



# Uncovering the Function of MBP and Antibiotics in Preventing Surgical Site Infections during Colorectal Procedures

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## Abstract

**Introduction** Surgical site infections (SSIs) remain a significant concern in colorectal surgery, impacting patient outcomes and healthcare costs. Mechanical bowel preparation (MBP) and antibiotic prophylaxis are widely used strategies to reduce the incidence of SSIs. However, their effectiveness and the associated risks continue to be topics of debate within the medical community. This review aims to assess the current evidence on the use of MBP and antibiotics in preventing SSIs during colorectal procedures, highlighting the benefits, controversies, and ongoing discussions in the field.

**Objective** This review evaluates the effectiveness and controversy surrounding the use of mechanical bowel preparation (MBP) and antibiotic prophylaxis in preventing surgical site infections (SSIs) during colorectal procedures.

**Methodology** The review looks at a variety of research, such as meta-analyses and trials, and examines the timing, choice of antibiotics, and various facets of MBP. Findings Prophylactic antibiotic use considerably lowers SSIs; however, resistance issues are raised. MBP works well, but there are debates over the risks involved. With continuous discussions, combined antibiotic-MBP methods are prevalent.

**Conclusion** the evaluation acknowledges the potential for prevention but emphasizes the need for careful use that takes patient variables into account. Optimal techniques are the subject of ongoing study, which emphasizes the dynamic nature of SSI prevention in colorectal surgery.

## Keywords

- ▶ mechanical bowel preparation
- ▶ oral antibiotics
- ▶ surgical site infections
- ▶ colorectal
- ▶ surgery
- ▶ antibiotic resistance

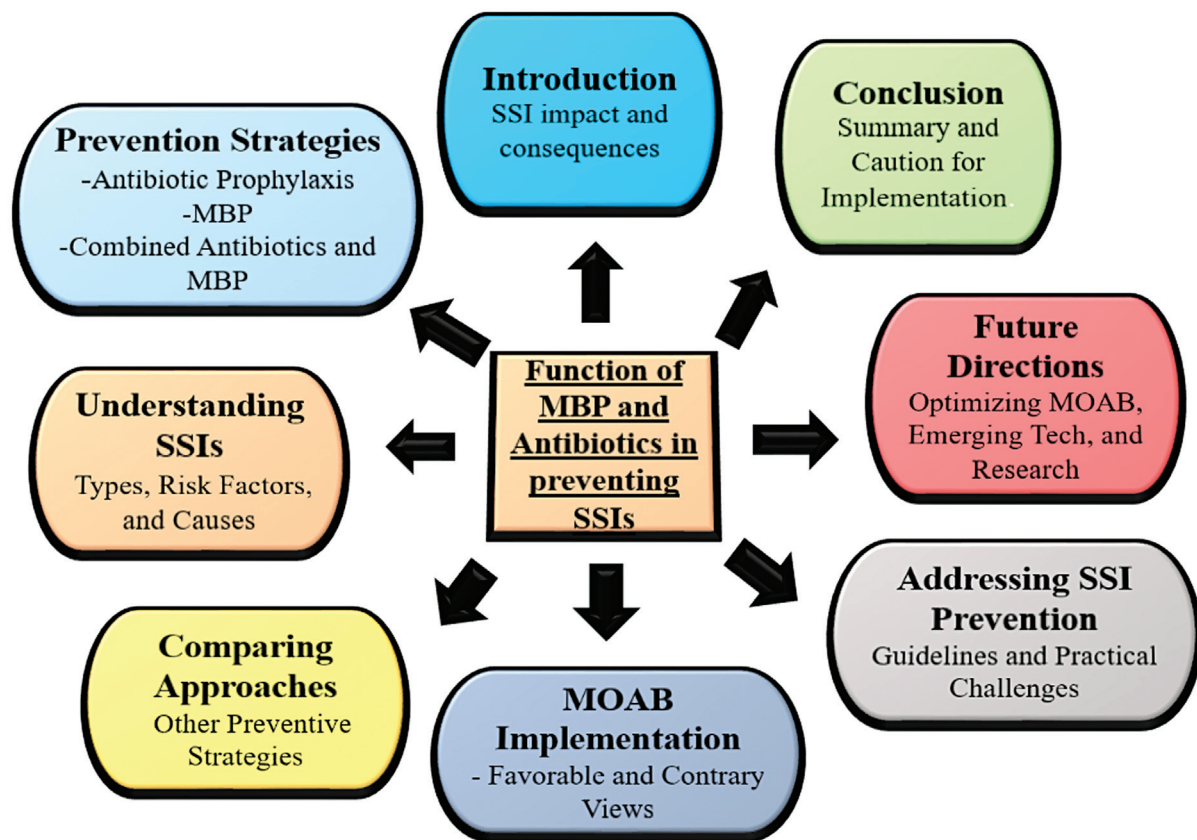
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## Introduction

