

Research Article

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Perioperative Management and Implementation of Enhanced Recovery After Surgery: State of the Art in Tunisia



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Abstract

Introduction: Enhanced recoveries after surgery (ERAS) protocols are multimodal perioperative care pathways. They include evidence-based bundles designed to reduce perioperative stress, promote recovery, and shorten the length of stay. In Tunisia, this practice isn't considered yet.

Purposes: Our first endpoint is to assess the knowledge of ERAS concept among Tunisian physicians. Our second endpoint is to establish a plan for future implementation of this strategy in Tunisian hospitals.

Materials and methods: Information was gathered through a survey that enrolled 100 surgeons and 42 anesthetists. The questionnaire was constructed in two forms: an electronic form via emails and a paper form.

Results: Our study showed that 78.5% of anesthetists (n=33) and 69% of surgeons (n=69) had some basic knowledge about ERAS protocols. Bundles that were well adopted according to most physicians are: preanesthetic assessment (95% of anesthetists, 92% of surgeons) and informing the patient (97% of surgeons, 95.2% of anesthetists). During postoperative phase, differences were noted between surgeons and anesthetists such multimodal analgesia (P<10-3), intravenous Lidocaine (P=0.013), ileus preventing (P<10-3) and glycemic control (P=0.029) for anesthetists. Adherence to all elements of ERAS protocols was low among all groups (4.8% of anesthetists, 13% of surgeons).

Conclusion: Physicians applied ERAS guidelines well that were already established in our daily practice long ago. However, new evidence-based guidelines were not applied. Our study also provides a practical strategy that aims to implement ERAS pathways in Tunisian health institutions in the future.

Keywords: Enhanced Recovery After Surgery; Surgeon; Anesthetist; State of the Art; Survey

Introduction

Enhanced recovery after surgery (ERAS) is a multimodal, multidisciplinary approach to the perioperative management of the surgical patient [1]. This evidence-based practice is designed to reduce perioperative stress, maintain postoperative physiological functions, and accelerate recovery after surgery [2]. Several studies have shown that following ERAS protocols reduces morbidity and mortality rates, improves recovery, and shortens the length of stay [3], even among frail patients [4] and children [5]. This concept was first designed by the Danish professor Henrik Kehlet in early 1990's [6]. Since then, it has gained a worldwide interest in the medical field. Despite inventing it three decades ago, it's still a foreign concept in Tunisia. Clinical and financial benefits of ERAS protocols are yet to be discovered by Tunisian physicians. Currently, there is no nationwide data that reflect

the actual status of perioperative care in Tunisia. We conducted our research to determine the knowledge about ERAS protocols among Tunisian physicians both surgeons and anesthetists. Our study also aims to clear the way for a future implementation of ERAS pathways in Tunisian conditions.

Materials and Methods

This study was conducted through a survey. It was intended for physicians that could potentially take part in the ERAS project in the future including certified specialists and junior physicians going through clinical rotations as well. It's a comparative study between anesthetists and surgeons, as well as junior and senior physicians. There was no validated questionnaire in literature about this matter. The survey was conducted over five weeks from

July the 1st 2019 to August the 7th 2019. No Ethical committee was needed since it's a knowledge assessing questionnaire among medical staff. Candidates were given one hour to answer the questionnaire. Since this is the first study that tackles this subject in Tunisia, we prepared our questions based on the ERAS® Society Guidelines [7]. Through our questionnaire, we aimed to assess theoretical knowledge and clinical adherence to enhanced recovery protocols. The questionnaire of the survey was first written and explained in French.

It consisted of 40 questions divided as follow: 6 questions about personal information, two questions about personal knowledge regarding ERAS program, 5 questions about logistics such as mean length of stay, the remaining questions assessed adherence to clinical guidelines of the ERAS program one by one, this section was divided into three segments: preoperative, intraoperative, and post-operative phase. The last question investigated the personal willingness to establish and follow these guidelines in the future. The questionnaire was constructed in two forms: an electronic form via emails and social networks and a one-on-one interview where the physician was asked to fill in the questionnaire in paper form. Surgical specialties in question

were mainly abdominal surgery, otorhinolaryngology, gynecology, orthopedics, and urology. Physicians invited to take part in this study were practicing over 6 regions of the country including: Monastir, Mahdia, Sousse, Kairouan, Tunis and Gafsa. Data analyses were performed via IBM SPSS version 25.0. Statistical analysis was performed using the chi-square test.

Results

Sample size of the respondents was not calculated since it is a pilot study. It involves 142 physicians including 100 surgeons, and 42 anesthetists working in six different regions of the country. Physicians asked were mainly from university hospital of Mahdia (38%) and Monastir (26.7%). Almost all of them were practicing in public health institutions (97.8%), except 3 surgeons (2.11%) were assigned to private hospitals. Surgeons were divided as follow: 35% were general surgeons, followed by gynecologists (26%), 16% were specialized in orthopedics, 13 % in urology and 10% were oto-rhinolaryngologists. The prevailing group included junior physicians under 5 years of experience with 74% of surgeons, and 89% of anesthetists. Seniors were 26% of surgeons (n=26) and 12% of anesthetists (n=6).

