgeries. As mentioned by Kakkar et al.[24] the non-availability of Cefazolin in the institute may be attributed to the poor availability of essential drugs like Cefazolin in lower- and middle-income countries. Instead of Cefazolin, the third-generation Cephalosporins like Cefoperazone and Ceftriaxone were administered in most of the cases.

Similar finding and the reasons behind it are reported by Meenalotchini P. et al.[20] These findings can be due to a broader spectrum of activity against gram-negative bacteria demonstrated by Cefoperazone and Ceftriaxone as compared to Cefazolin. In addition to this, Ceftriaxone has a longer half-life as compared to Cefazolin, requiring less frequent dosing.[21,22] In our study, Metronidazole was the most commonly prescribed antimicrobial followed by Ceftriaxone. Reshma Begum et al.[14] reported Ceftriaxone as the most commonly prescribed antibiotic. Both these study findings were non-compliant to SAP standard guidelines.

A large number of literatures have reported a successful role of Clinical pharmacist in the switch over process. Clinical pharmacist can assist with the switch over process in terms of appropriate drug, class, bioavailability, cost- effectiveness and timeliness. Medical professionals should be made aware regarding the national standard guidelines formulated according to the nation's healthcare setup. Efforts can also be undertaken to bridge the gap between traditional practices involving false beliefs, misconceptions and contemporary medicine to provide a more holistic approach to healthcare.

There were certain limitations of the study. This is the first study as attempt to work in IV to oral conversion therefore limited to univariate analysis, multivariate analysis could be a better approach to study covariate and confounders. Pharmacist role in antibiotic use has been documented well but in case of surgical condition/ward is on fingertips that limit us to intervene. Somewhere, Injectables are focused and categorise as Intravenous or intra muscular rather focussing all. No indirect cost or hidden cost/ extra expenses have been calculated for cost analysis. During the study period, laboratory tests were only performed once in the surgical patients, it was not possible to evaluate compliance to the switch criteria of Downward WBC count. Accurate data was not available on the timing of Surgical Antimicrobial Prophylaxis administration and hence its compliance to the guidelines was not fully evaluated. In order to fill gap and more generalizable results, another study needs to be conducted with overcoming these limitations with performing interventions, IV to oral policy in larger sample size.

CONCLUSION

Switch over is common practice in treating patient as and when needed. Switching affects both the length of hospital stay and cost minimization. All patients who transitioned from IV to oral antimicrobials were switched according to the ICMR guidelines. However, most prescribed antimicrobials for surgical prophylaxis find issues to adhere to ICMR guidelines, highlighting a gap in the rational use of antimicrobial therapy for which reason can be the rational and not investigated.

ACKNOWLEDGEMT

We extend our gratitude to every individual, directly or indirectly involved in this study. This study was financially supported by K.B. Institute of Pharmaceutical Education and Research, Gandhinagar.

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