Surgical site infections (SSIs) are a substantial source of morbidity and mortality following colorectal surgeries, affecting up to 20% of patients.<sup>1-3</sup> These infections can lead to prolonged hospital stays, increased healthcare expenses, and even death in severe cases.<sup>4,5</sup> Therefore, it is necessary to implement preventive measures to limit the occurrence of SSIs in colorectal procedures.<sup>6,7</sup> Antibiotic prophylaxis and mechanical bowel preparation are two regularly utilized preventative strategies in colorectal surgeries.<sup>8,9</sup> Antibiotic prophylaxis is the use of antibiotics before surgery to lower the risk of infection.<sup>8</sup> Mechanical bowel preparation, on the other hand, involves the cleansing of the intestine to reduce the bacterial load in the colon, which can lead to a lower risk of infection.<sup>10</sup> The use of antibiotic prophylaxis has been found to considerably lower the incidence of SSIs in colorectal procedures.<sup>11</sup> However, the type of antibiotics, time of treatment, and length of prophylaxis are also areas of ongoing discussion. The Cochrane analysis of antimicrobial prophylaxis in colorectal surgery identified 68 distinct antibiotics in the 260 trials included, making it impossible to establish if any regime is better or worse than any other. Despite guidelines, national surveys demonstrate that adherence to surgical prophylaxis is poor, both in timing and duration.<sup>12</sup> Mechanical bowel preparation has also been found to lower the risk of SSIs in colorectal surgeries.<sup>13</sup> However, the use of mechanical bowel preparation is con-

tentious due to its potential negative effects, such as dehydration, electrolyte imbalances, and an increased risk of anastomotic leakage.<sup>14</sup> Therefore, the use of mechanical bowel preparation is not suggested in all circumstances, and its usage should be reviewed on a case-by-case basis. SSIs are a significant source of morbidity and mortality following colorectal operations. The use of preventive treatments such as antibiotic prophylaxis and mechanical bowel preparation can greatly lower the incidence of SSIs. However, the choice of antibiotics and the use of mechanical bowel preparation should be reviewed on a case-by-case basis, considering the potential risks and advantages.

## Understanding Surgical Site Infections (SSI)

Surgical site infections (SSIs) are infections that occur after surgery in the region of the body where the surgery took place. SSIs can be divided into three types: superficial, deep, and organ/space.<sup>15,16</sup> Superficial SSIs involve only the skin and subcutaneous tissue, while deep SSIs involve deeper soft tissues such as fascia and muscle.<sup>17</sup> Organ/space SSIs include any portion of the body other than the incision site, such as organs or spaces that were handled during surgery.<sup>18</sup> Colorectal procedures are associated with a higher risk of SSIs due to the presence of fecal matter in the colon, which includes a high number of bacteria.<sup>19</sup> Other risk factors for SSIs in colorectal surgeries include advanced age, obesity, smoking, diabetes, malnutrition, immunosuppression, longer surgical

time, and the existence of a stoma.<sup>2,20</sup> A study indicated that patients with a body mass index (BMI) greater than 30 had a higher risk of getting SSIs after colorectal surgery.<sup>21</sup> Another study indicated that patients with diabetes had a greater chance of acquiring SSIs after colorectal surgery due to delayed wound healing and increased susceptibility to infection.<sup>2</sup> Preoperative factors such as the presence of a preoperative stoma, the use of neoadjuvant therapy, and the type of surgical method (open versus laparoscopic) can further affect the risk of SSIs in colorectal surgeries.<sup>22,23</sup> A study indicated that patients who underwent laparoscopic surgery had a decreased chance of getting SSIs compared with those who received open surgery.<sup>24,25</sup> SSIs are infections that occur after surgery in the region of the body where the procedure took place. Colorectal surgeries are associated with a higher incidence of SSIs due to the presence of fecal matter in the colon, and other risk factors include advanced age, obesity, smoking, diabetes, malnutrition, immunosuppression, prolonged operating time, and the existence of a stoma.<sup>26</sup> Preoperative factors such as the use of neoadjuvant therapy and the kind of surgical technique can also increase the risk of SSIs in colorectal operations.<sup>26</sup> Surgical site infections (SSIs) are one of the most common consequences of surgical intervention. The source of wound infections may be external or endogenous. A regular bacteriological evaluation is important to identify the causative microorganisms and their antibiotic susceptibility patterns. The following are some causal factors for surgical site infections:

