



REVIEW

# Differences Between the 2016 and 2022 Editions of the Enhanced Recovery After Bariatric Surgery (ERABS) Guidelines: Call to Action of FAIR Data and the Creation of a Global Consortium of Bariatric Care and Research

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## Abstract

In 2016, the Enhanced Recovery After Bariatric Surgery guidelines (G16) was published, and in 2022, an update to it was released (G22). Grading of recommendations, assessment, development, and evaluations (GRADE), emphasizing the level of evidence (LoE) of both the guidelines, was performed. An overview of methodology was also performed, considering the following questions: how can research be improved, what can be done in the future using data, and how to collaborate more? Both guidelines did not explain how the LoE conclusions were derived regarding the risk of bias. There is also potential for forming a global consortium that deals with bariatric research, which can serve as a repository for all relevant data. Ensuring that this data is FAIR (findability, accessibility, interoperability, reusability) compliant and using this data to formulate future guidelines will benefit clinicians and patients alike.

**Keywords** ERAS · ERABS · FAIR · Bariatric surgery

## Key Points

1. Both G16 and G22 thoroughly reviewed the literature and used the exact keywords and medical subheading (MESH) terms.
2. Among the recommendations in G16, ten were weak, and 26 were strong, and in G22, there were eight weak and 32 strong recommendations.
3. When comparing the level of evidence (LoE) concerning the recommendations themselves, strong recommendations based on a low LoE were observed nine times in G16 and 14 times in G22. Strong recommendations with a moderate LoE were noted 13 times in G16 and 14 times in G22. Finally, strong recommendations with a high LoE were noted 11 times in G16 and six in G22.
4. Change in LoE over time: Low levels of evidence in G16 remained low in G22 concerning 13 items. Moderate levels of evidence in G16 headed toward low levels of evidence in G22 concerning five items and did not head toward higher levels of evidence in G22.

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## Introduction

The Enhanced Recovery After Surgery (ERAS) is a model of care introduced in 1997 by a group of general surgeons from Northern Europe led by Henrik Kehlet [1–3]. The core tenet of this approach was to improve patient outcomes following surgery, especially in terms of hospital stay, complications rate, early recovery, and reduction of economic burdens.

Since bariatric surgery can be very protocolized, it was necessary to create one to enhance recovery after bariatric surgery. Therefore, in 2016, the first such protocol was introduced by Thorell et al. [4], the so-called Enhanced Recovery After Bariatric Surgery (ERABS). It focused on all the aspects around the procedure itself and patients with obesity in terms of safety and outcome. In 2022, Stenberg et al. [5] introduced a 2021 update version of this same protocol. Both protocols used extensive literature sourced from all known databases PubMed, EMBASE, and Cochrane databases [6] and ClinicalTrials.gov and the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) system [7–9]. GRADE is the gold standard for evaluating the quality of research.

Grading is classified from high, wherein the actual effect lies close to the estimate of the impact, to very low, wherein

the real impact is likely to be substantially different from the assessment of the effect. Both protocols describe all the grading well, but they do not mention what criteria were used to arrive at the grading score and how further research has changed or altered specific aspects of care over 6 years.

This review describes all the observations between 2016 and 2022 on how the score changed, the risk of bias assessment findings, and how guided, collaborative research can be beneficial to the next update.

## Method

This review checked two guidelines regarding perioperative care in bariatric surgery and described the changes over time in both guidelines (ERABS): from the ERABS guideline in 2016 (G16) (first edition) [4] and the ERABS guideline in 2022 (G22) (a 2021 update, second edition) [5].

Depending on the results, a recommendation is given for the future, based on the latest methodology, research, and statistics insights.

Two reviewers (Torensma and Hisham) independently screened all elements, basis of recommendations, and level of evidence (LoE) (as per GRADE) in this review. Disagreements were solved via discussion or by consulting a third independent reviewer (Hany). G16 involved a review of the literature published between January 1966 and January 2015. G22 included literature published till 2020.

The scoring of each element was investigated, on how it was assigned an LoE and how it impacted recommendations, and then results were compared. This gave three possible results when comparing G16 and G22 results: “same,” “increased,” or “decreased.” All the elements that contained sub-elements were scored separately. The results of this review include both the primary and sub-elements together.

A methodology overview was also performed on how research can be improved, facilitating GRADE concerning results for each element. The questions of what can be done in the future regarding guideline formulation using FAIR data and how research can be more collaborative at a global level were also analyzed and discussed under the purview of this review.