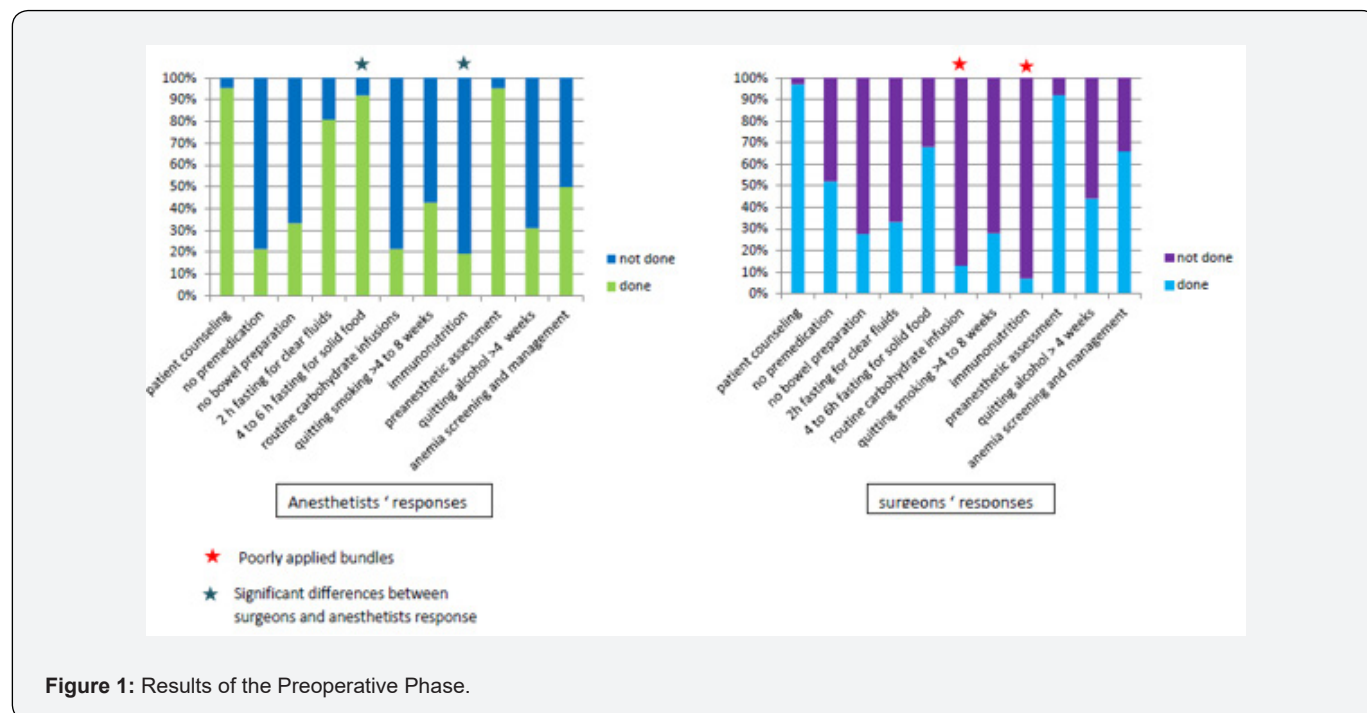


Figure 1: Results of the Preoperative Phase.