- A) Corynebacterium striatum with Staphylococcus aureus: These are the main causative agents of SSI, resulting in the loss of implants and the necessity for reoperations in reconstructive surgery on the mammary gland utilizing endoprostheses.<sup>27</sup>
- B) Propionibacterium acnes: This is a common element of the human body's flora and has been connected to the infectious agent that caused it after several procedures, such as the installation of a device.<sup>28</sup>
- C) Rhizopus caespitosus: This is a fungus that has been documented to cause surgical site infections in humans. It is the most prevalent causal agent of invasive non-Aspergillus filamentous fungal infections.<sup>29</sup>

*Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Acinetobacter* spp., Coagulase-negative *Staphylococcus* (CONS), *Klebsiella pneumoniae*, *Proteus* spp., and *Citobacter* spp. are some of the most common bacteria isolated from surgical site infections.<sup>30</sup> The microbiological etiology and antibiotic resistance are generally omitted from reports on the clinical and economic impact of antibiotic usage, despite their importance for the mid- and long-term.<sup>31</sup> Prophylactic antibiotics are used for SSI prevention, whereas empirical antibiotics are used for the temporary initial treatment of sepsis and hospitalized community-acquired pneumonia (CAP).<sup>32</sup> Diagnostic-based antibiotic therapies employing microbiological evaluations contribute to increasing appropriately focused use of preventive and empirical antibiotics.

## Role of Antibiotic Prophylaxis

Antibiotic prophylaxis is a widely utilized preventive treatment in colorectal surgery to lower the occurrence of surgical site infections (SSIs). The notion of antibiotic prophylaxis involves the administration of antibiotics before surgery to reduce the bacterial burden at the surgical site and avoid the formation of SSIs.<sup>11</sup> The choice of antibiotics, doses, and time of administration are critical determinants of the success of antibiotic prophylaxis. The American Society of Colon and Rectal Surgeons recommends the use of a single dosage of a broad-spectrum antibiotic, such as cefazolin or cefuroxime, administered within 60 minutes before surgical incision.<sup>33</sup> The choice of antibiotics should be based on the local microbiological profile and the patient's particular risk factors for infection.<sup>34</sup> Several studies have established the usefulness of antibiotic prophylaxis in lowering the incidence of SSIs in colorectal surgery.<sup>35</sup> A meta-analysis of randomized controlled trials (RCTs) indicated that antibiotic prophylaxis lowered the risk of SSIs by 60% in colorectal surgery.<sup>19</sup> Another meta-analysis of RCTs indicated that the use of oral antibiotics in addition to intravenous antibiotics and mechanical colon preparation further lowered the risk of SSIs in colorectal surgery.<sup>36</sup> However, the use of antibiotics in colorectal surgery is not without danger. The abuse of antibiotics can lead to the development of antibiotic-resistant bacteria, which can be difficult to cure.<sup>37</sup> Therefore, it is vital to use antibiotics wisely and according to local norms and practices. Antimicrobial prophylaxis is a critical preventive treatment in colorectal surgery to lower the risk of SSIs.<sup>38</sup> The choice of antibiotics, doses, and timing of treatment should be based on local microbiological profiles and individual patient risk factors. The evidence supports the usefulness of antibiotic prophylaxis in lowering the risk of SSIs in colorectal surgery. However, the abuse of antibiotics should be avoided to prevent the growth of antibiotic-resistant microorganisms.