## Results

### Search Strategy

Both G16 and G22 did a comprehensive search and used appropriate keywords and medical subheading (MESH) terms. The databases surveyed and the terms used include:

### G16

PubMed, EMBASE, and Cochrane databases and Clinical-Trials.gov through December 2015.

Keywords included “obesity,” “morbid obesity,” “bariatric surgery,” “metabolic surgery,” “gastric bypass,” “sleeve gastrectomy,” one anastomosis gastric bypass,” “mini-gastric bypass,” “gastric banding,” “fast track,” and “enhanced recovery.”

### G22

PubMed, EMBASE, and Cochrane databases and Clinical-Trials.gov through December 2020.

Keywords included “obesity,” “morbid obesity,” “bariatric surgery,” “metabolic surgery,” “gastric bypass,” “sleeve gastrectomy,” one anastomosis gastric bypass,” “mini-gastric bypass,” “gastric banding,” “fast track,” and “enhanced recovery.”

### Study Selection

Both G16 and G22 performed a title and abstract screening with individual authors blinded to each other. A third author resolved any disagreement.

### Quality Assessment and Data Analysis

The quality assessment was done appropriately and according to the scientific community’s methodology and advice. Cochrane checklist [6] and GRADE [7–9] were used to guide the process.

All authors determined the strength of each recommendation, and if there was disagreement regarding the power, the Delphi method was used to reach a consensus between all the authors.

The criteria for rating the strength of recommendations were as follows: “Strong recommendation”: There was confidence that the desirable effects of adherence to the recommendation outweigh the undesirable effects. “Weak recommendation”: the desirable results of commitment to the recommendation probably outweigh the unwanted effects, but the panel is less confident.

### Differences Between G16 and G22 Over Time (Table 1)

Among the recommendations in G16, ten of them were classified as weak and 26 of them as strong. In G22, there were eight weak recommendations and 32 strong recommendations.

**Table 1** ERABS comparisons between the guidelines from 2016 and 2022

ERABS chapters			2016	2022	6 years time	2016	2022	6 years time
Elements	Recommendation summary		Level of evidence	Level of evidence	Delta LoE	Recommendation grade	Recommendation grade	Delta RG
	2016	2022						
Preoperative information, education and counselling	Patients should receive preoperative counselling	Preoperative information and education, adapted to the individual requirements, should be given to all patients	Moderate	Low	Decreased	Strong	Strong	same
Prehabilitation and exercise	Although prehabilitation may improve functional recovery, there are insufficient data in the literature to recommend prehabilitation before bariatric surgery for the reduction of complications or length of stay	Although prehabilitation may improve general fitness and respiratory capacity, there is insufficient data to recommend prehabilitation before bariatric surgery	Low	Low	same	Weak	Weak	same
Indications and contraindications for surgery	-	Indications for bariatric surgery should follow updated global and national guidelines	-	Moderate	-	-	Strong	-
Smoking and alcohol cessation	Tobacco smoking should be stopped at least 4 weeks before surgery. For patients with a history of alcohol abuse, abstinence should be strictly adhered to for at least 2 years. Moreover, the risk of relapse (or new onset in patients without earlier abuse) after gastric bypass should be acknowledged	All patients should be screened for alcohol and tobacco use. Tobacco smoking should be stopped at least 4 weeks before surgery. For patients with alcohol abuse, abstinence should be strictly adhered to for 1–2 years. Moreover, the risk for relapse after bariatric surgery should be acknowledged	Smoking: High Alcohol: Low (only one high-quality RCT)	Smoking: Moderate Alcohol: Low	Smoking decreased Alcohol same	Strong	Strong	same
Preoperative weightloss	Preoperative weight loss should be recommended prior to bariatric surgery. Patients on glucose-lowering drugs should be aware of the risk of hypoglycaemia.	Preoperative weight loss using very low or low-calorie diet prior to bariatric surgery should be recommended. While feasible, patients with diabetes and treatment with glucose lowering drugs should closely monitor treatment effects, and be aware of the risk for hypoglycaemia. Very low calorie diet improves insulin sensitivity in patients with diabetes	Postoperative complications: High Postoperative weight loss: Low (inconsistency, low quality)	Postoperative complications: Moderate Postoperative weight loss: Low. Diabetes: Low	Post operative complication: decreased. Post operative weight loss same. Diabetes new 2022	Strong	Strong	same
2016 Glucocorticoids 2022 Supportive pharmacological intervention	Eight mg dexamethasone should be administered i.v., preferably 90 min prior to induction of anaesthesia for reduction of PONV as well as inflammatory response	8 mg intravenous dexamethasone should be administered preferably 90 min prior to induction of anaesthesia for reduction of PONV as well as inflammatory response & There is insufficient evidence to support perioperative statins for statin-naive patients in bariatric surgery. Patients on statins can safely continue the treatment during the perioperative phase & Beta-adrenergic blockade does not influence the risk for adverse outcomes in bariatric surgery, but can be safely continued during the perioperative phase for patients at high risk of cardiovascular events	Low (no RCTs in bariatric surgery)	Glucocorticoids: Low	same	Strong	Weak	Decreased