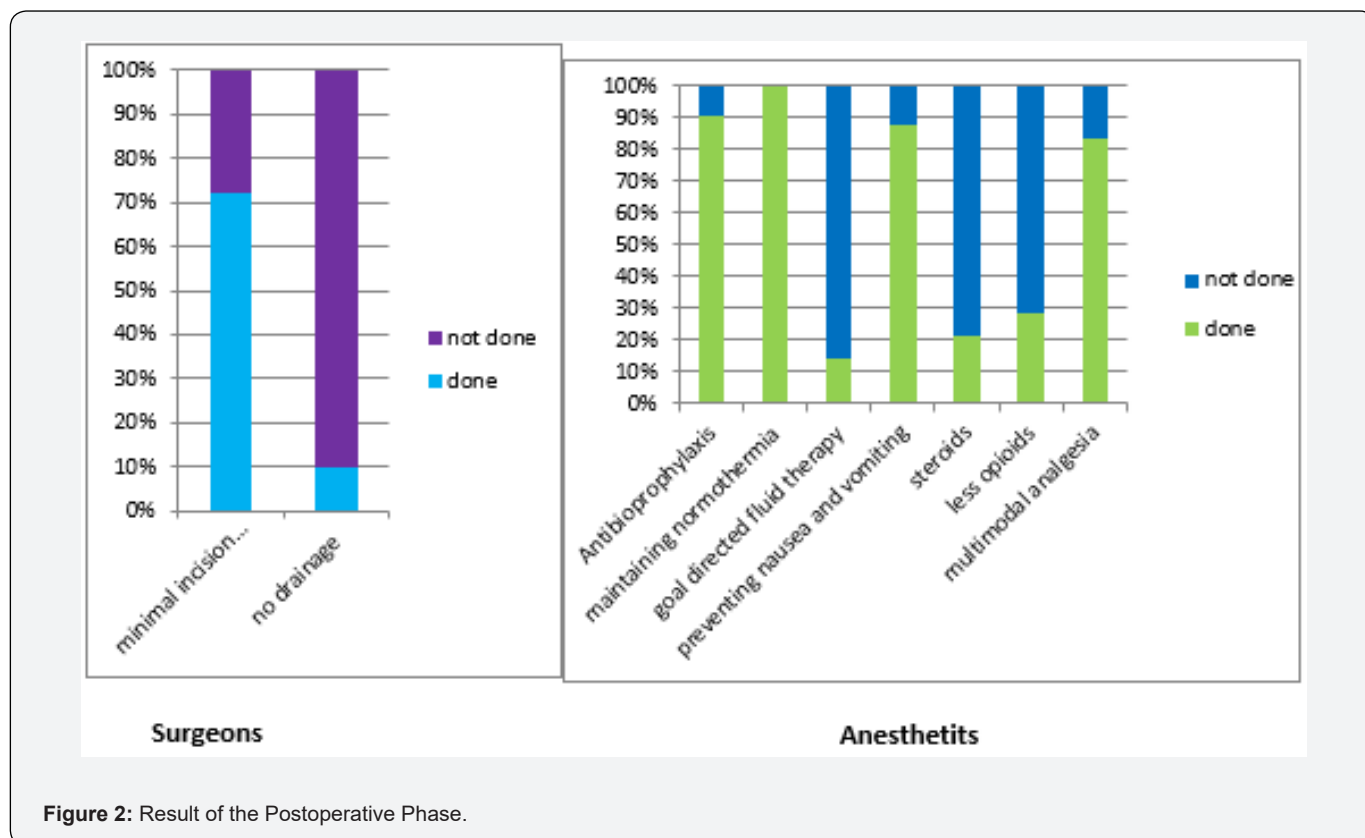
When asked about theoretical knowledge about ERAS protocols, (69%) of surgeons and (78.5%) of anesthetists responded that they were well versed with the basic concept of ERAS. However, (31%) of surgeons and (21.5%) of anesthetists claim they never heard about it. Practical details seemed blurry for almost all of physicians asked. As for preoperative care (Figure 1), the guidelines intensively followed by surgeons were patient counseling (97%), preanesthetic assessment (92%), 6-hour

fasting for solid food (67.7%), anemia screening and management (66%). Guidelines that were poorly followed by surgeons were: no premedication (52%), no bowel preparation (27.6%), 2hour fasting for clear fluids (33.3%), carbohydrate infusion (13%), quitting alcohol (44%) and smoking (28%) at least a month before surgery and immunonutrition (7%). Preanesthetic assessment was more practiced among junior surgeons than senior surgeons (96% vs. 88.2%) with a significant p of 0.01.

Guidelines that were strongly followed by anesthetists were: patient counseling (95.2%), preanesthetic assessment (95%), 2hour fasting for clear fluids (81.6%) and 6-hour fasting for solid food (92.1%). Statistics also showed that junior anesthetists insisted on informing the patient (97.2% vs. 83.3%, $p = 0.049$) and solid food fasting rules (93.7% vs. 83.3%, $p=0.016$) more than senior anesthetists. In comparison between surgeons and anesthetists' responses, anesthetists insisted on immunonutrition (19% vs. 7%, $P= 0.022$) and fasting rules for solid food (92.1% vs. 67.74%, $p=0.004$) more than surgeons. Anesthetists also recommended giving clear fluids up to two hours prior to the operation more than surgeons (81.6% vs. 33.3%) with a highly significant correlation ($p < 10^{-3}$). While anemia screening was mostly done by surgeons (66% vs. 50%, $p=0,042$).

As for perioperative care (Figure 2), the guideline that was strongly followed by surgeons was minimally invasive incision (72%). The guideline that was poorly followed was no drains (10.1%). As for anesthetists, guidelines that were strongly followed were: antibi prophylaxis (90.5%), normothermia (100%), preventing nausea and vomiting (88.1%) and multimodal analgesia (83.3%). Guidelines that were poorly followed by anesthetists

were: goal directed fluid therapy (14.3%), steroids (21.4%), less opioids (28.6%). We should mention that goal directed fluid management was more practiced by senior anesthetists rather than junior anesthetists (50% vs. 8.3%, $p=0.004$). As for post-operative care (Figure 3), guidelines strongly followed by surgeons were: selective gastric decompression according to 70.5% of general surgeons, 60% of oto-rhino-laryngologist surgeons and 30.7% of urology surgeons, removing bladder catheter in less than 24hours (68.1%), thrombophylaxis (96%), first ambulation in less than 24 hours (73%), oral intake in less than 24 hours (62%), no epidural analgesia (82%), less opioids (72%). Guidelines that were poorly followed by surgeons were: non-steroidal-anti-inflammatory prescription (18%), Lidocaine infusion (2%), multimodal analgesia (47%), removing intravenous infusions in less than 24 hours (11%), strict glycemc control (35%) and ileus prevention (43%). We should note that, when indicated, urinary catheter early removal was more applied by general surgeons (77.1%), gynecologists (88.4%) and orthopedists (43.7 %) than urologists (38.4%) with a significant $p=0.006$. While preventing postoperative ileus was more practiced by general surgeons (97.14%) and urologists (46.1%) than gynecologists (0%) ($p < 10^{-3}$).