## Mechanical Bowel Preparation (MBP)

Mechanical Bowel Preparation (MBP) is a method that involves cleansing the colon from its contents by delivering oral preparations before surgery to eliminate fecal particles from the bowel lumen.<sup>39</sup> The goal of MBP in colorectal surgery is to lower the incidence of surgical site infections (SSIs) by decreasing the bacterial burden in the colon.<sup>40,41</sup> There are numerous techniques for MBP, including oral antibiotics and mechanical cleansing. Oral antibiotics are used to lower the bacterial load in the colon, whereas mechanical cleansing involves the use of enemas or laxatives to clear the gut lumen of fecal material.<sup>42</sup> Advantages of MBP include a lower risk of SSIs, greater vision of the surgical region, and less postoperative ileus.<sup>43,44</sup> However, there are also downsides to MBP, including electrolyte imbalances, dehydration, and patient discomfort.<sup>45</sup> Studies have found inconsistent results about the usefulness of MBP in preventing SSIs. One study found that preoperative MBP dramatically reduced the incidence of intra-abdominal septic complications in patients undergoing

elective colorectal resections for Crohn's disease.<sup>46</sup> Another study found that MBP did not improve the intraoperative visibility of the surgical field or the overall ease of surgery in patients having elective laparoscopic gynaecological surgeries.<sup>47</sup> However, a recent study indicated that MBP is a risk factor for postoperative delirium as it affects the gut microbiota composition.<sup>48</sup> MBP is a strategy applied to minimize the risk of SSIs in colorectal surgery. While it has advantages, such as lowering the bacterial burden in the colon, it also has problems, such as electrolyte imbalances and patient pain. Studies have revealed inconsistent results regarding its effectiveness in avoiding SSIs, and its use should be reviewed on a case-by-case basis.

### Combined Use of Antibiotics and MBP

The combined administration of antibiotics and mechanical bowel preparation (MBP) is a prevalent method in colorectal surgery to lower the incidence of surgical site infections (SSIs). The objective of utilizing both antibiotics and MBP is to lower the bacterial burden at the surgical site and avoid the development of SSIs. Several studies and guidelines support the combination strategy of antibiotics and MBP in colorectal surgery. A comprehensive review and meta-analysis of 8,515 patients indicated that surgical care bundles, which included the administration of both antibiotics and MBP, significantly reduced the risk of SSIs in patients after colorectal surgery.<sup>49</sup> The American Society of Colon and Rectal Surgeons supports the use of both antibiotics and MBP in patients undergoing elective colorectal surgery.<sup>50</sup> However, there are debates and challenges associated with the combination use of antibiotics and MBP. The use of MBP has been associated with deleterious consequences, such as dehydration, electrolyte imbalances, and poor wound healing.<sup>51</sup> In addition, the effectiveness of MBP in reducing the risk of SSIs is contested. A Cochrane study indicated that there was no significant difference in the incidence of SSIs between individuals who got MBP and those who did not.<sup>52</sup> Furthermore, the abuse of antibiotics might lead to the development of antibiotic-resistant bacteria, which can be difficult to cure.<sup>53</sup> Therefore, it is vital to use antibiotics wisely and according to local norms and practices. Thus, the combination use of antibiotics and MBP is a standard technique in colorectal surgery to lower the occurrence of SSIs. The evidence supports the benefit of surgical care bundles, which incorporate both antibiotics and MBP, in minimizing the risk of SSIs in patients after colorectal surgery. Nevertheless, there have been drawbacks to using MBP, and its usefulness in reducing the risk of SSIs is called into question. The abuse of antibiotics should be avoided to prevent the formation of antibiotic-resistant bacteria.

### Comparing MBP and Antibiotics with Other Approaches

Apart from the standard colorectal surgical strategy of antibiotics and MBP, there are other strategies that might be employed to prevent SSIs. These solutions include preoperative

optimization and enhanced recovery measures. Preoperative optimization entails optimizing the patient's health status before surgery to lessen the chance of complications, particularly SSIs.<sup>54</sup> This can involve actions like giving up smoking, losing weight, and helping diabetic individuals regulate their blood glucose levels.<sup>55</sup> Enhanced recovery techniques comprise a multimodal approach to perioperative care, including prophylactic intake of carbohydrates, minimally invasive surgery, and quick action.<sup>56</sup> When individuals are enduring colorectal surgery, preoperative enhancement and improved recuperation measures have been clinically proven to lower the possibility of operation incision complications.<sup>57</sup> A comprehensive review and meta-analysis of 23 trials found that enhanced recovery regimens were linked to a statistically significant reduction in the frequency of SSIs when contrasted with conventional therapy.<sup>58</sup> As stated by a different thorough evaluation and meta-analysis of 11 papers, preoperative optimization significantly reduced the frequency of SSIs.<sup>59,60</sup> The application of improved recovery and preoperative optimization regimens has various advantages over the application of antibiotics and MBP. These methods do not produce antibiotic-resistant microbes since they are non-antibiotic. In addition, they can enhance patient outcomes and minimize healthcare expenses. However, there are potential hazards associated with using quick healing and preoperative optimization procedures. Such approaches necessitate a multidisciplinary team approach, and not all hospital environments will be suitable for them. Furthermore, the evidence supporting these methods' advantages is continually changing, and further research is necessary to ascertain their long-term efficacy. The usage of preoperative improvement and improved methods for recovery is a promising option for the administration of antibiotics and MBP for SSI prophylaxis in patients following colorectal surgery. These treatments are non-antibiotic and can enhance patient outcomes. However, further research is necessary to ascertain their long-term utility, and they necessitate a multidisciplinary team approach.