Table 1 (continued)

Preoperative fasting	Obese patients may have clear fluids up to 2 h and solids up to 6 h prior to induction of anaesthesia. Further data are necessary in diabetic patients with autonomic neuropathy due to potential risk of aspiration.	<b>A:</b> Solids until 6 h before induction and clear liquids until 2 h before induction for elective bariatric surgery assuming no contraindications (e.g., gastroparesis, bowel obstruction) <b>AND</b> <b>B:</b> Patients with diabetes should follow these recommendations, but further studies are needed for patients with additional risk factors such as gastroparesis	Non-diabetic obese patients: <b>High</b> Diabetic patients without Autonomic neuropathy: <b>Moderate</b> Diabetic patients with autonomic neuropathy: <b>Low</b>	<b>A:</b> <b>Low</b> <b>B:</b> <b>Low</b>	Decreased Decreased same	Non-diabetic obese patients: <b>Strong</b> Diabetic patients without Autonomic neuropathy: <b>weak</b> Diabetic patients with autonomic neuropathy: <b>weak</b>	<b>A:</b> <b>Strong</b> <b>B:</b> <b>Strong</b>	partly decreased
Carbohydrate loading	While preoperative oral carbohydrate conditioning in patients undergoing major abdominal elective surgery has been associated with metabolic and clinical benefits, further data are required for patients with morbid obesity. Similarly, further data are needed on preoperative carbohydrate conditioning in patients with gastroesophageal reflux who may be at increased risk of aspiration during anaesthetic induction.	There is insufficient evidence to make a recommendation about preoperative carbohydrate loading in bariatric surgery	Shortened preoperative fasting (Non-diabetic obese patients): <b>Low</b> Diabetic patients without autonomic neuropathy: <b>Moderate</b> . Diabetic patients with autonomic neuropathy: <b>Low</b> . Preoperative carbohydrate loading in obese patients: <b>Low</b>	<b>Low</b>	same and 1x decreased	<b>Strong</b>	<b>Weak</b>	Decreased
Perioperative fluid management	Excessive intraoperative fluids are not needed to prevent rhabdomyolysis and maintain urine output. Functional parameters, such as stroke volume variation facilitate goal-directed fluid therapy and avoid intraoperative hypotension and excessive fluid administration. Postoperative fluid infusions should be discontinued as soon as practicable with preference given to use of the enteral route	<b>A:</b> The goal of perioperative fluid management is to maintain normovolemia and optimize tissue perfusion and oxygenation. Individual goal-directed fluid therapy is the most effective strategy, avoiding both restrictive or liberal strategies <b>B:</b> Colloid fluids do not improve intra- and postoperative tissue oxygen tension compared with crystalloid fluids and do not reduce postoperative complications	Maintenance as opposed to liberal fluid regimens: <b>Moderate</b> Reduce stress response: <b>Moderate</b> Open surgery: <b>High</b>  Laparoscopic surgery: <b>Moderate</b>	<b>A:</b> <b>Moderate</b> <b>B:</b> <b>Low</b>	same	Maintenance fluid regimens: <b>Strong</b>	<b>A:</b> <b>Strong</b> <b>B:</b> <b>Weak</b>	Same
PONV	A multimodal approach to PONV prophylaxis should be adopted in all patients		<b>Low</b>	<b>High</b>	Improved	<b>Strong</b>	<b>Strong</b>	same
Standardised anaesthetic protocol	The current evidence does not allow recommendation of specific anaesthetic agents or techniques.		<b>Low</b>	<b>Low</b>	same	<b>Weak</b>	<b>Weak</b>	same
Airway management	<b>A:</b> Anaesthetists should be aware of the specific difficulties in managing bariatric airway <b>B:</b> Tracheal intubation remains the reference for airway management	<b>A:</b> Anaesthetists should recognize and be prepared to handle the specific challenges in airways in patients with obesity <b>B:</b> Endotracheal intubation remains the main technique for intraoperative airway management	<b>A:</b> <b>Moderate</b> <b>B:</b> <b>Moderate</b>	<b>A:</b> <b>Moderate</b> <b>B:</b> <b>Moderate</b>	same	<b>A:</b> <b>Strong</b> <b>B:</b> <b>Strong</b>	<b>A:</b> <b>Strong</b> <b>B:</b> <b>Strong</b>	same
Ventilation strategies	<b>A:</b> Lung protective ventilation should be adopted for elective bariatric surgery <b>B:</b> Patient positioning in an anti-Trendelenburg, flexed hip, anti- or beach chair positioning, particularly in the absence of pneumoperitoneum improves pulmonary mechanics and gas exchange	<b>A:</b> Lung protective ventilation should be adopted for all patients undergoing elective bariatric surgery with avoidance of high PEEP values <b>B:</b> Increases in driving pressure resulting from adjustments in PEEP should ideally be avoided <b>C:</b> PCV or VCV can be used for patients with obesity with inverse	<b>A:</b> <b>Moderate</b> <b>B:</b> <b>Low</b>	<b>A:</b> <b>Moderate</b> <b>B:</b> <b>Low</b> <b>C:</b> <b>Low</b> <b>D:</b> <b>Low</b>	same	<b>A:</b> <b>Strong</b> <b>B:</b> <b>Weak</b>	<b>A:</b> <b>Strong</b> <b>B:</b> <b>Strong</b> <b>C:</b> <b>Strong</b> <b>D:</b> <b>Weak</b>	improved