As for anesthetists, post-operative guidelines that were strongly followed were selective gastric decompression (69%), non-steroidal-anti-inflammatory prescription (73.8%), urinary

drainage removal in less than 24 hours (66.7%), thrombophylaxis (100%), first ambulation in less than 24 hours (64.3%), multimodal analgesia (90.74%), and ileus prevention (100%). Post-operative

guidelines that were poorly followed by anesthetists were: early oral intake in less than 24 hours (47.6%), no epidural analgesia (50%), less opioids (35.7%), Lidocaine infusions (11.9%), intravenous fluid infusion removal in less than 24 hours (9.5%) and glyceimic control (54.8%). Statistics have shown that senior anesthetists were more eager to remove bladder catheters and intravenous catheters by day zero than junior anesthetists (50%

vs. 5.5%, $p=0.001$). Also, they promoted early first ambulation (66.6% vs. 5.55%, $p=0.001$) and Lidocaine infusions (50% vs. 5.5%, $p=0.001$) more than young anesthetists. In comparison with surgeons, anesthetists prescribed multimodal analgesia (90.74% vs. 47%, $p<10^{-3}$), non-steroidal-anti-inflammatory drugs (73.8% vs. 18%, $p<10^{-3}$) and intravenous Lidocaine (11.9% vs. 2%, $p=0.013$) more than surgeons.

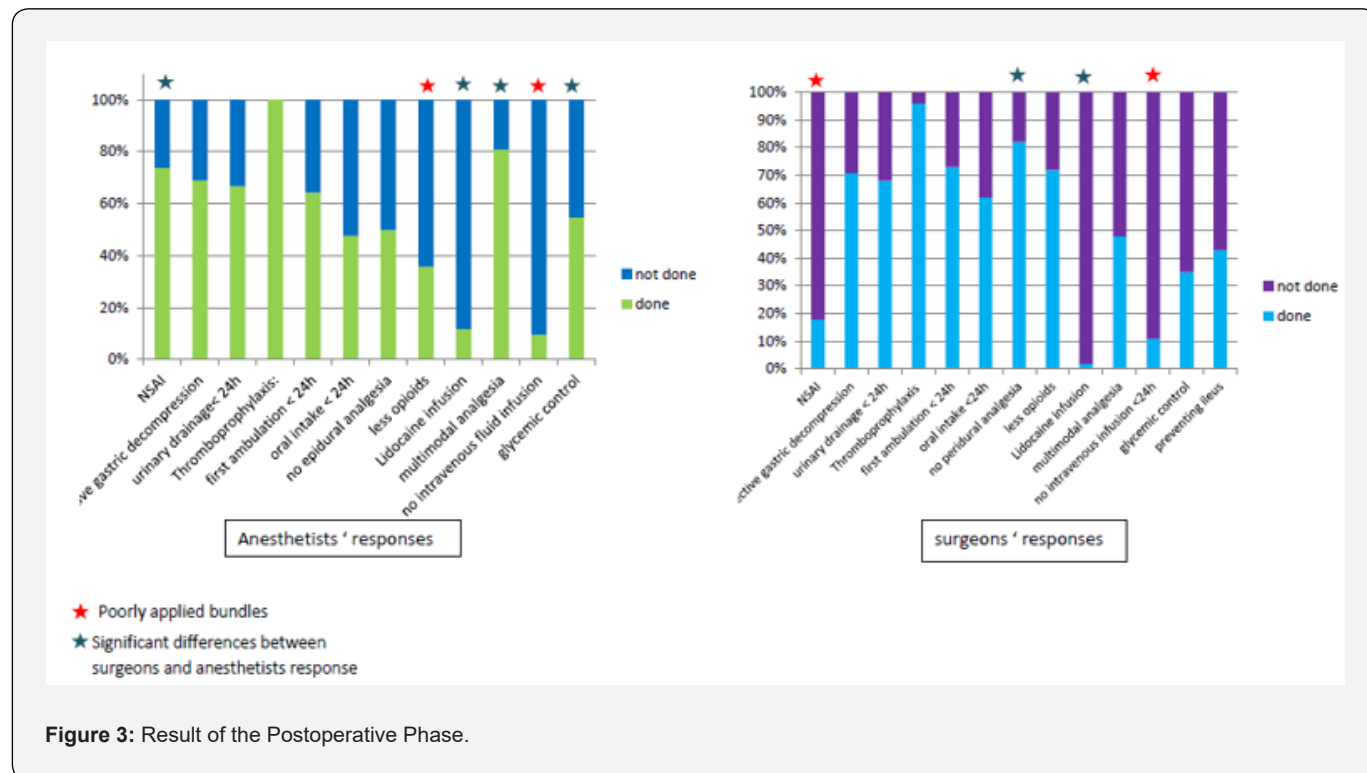


Figure 3: Result of the Postoperative Phase.