### Disadvantages of MBP

While mechanical bowel preparation (MBP) is widely employed, recent studies have underscored several drawbacks that may pose challenges for patients.

Injuries to the bowel and manifestation of other problems such as anastomotic leakage or leaking from the junction of bowel segments are comparable in patients who were given MBP and those who were never given it.<sup>14,61</sup> Prior research has noted stability or negligible improvement in these outcomes. Both laxatives and fluid purging are often employed in MBP regimens and have the potential to lead to sub-optimal rehydration and further electrolyte disturbances. This can add certain complications to the situation for elderly people or those who have chronic diseases.<sup>62</sup> Constipation, gas, stomach pains and headaches, tiredness, and feeling sick are some of the discomforts that a patient is likely to develop while going through the MBP process. This might cause anxiety, which, when combined with everything else, could make for an awful experience for the surgery.<sup>63</sup> The



requirements for the use of MBP supplies like the laxatives and enemas, among others, boost healthcare expenses, and considering the controversies surrounding their effectiveness, such costs may not be justified. While the U.S. and other countries aim to prescribe limited antibiotics within the MBP regimens, the possibility of antibiotic resistance is increasing.<sup>64</sup>

### Arguments in Favor of MOAB Implementation

During elective colorectal surgery, mechanical planning for the stools (MBP) and oral antibiotics have been used to prevent surgical site infections (SSI). Numerous studies have provided support for the usage of MOAB. MBP supposedly permits better bowel handling, decreased fecal contamination and spillage, and decreased luminal pressure and bacterial load, based on a network meta-analysis.<sup>63</sup> MBP has been shown to cause inflammatory and mucosal changes, but it may still have an advantage over oral (IAB + OAB) and intravenous (IV) antibiotics' potential to cause anastomotic leakage. An in-depth examination found that MBP does not lower the danger of SSI when oral antimicrobials are not used.<sup>65</sup> As it may lower incisional SSI, a different study suggested that oral antibiotics be added to IV antibiotics for bowel preparation.<sup>66</sup> As a prospective randomized study showed, effective MBP is usually meant to help reduce infection issues after elective surgery on the colon.<sup>67</sup> A multicentre, randomized, parallel, single-blinded trial found that oral neomycin and bacitracin can prevent infections of surgical sites following elective colorectal surgery.<sup>68</sup> These investigations offer proof in favor of using MOAB to stop SSI during colorectal surgery.

### Arguments Against Putting MOAB into Practice

The practice of manual bowel preparation and oral antibiotics to prevent infection of the operation site during colorectal procedures is up for debate. While some studies have shown that MOAB can reduce the likelihood of these infections, other research has cast doubt on the efficacy of this tactic. In contrast with MBP alone, oral antibiotics plus MBP reduced the SSI rate by 16%, based on a combined analysis of seven studies using randomization and control, including 1,769 patients.<sup>69</sup> However, an extensive investigation discovered that preoperative MBP has no benefit in reducing the SSI rate when compared with utilizing no MBP at all.<sup>65</sup> Moreover, a network meta-analysis revealed that oral antibiotics combined with mechanical bowel preparation were linked to a reduction in SSIs; however, oral antibiotics by themselves were rated as the second-best strategy; moreover, there was no distinction between MBP alone and no preparation.<sup>70</sup> A retrospective regression study revealed that the infection at the incision site was much more common in situations involving surgery lasting longer than four hours.<sup>69</sup> More specifically, for every 10 minutes of operation, the danger of infections at the surgical area (SSI)