**Table 1** (continued)

		respiratory ratio (1.5:1) D: Positioning in a reverse Trendelenburg, flexed hips, reverse- or beach chair positioning, particularly in the presence of pneumoperitoneum, improves pulmonary mechanics and gas exchange						
Neuromuscular block	A: Deep neuromuscular block improves surgical performance B: Ensuring full reversal of neuromuscular blockade improves patient recovery C: Objective qualitative monitoring of neuromuscular blockade improves patient recovery		A: Low B: Moderate C: Moderate	A: Low B: Moderate C: Moderate	same	A: Weak B: Strong C: Strong	A: Strong B: Strong C: Strong	increased and same
Monitoring of anaesthetic depth	BIS monitoring of anaesthetic depth should be considered where ETAG monitoring is not employed		High	Low	decreased	Strong	Strong	same
2016: Laparoscopy 2022: Surgical technique, volume and training	Laparoscopic surgery for bariatric surgery is recommended whenever expertise is available	A: Laparoscopic approach whenever possible B: During the learning curve phase, all operations should be supervised by a senior surgeon with significant experience in bariatric surgery C: There is a strong association between hospital volume and surgical outcomes at least up to a threshold value	High	A: High B: Low C: Low	same and new	Strong	A: Strong B: Strong C: Strong	same
Abdominal drainage and nasogastric decompression	A: Routine use of nasogastric tube is not recommended postoperatively B: There is insufficient evidence to recommend routine use of abdominal drainage	Nasogastric tubes and abdominal drains should not be used routinely in bariatric surgery	A: Low B: Low	Weak	sort of same	A: Strong B: Weak	Strong	same
Postoperative analgesia	Multimodal systemic medication and local anaesthetic infiltration techniques should be combined. Thoracic epidural analgesia should be considered in laparotomy	A: Opioid-sparing anaesthesia using a multimodal approach, including local anaesthetics, should be used in order to improve postoperative recovery B: Whenever possible, regional anaesthetic techniques should be performed to reduce opioid requirements. Thoracic epidural analgesia should be considered in laparotomy	A: Multimodal intravenous medication, local anaesthetic infiltration High B: Epidural analgesia: Very low	A: High B: Low	same	A: Strong B: Weak	A: Strong B: Weak	same
Thromboprophylaxis	Thromboprophylaxis should involve mechanical and pharmacological measures with LMWH. Dosage and duration of treatment should be individualized	Thromboprophylaxis should involve mechanical and pharmacological measures. Doses and duration of treatment should be individualized	A: Mechanical measures in combination with LMWH: High B: Dosage of LMWH: Low	High	increased	A: Strong B: Weak	Strong	same and increased
Early postoperative nutrition	A: Protein intake should be monitored. Iron, vitamin B12 and calcium supplementation is mandatory B: Postoperative glycaemic and lipid control has to be strict in patients with diabetes	A: A clear liquid meal regimen can usually be initiated several hours after surgery B: All patients should have access to a comprehensive nutrition and dietetic assessment with counselling on the macronutrient and micronutrient content of the diet based on the surgical procedure and the patient's nutritional status C: Patients and healthcare professionals should be aware of the risks of thiamine deficiency, especially in the early postoperative periods	A: Nutritional supplementation: Moderate B: Glycaemic control: High	A: Moderate B: Moderate C: Low	same	A: Strong B: Strong	A: Strong B: Strong C: Strong	same