They also insisted more on ileus preventing (100% vs. 43%, $p<10^{-3}$) and glyceimic check (54.8% vs. 35%, $p=0.029$) more than surgeons. While surgeons preferred no epidural analgesia (82% vs. 50%, $p<10^{-3}$) and less opioid consumption (72% vs. 35.71%, $p<10^{-3}$) compared to anesthetists. Adherence rate was low according to both groups (46% of surgeons along with 42.9% of anesthetists) despite convenient theoretical knowledge. Only 4.8% of anesthetists and 13% of surgeons were willing to give it a full shot. To prepare patients for surgery, 43% of surgeons required two to three days of hospital care. However, patients were hospitalized for at least one week before surgery in the opinion of half of anesthetists. Patients were usually discharged two to three days after surgery by 54% of surgeons. As for anesthetists, 61.9% think that patients were hospitalized at least three days after surgery. Senior anesthetists were more eager to discharge patients one day after surgery than young anesthetists (16.6% vs. 2.7%) with a significant $p<10^{-3}$.

Discussion

The protocols of ERAS were founded based on studies that revisited the efficiency of traditional care. This approach suggests

that several elements in conventional care need to be changed or abandoned to accelerate post-operative recovery. This is the first Tunisian survey that investigated the status of perioperative care to foresee a successful implementation of ERAS protocols in Tunisia. We conducted this survey to collect baseline data that would serve as a solid ground to widely establish ERAS program in clinical practice. A remotely close study was conducted in Korea in 2019 about enhanced recovery after gastric cancer surgery [8]. This survey was intended for gastric surgeons who specialize in gastric cancer surgery and are currently working at referral hospitals. It included 89 gastric surgeons. No anesthetist was involved in this study.

It showed that among the ERAS protocols, preoperative education, avoidance of preoperative fasting, maintenance of intraoperative normothermia, thromboprophylaxis, early active ambulation, and early removal of urinary catheter were relatively well adopted in perioperative care. However, other practices, such as avoidance of preoperative bowel preparation, provision of preoperative carbohydrate-rich drink, avoidance of routine abdominal drainage, prophylactic antibiotics, early

postoperative diet, restricted intravenous fluid administration, and application of discharge criteria were less well adopted. In terms of our study, we found out that practitioners applied ERAS guidelines that were already established in our daily practice long ago, such as preanesthetic assessment, fasting rules, anemia management during preoperative care, minimal incisions, antibioprophyllaxis, normothermia, preventing nausea and vomiting and multimodal analgesia during perioperative care, selective gastric decompression, early removing bladder catheter, thrombophyllaxis, early first ambulation during post-operative care.

However, new evidence-based guidelines were not applied such as no premedication, no bowel preparation, smoking and alcohol quitting, carbohydrate infusion and immunonutrition during preoperative phase, no drain surgery, goal directed fluid therapy, steroids, less opioids during peroperative phase, Lidocaine infusions, intravenous fluid infusion removal in less than 24 hours and glycemic control during postoperative phase. Small differences were noted between surgeons and anesthesiologists such as immunonutrition and fasting rules for anesthesiologists, anemia management for surgeons during preoperative care, multimodal analgesia, non-steroidal-anti-inflammatory drugs, intravenous Lidocaine, ileus preventing and glycemic control for anesthesiologists, no epidural analgesia and less opioid consumption for surgeons during post-operative care. Among all groups, adherence to all elements of ERAS protocols was low and it explains to some extent prolonged hospital stay before and after surgery.

We also noticed small differences among surgical specialties for example early removal of urinary catheter outside justifiable surgical indications was less recommended by urologists and ileus prevention was not practiced by gynecologists. Differences between practices among junior and senior physicians are also mentioned: preanesthetic assessment was more recommended by junior surgeons, preanesthetic assessment, patient information and solid food fasting rules were more practiced by junior anesthesiologists, goal directed fluid management, and early removing of bladder catheter and intravenous catheter were more practiced by senior anesthesiologists.

Before Surgery

As for ERAS bundles, first, preadmission counseling and preanesthetic examination are the first steps to properly conduct an ERAS protocol to select patients and check for health problems. In fact, proper information can reduce anxiety and subsequent pain [9]. That's why patients should be informed of the benefits and disadvantages of enhanced recovery after surgery protocols and be motivated to facilitate their own recovery. In ERAS protocols, smoking should cease 4 to 8 weeks before surgery. In fact, post-operative complications have been known to increase among smokers. Smoking may hinder respiratory function and alter wound healing process [10]. On the other hand, alcohol

abuse has been reported to increase post-operative morbidity. Reducing alcohol intake has been reported to reduce postoperative infections. That's why alcohol abstinence of 4 weeks is encouraged [11]. Premedication through benzodiazepines was prescribed usually before surgery. Yet, this medication has shown sedative properties as well as adverse side effects such as psychomotor and cognitive impairment [12].