increased by 5% for every 15 minutes, 17% for every 30 minutes, and 37% for every 60 minutes.<sup>71</sup> This implies that a prolonged surgical procedure is a significant contributing factor to the emergence of surgical site infections. Aside from the duration of the surgery, age has also been found to be an element of risk for infection at the surgical site, with individuals under 65 years old having a decreased risk of SSI.<sup>69</sup> Nevertheless, it was previously found that using oral antibiotics before surgery helps prevent SSI.<sup>69</sup> Additionally, it's been proven that concomitant conditions, including diabetes mellitus and hypertension, increase the likelihood of infection of the surgical site in orthopaedic patients.<sup>72</sup> As a consequence of applying oral antibiotics should be carefully examined, and more investigation is required to ascertain their safety and effectiveness.

### Mode of Action/The Combined Impact of OAB and MBP

The synergy between OAB and MBP indicates a two-pronged approach to preparing the patient's colon for surgery. MBP clears the intestine of fecal matter through an osmotically induced purge, minimizing the sheer biomass that could possibly contaminate the surgery field. Meanwhile, OAB targets the microscopic dimension, decreasing the bacterial burden in the gut and further minimizing the chance of postoperative contamination. By means of a physical action, however, namely the mechanical evacuation of intraluminal material, MBP significantly lowers the bacterial load and excrement waste.<sup>73</sup> Consequently, there is less chance of contamination during operation and less chance of bacterial translocation. Together, OAB and MBP function in tandem to accomplish a large reduction in bacterial burden, both in absolute numbers and in relative proportions. It is widely believed that this coordinated action minimizes the chance of contracting an infection, creates a cleaner working environment, and lessens the occurrence of SSIs.<sup>74</sup> The process's supporting evidence is convoluted, though, and other research found little variation in the frequency of SSIs between people with OAB and MBP combo and people with OAB alone.<sup>52</sup> Elements like antibiotic choice, patient compliance, and regional changes in bacterial populations may have influenced these outcomes. While the integrative use of OAB and MBP holds potential for lowering SSIs, continued research is warranted. Enhanced awareness of this method's functioning will guide surgical best practices, potentially enhancing patient outcomes and expanding the bounds of preventative medicine.

### Addressing SSI Prevention, Controversies, and Variations in Surgery on the Colorectal

SSIs are a significant problem in colorectal procedures, and leading medical societies and organizations have published guidelines and recommendations to prevent them. Following SSI preventive packages can dramatically lower the probability of SSIs during colorectal surgery, based on several of publications.<sup>49</sup> These bundles often involve a mixture of

therapies such as prior skin preparation, antimicrobial prophylaxis, and glycaemic control.<sup>75</sup> One Research revealed that compliance of 70% or higher with Thailand's SSI Prevention Bundle was connected with a reduced occurrence of incisional SSI.<sup>76</sup> It is controversial to use MBP for colorectal elective surgery because some research indicates that are unlikely to be necessary.<sup>77,78</sup> MBP is still required by some requirements to be incorporated into in preventive packages of SSI.<sup>13</sup> The use of antibiotics taken orally (OA) regardless of MBP is advised by recent guidelines to prevent infections at the surgical area (SSIs) during colorectal surgery.<sup>50</sup> An examination of studies using randomization and control by a network meta-analysis revealed that combination MBP-OA was related to a decreased incidence of SSIs compared with no preparation, OA alone, or MBP alone.<sup>52</sup> There are various discrepancies in guidelines and recommendations addressing SSI prevention in surgery on the colorectal, which can have ramifications for clinical practice. For example, the usage of MBP is disputed, and some standards advocate against its use.<sup>11</sup> Clinicians should carefully assess the existing evidence and guidelines when making decisions concerning SSI prevention in surgery on the colorectal.