ERAS protocols strongly urge physicians to avoid routine sedative medication [13]. In fact, efficient counseling can modify the patient's response to the operative experience [14]. Overnight preoperative fasting has been a routine practice to avoid pulmonary aspirations during surgery. Yet, this practice not only isn't based on scientific evidence [15], but also exposes patients to dehydration, hypoglycemia and increases insulin resistance [16]. That's why actual guidelines allow clear fluid intake up to 2 hours and solid food up to 6 hours prior to surgery [17]. ERAS protocols urge physicians to screen and eventually treat anemia before surgery. Hemoglobin concentration of 6 g/dl should be maintained through the perioperative period, and a target above 8g/dl for patients with heavy medical history or undergoing high risk surgery [18]. Mechanical bowel preparation can cause patient discomfort along with preoperative dehydration and electrolyte disturbance. Besides, it showed no clinical advantage.

It reduced neither surgical site infections, nor anastomotic leak rate [19]. Avoiding routine mechanical bowel preparation helps reduce preoperative fluid deficit and subsequently intraoperative fluid requirement. That's why ERAS pathways call for the omission of routine bowel preparation especially in colonic surgery. Patients should reach the operating room in as close a state to euvolemia as possible. Particularly carbohydrate rich solutions before surgery can significantly reduce dehydration along with postoperative insulin resistance [20]. It also has been shown to attenuate catabolic response due to overnight fasting and surgery [21]. Preoperative malnutrition has been associated with increased post-operative morbidity and mortality as well as poor surgical outcome [22]. Immunonutrition has gained huge attention in ERAS pathways. In fact, Immune-modulating substrates, such as arginine, glutamine, and omega-3 fatty acids, have been linked in early studies to decreasing infectious complications, and preserving small bowel function [23].

It has shown to significantly reduce the length of stay [24]. Our study highlights the elements of ERAS protocols that need to be tackled. We urge physicians to work on guidelines that were poorly followed in the preoperative care such as no bowel preparation, no premedication, quitting smoking and alcohol at least a month, carbohydrate infusion and immunonutrition. We should insist on anemia screening for anesthesiologists and clear liquid fasting rules for surgeons, preanesthetic assessment, patient information, solid food fasting rules among senior anesthesiologists, and preanesthetic assessment among senior surgeons.

During Surgery

Excessive saline infusions can be associated with acidosis, renal dysfunction due to high chloride intake as well as fluid retention caused by sodium overload [25]. Experts recommend the use of balanced crystalloids over saline. Over hydration may have deleterious effects on pulmonary, cardiac function, wound healing, coagulation, and tissue oxygenation [26]. In addition, the impact of changes in intraoperative volume status on gastrointestinal mucosa has been suggested as a cause of delayed return of bowel function postoperatively [27]. Goal directed fluid therapy allows more accurate, patient specific fluid resuscitation. In fact, goal directed fluid therapy was associated with a significant reduction in morbidity, intensive care length of stay and time to first bowel movement [28]. To avoid fluid overloading, ERAS protocols recommend the use of advanced hemodynamic monitoring.

Regarding perioperative body temperature, both neuroaxial and general anesthesia can alter the body's proper response to hypothermia, even mild inadvertent perioperative hypothermia can be associated with increased bleeding and prolonged postoperative stay [29]. That's why an accurate measurement of body temperature is fundamental. ERAS pathways recommend reliable temperature monitoring. Active ways to warm patients should be undertaken. ERAS pathways recommend proper prophylactic antibiotics before surgery. Intravenous antibiotic prophylaxis reduces surgical site infections. It should be given at least 30 minutes before surgical incision [30]. Post-operative nausea and vomiting can cause patient discomfort, dehydration, delay of first oral intake and extend bed rest. Insufficient analgesia as well as liberal use of opioids may increase the risk of developing post-operative nausea and vomiting (PONV) [31]. Prophylactic anti-emetics can reduce PONV by 40% [32].

Besides, perioperative intravenous dexamethasone has shown remarkable results in preventing nausea and vomiting after surgery [33]. Prophylactic multimodal administration of antiemetic drugs as well as adopting an opioid free strategy is recommended by ERAS protocols. In comparison with standard anesthetic protocol, opioid sparing protocols allow rapid awakening with less side effects. It minimizes post-operative nausea and vomiting and shortens bed rest [34]. Pain management is usually started during the perioperative phase and followed right after surgery. Recent research has found that each patient may have a different response to the same analgesic drug due to genetic diversity [35]. Subsequently, multimodal analgesia resulted in having a larger panel of efficacy with less toxicity and fewer side effects. One of alternative means of pain management is continuous intravenous administration of Lidocaine during and after surgery. In fact, it has been proven that Lidocaine infusions improve patient rehabilitation and shorten hospital stay [36]. On the other hand, the administration of glucocorticoids not only decreases pain through attenuating the postsurgical inflammatory response, but also decreases length of hospital stay after major surgery with no

evidence of increasing complications [37].

In terms of all these means of pain control, ERAS protocols recommend multimodal analgesia, while discouraging opioid consumption. Minimally invasive surgical access reduced post-operative pain, wound related complications and inflammatory response to surgical stress. Laparoscopy enabled the successful administration of many of the major bundles of ERAS protocols such as optimized fluid therapy and opioid free anesthesia. Moreover, the use of endoscopic procedures has revolutionized several aspects of surgical care [38]. On the other hand, drains didn't show any effect of decreasing anastomotic leakage or wound infections [39], and thus should be avoided. Also, omission of drains allowed better ambulation. In our study, surgeons should promote no drain surgery, while anesthetists should work more on goal directed fluid therapy, steroids, and less opioid consumption. We should insist more on goal directed fluid monitoring among young anesthetists.

After Surgery

Nasogastric decompression has been correlated to slower return of bowel function as well as increased pulmonary infections [40]. That's why ERAS protocols encouraged avoiding nasogastric tube during post-operative care. Similarly, prolonged urinary drainage increases the risk of urinary tract infection and may limit post-operative mobilization. Urinary catheter should be removed from day zero after surgery, without increasing recatheterization rate [41]. In our study, urinary catheter removal was promoted outside justifiable surgical indications. Traditional postoperative care includes prolonged bed rest. In fact, it can lead to skeletal muscle loss and weakness, atelectasis, pulmonary infections, insulin resistance and thromboembolism [42]. Early active mobilization is recommended from day zero after surgery. All ERAS pathways initiate the patient for early first ambulation and eventually hospital discharge. Surgical injury changes the coagulatory and fibrinolytic balance in favor of coagulation. Hence, it increases the risk of deep venous embolism and pulmonary thromboembolism [43].

Mechanical thrombophylaxis should be practiced until discharge while pharmacological thrombophylaxis should be prolonged at least 28 days after surgery [44]. As for post-operative analgesia, along with intravenous Paracetamol, the early use of non-steroidal anti-inflammatory drugs (NSAI) reduced opioid requirement after surgery as well as post-operative nausea and vomiting [45]. Over the years, many specialists promoted epidural analgesia as an efficient tool for postoperative care. However, recent research found that patients having epidural analgesia presented with higher risk of arterial hypotension as well as urinary retention and pruritus. It was particularly inconvenient for patients who underwent laparoscopic surgery [46]. Also, motor blockage has been reported, requiring additional postoperative care [47]. As a result, it has been reported to delay

hospital discharge [48]. Abdominal wall blocks avoid the risks and adverse effects of central neuraxial blockade, decrease the consumption of opioids and provide a relatively safe alternative to thoracic epidural analgesia [49]. Post-operative oral nutrition is an important component to accelerate recovery. In fact, early enteral feeding can reduce the risk of infections and reduce the length of stay, without increasing the risk of anastomotic leak [50].

Early oral diet has been shown to be safe four hours after surgery even in abdominal surgery. When oral fluid intake is tolerated, intravenous fluid therapy should cease as soon as possible. Fluid intake shouldn't exceed 30 ml/kg/day and preferably be discontinued by postoperative day zero [51]. Also, fluid balance needs to be kept near zero. Surgical stress on the body can induce insulin resistance. This phenomenon can persist for several weeks after surgery [52]. Intensive insulin therapy is recommended to keep strict glycemic control [53]. Delaying the return of bowel movement can increase patient discomfort. ERAS protocols recommend a multimodal approach to deal with post-operative ileus. To boost gastrointestinal motility and to fasten the first flatus, some steps should be taken.

First, early oral intake should be encouraged. Opioid administration should be limited. Also, patients should be pain free. Eliminating routine nasogastric tube and maintaining fluid balance can also improve bowel function and reduce post-operative ileus. Prokinetics can also be useful. As for postoperative care according to our study, elements that deserve more attention by all physicians asked are Lidocaine infusions, intravenous fluid infusion removal in less than 24 hours and glycemic control, prescribing NSAID and multimodal analgesia for surgeons, early oral intake in less than 24 hours, no epidural analgesia, less opioids for anesthetists. We should also insist more on early removal of bladder catheter early first ambulation and Lidocaine infusions among young anesthetists, urinary catheter early removal outside surgical indications among urology surgeons, and ileus prevention among gynecologists.