### Practical Considerations and Implementation

To avoid SSIs and additional issues during colorectal surgery, MBP and antibiotic prophylaxis are frequently utilized in clinical practice.<sup>79</sup> Although there are various practical difficulties that must be considered when adopting these therapies in clinical practice, implementing antimicrobial prophylaxis and MBP in clinical practice necessitates addressing various practical problems.<sup>80,81</sup> Patient compliance is a significant issue that is something to think about. Several of the challenges to the effective use of medications include poor provider-patient communication, an absence of understanding about a drug and how to use it, not being persuaded of the requirement for treatment, fear of the drug's side effects, long-term drug regimens, complex regimens requiring multiple medications with different dosing schedules, cost, and access issues.<sup>82</sup> To increase patient compliance, healthcare practitioners should clarify crucial facts when prescribing or dispensing a medicine, provide medication adherence improvement aids, and provide behavioral support.<sup>83</sup> Healthcare expenditures are another essential factor when considering antibiotic prophylaxis and MBP.<sup>41,84</sup> These interventions can be expensive, and the cost-effectiveness of these initiatives must be reviewed carefully. A method of cutting costs was applied in formulating clinical guidelines for best practices regarding antimicrobial prophylaxis in surgery.<sup>33</sup> Every organization needs to take purchasing expenses into account while applying these rules. Additional cost savings may be gained by coordinated supervision by surgeons and pharmacists to pick the most cost-effective medication and reduce or remove postoperative dosage.<sup>85</sup> Resource availability is also a crucial element in implementing antibiotic prophylaxis and MBP. In some settings, access to antibiotics and other resources may be

limited, making it tough to offer appropriate care.<sup>86,87</sup> In such circumstances, alternate treatments, such as accelerated recovery after surgery (ERAS) protocols, may be more viable and effective. Integrating antibiotic prophylaxis and MBP in clinical practice necessitates addressing practical concerns such as patient compliance, healthcare expenditures, and resource availability.<sup>88</sup> Healthcare practitioners should convey crucial facts while prescribing or dispensing a medicine, provide medication adherence improvement aids, and provide behavioral support to increase patient compliance. A cost-minimization approach should be applied in formulating clinical guidelines for best practices for antimicrobial prophylaxis in surgery. Alternative solutions, such as ERAS procedures, may be more viable and effective in environments where resource availability is restricted.

### Future Directions

While MOAB has shown encouraging results in lowering SSIs, apparently there are still places where further research is needed.<sup>19</sup> One area of investigation is the best time and duration of MOAB administration. Some studies have suggested that providing MOAB within 2 hours before incision may be more beneficial than delivering it the night before surgery, although further study is required to confirm this conclusion.<sup>89</sup> Additionally, the optimal period of MOAB administration is still uncertain, with some research suggesting that a shorter duration of MOAB administration may be just as effective as a longer duration.<sup>90</sup> Another area of investigation is the use of MOAB in combination with other therapies, such as probiotics or fecal microbiota transplantation. These approaches have shown promise in lowering the risk of SSIs in other surgical settings and may have potential in the context of elective colorectal resection.<sup>91,92</sup> Emerging technologies and approaches in this sector include the usage of molecular diagnostics to identify the specific pathogens responsible for SSIs and the use of personalized medicine to customize antibiotic prophylaxis for individual patients based on their microbiome.<sup>93,94</sup> Additionally, the application of enhanced recovery after surgery (ERAS) protocols, which involve a multimodal approach to perioperative care that includes preoperative carbohydrate loading, early mobilization, and opioid-sparing pain management, has shown promise in lowering the chance of surgical infections and other complications in elective colorectal surgery.<sup>95</sup> In conclusion, while MOAB has shown promise in lowering the possibility of SSIs in elective colorectal resection, there are still areas where further research is required to optimize its use. Emerging technology and approaches, such as molecular diagnostics and tailored treatment, may hold hope for the future of preventing complications from surgery in this environment.

### Conclusion

The analysis concludes by highlighting the complex environment around the use of oral antibiotics (MOAB) and mechanical bowel preparation (MBP) to avoid surgical site infections

(SSIs) during colorectal procedures. Although the available data points to the possible advantages of MOAB in combination with MBP, the field is characterized by continuous discussions, disagreements, and differences in surgical techniques. By addressing both macroscopic and microscopic dimensions, the combination of MOAB and MBP offers a two-pronged strategy to lessen the bacterial burden. But difficulties, including patient compliance, financial concerns, and differences in local bacterial populations, highlight the necessity of cautious use. Research on the best times and duration to administer MOAB, the investigation of therapeutic synergies, and developments in personalized medicine and molecular diagnostics are promising avenues for improving SSI prevention tactics. Based on available data, the prudent use of MOAB in colorectal surgery seems to have prospective advantages. However, to optimize surgical outcomes, its practical implementation should be customized to each patient's unique circumstances and informed by ongoing research.

#### Authors' Contributions

Agnes Sara Shibu and Rohit Singh Deo contributed to the writing, while Rojin G. Raj was responsible for the validation.

#### Conflict of Interest

None.

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