Logistics and Adherence to the ERAS Protocols

According to ERAS protocols, patients are expected to follow up recommendations and treatment set during counseling before hospitalization. That's how they should be safely admitted the night before surgery [54]. Two to four days is the mean length of stay after the operation reported by ERAS protocols. However, in our survey, the time to surgery after hospital admission is usually in two to three days according to surgeons, while anesthetists reported that patients were admitted at least a week before surgery. This is mostly due to a lack of preparation before hospital admission. It has been established that the greater the adherence to all elements of the ERAS protocols, the better the outcome. In fact, when every step of the protocol is applied, postoperative recovery is improved, complications rate is lower, and discharge

is faster [55]. According to our study, despite the knowledge about the bundles of ERAS, only 4.8% of anesthetists and 13% of surgeons were ready to adhere to all elements of the program. Prolonged hospital stay can be explained to some extent by the low adherence to the ERAS bundles.

Strategy of Implementation

Implementing guidelines into clinical practice can be challenging. As for our second endpoint, to successfully implement ERAS protocol, three major effectors shall be taken into consideration: the patient, health care professionals and administration. Instead of being a passive receiver of health care, ERAS protocols consider the patient as an active actor of the healing process. The compliance of the patient is a major element of the success of the ERAS protocol. We urge physicians to give patients information required about ERAS protocols and advice that helps them cope with the program. To ease patients into the idea of ERAS, in addition to verbal information, we might use written and multimedia information such as brochures and videos. Another innovative idea is to provide patients with a personal notebook that explains the program step by step in an understandable way. Health care providers also need to keep track of their patients after early discharge.

As for health care professionals, our study highlights the elements of ERAS protocols that need to be tackled. Active efforts are required to provide information and education about ERAS protocols among physicians. We urge physicians to work on guidelines that were poorly followed in the preoperative care such as no bowel preparation, no premedication, quitting smoking and alcohol at least a month, carbohydrate infusion, immunonutrition for all physicians, anemia screening for anesthetists and clear liquid fasting rules for surgeons. We should insist more on preanesthetic assessment, patient information, solid food fasting rules among senior anesthetists, and preanesthetic assessment among senior surgeons. As for peroperative care, surgeons should promote no drain surgery, while anesthetists should work more on goal directed fluid therapy, steroids, and less opioids. We should insist on goal directed fluid monitoring among young anesthetists.

As for postoperative care, Elements that deserve more attention by all physicians asked are Lidocaine infusions, intravenous fluid infusion removal in less than 24 hours and glycemic control, prescribing NSAID and multimodal analgesia for surgeons, early oral intake in less than 24 hours, no epidural analgesia, less opioids for anesthetists. We should also insist more on early removal of bladder catheter outside surgical indications, early first ambulation and Lidocaine infusions among young anesthetists, urinary catheter early removal among urology surgeons and ileus prevention among gynecologists. Yet, a protocol alone isn't enough to achieve good outcomes. While the effectiveness of ERAS protocols is based on solid scientific

bases, successful implementation of the program requires other skills such as leadership and teamwork. Our survey focuses on surgeons and anesthesiologists. However, it takes the entire medical and paramedical team to successfully implement ERAS pathways.

Other health professionals such as nurses, nutritionists and physiotherapists are also involved in the process. As a matter of fact, imbedding ERAS program can face some barriers such as resistance to change, the fast turnover of the medical and paramedical team, poor team coordination and lack of motivation. A team leader dedicated to the ERAS program should be assigned. This leader will oversee coordinating team efforts, providing guidance, implement regulations and solve problems and promote adherence to every step of the protocol. An administrative role is crucial to a successful ERAS implementation. Statistical analyses of results and feedback are fundamental to encourage the team and to remind each member of the importance of his individual role in the healing process. Outcomes should be audited and reported to all healthcare providers on a regular basis to assess protocol compliance. Administration should also organize regular meetings for the team to identify local barriers to the implementation, detect eventual reluctances to apply protocols, find solutions and boost team spirit around the program. Another important step is to provide a proper platform for work such as supplying proper equipment and reorganizing the surgical ward into a rehabilitation ward where early mobilization of patients can be allowed.

Strength and Limitations

This is the first Tunisian survey that investigated the status of perioperative care to foresee a successful implementation of ERAS protocols in Tunisia. It involves anesthesiologists and surgeons as well. Our report points out the deficiencies regarding the knowledge of ERAS protocols among physicians. It showed that there is more room for improvement of perioperative care to facilitate the implementation of ERAS protocols in Tunisian hospitals. However, our study has some limitation: The response rate was relatively low. The junior respondent group was by far larger than the senior respondents. Also, our survey focuses more on theoretical knowledge about ERAS protocols. Further studies with larger respondent groups would be interesting in the future.

Conclusion

Our study highlights evidence-based guidelines of enhanced recovery after surgery protocols that are already followed by physicians and focuses on weak practices that need to change among anesthesiologists and surgeons as well. We conducted this survey to collect baseline data that would serve as a solid ground to widely establish ERAS program in clinical practice. It's a collaborative approach to bring the department of surgery and anesthesiology to revolutionize perioperative care. In terms of

our study, we conclude that despite the basic knowledge of ERAS protocols among physicians, clinical practice is far from applying bundles. In fact, practitioners applied ERAS guidelines that were already established in our daily practice long ago. However, new evidence-based guidelines were not applied and subsequently deserve more attention in the future.

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