**Table 1** (continued)

Postoperative oxygenation	<p><b>A:</b> Obese patients without OSA, should be supplemented with oxygen prophylactically in head-elevated or semi-sitting position in the immediate postoperative period  <b>B:</b> Uncomplicated patients with OSA should receive oxygen supplementation in a semi-sitting position  <b>C:</b> Monitoring for possible increasing frequency of apnoeic episodes should be diligent. A low threshold for initiation of positive pressure support must be maintained in the presence of signs of respiratory distress</p>	<p>Patients without OSA or with uncomplicated OSA should be supplemented with oxygen prophylactically in a head-elevated or semi-sitting position. Both groups can be safely monitored in a surgical ward after the initial PACU stay. A low threshold for non-invasive positive pressure ventilation should be maintained in the presence of signs of respiratory distress</p>	<p><b>A:</b> Prophylactic oxygen supplementation: <b>Low</b> (only retrospective data)  <b>B:</b> Positioning in the postoperative period: <b>High</b>  <b>C:</b> <b>High</b> (14 RCTs and 1 meta-analysis)</p>	<p>Oxygen supplementation: <b>Low</b>                  Position in the postoperative period: <b>High</b></p>	<p>same and new criteria</p>	<p><b>A:</b> <b>Strong</b>  <b>B:</b> <b>Strong</b>  <b>C:</b> <b>Strong</b></p>	<p><b>Strong</b></p>	<p>same</p>
Non-invasive positive pressure ventilation	<p><b>A:</b> Prophylactic routine postoperative CPAP is not recommended in obese patients without diagnosed OSA  <b>B:</b> CPAP therapy should be considered in patients with BMI [50 kg/m<sup>2</sup>, severe OSA or oxygen saturation B90 % on oxygen supplementation  <b>C:</b> Obese patients with OSA on home CPAP therapy should use their equipment in the immediate postoperative period  <b>D:</b> Patients with Obesity Hypoventilation Syndrome (OHS) should receive postoperative BiPAP/NIV prophylactically along with intensive care level monitoring</p>	<p><b>A:</b> Patients with OSA on home CPAP therapy should use their equipment in the immediate postoperative period  <b>B:</b> Patients with obesity hypoventilation syndrome (OHS) are at higher risk of respiratory adverse events. Postoperative BiPAP/NIV should be considered liberally during the immediate postoperative period, in particular in the presence of hypoxemia</p>	<p><b>A:</b> <b>Moderate</b> (only retrospective data)  <b>B:</b> <b>Low</b>  <b>C:</b> <b>Moderate</b> (Only retrospective data)  <b>D:</b> <b>Low</b> (Only retrospective data)</p>	<p><b>A:</b> <b>Moderate</b>  <b>B:</b> <b>Low</b></p>	<p>same</p>	<p><b>A:</b> Avoiding routine use of CPAP: <b>Weak</b>  <b>B:</b> <b>Strong</b>  <b>C:</b> <b>Strong</b>  <b>D:</b> <b>Strong</b></p>	<p><b>A:</b> <b>Strong</b>  <b>B:</b> <b>Strong</b></p>	<p>same</p>
Supplementation of vitamins and minerals	-	<p>A regimen of life-long vitamin and mineral supplementation and nutritional biochemical monitoring is necessary</p>	-	<p><b>High</b></p>	-	-	<p><b>Strong</b></p>	-
PPI prophylaxis	-	<p><b>A:</b> PPI prophylaxis should be considered for at least 30 days after Roux-en-Y gastric bypass surgery  <b>B:</b> There is not enough evidence to provide a recommendation of PPI prophylaxis for sleeve gastrectomy, but given the high numbers of patients with gastroesophageal reflux after this procedure, it may be considered for at least 30 days after surgery</p>	-	<p><b>A:</b> RYGB: <b>Moderate</b>  <b>B:</b> SG: <b>Very Low</b></p>	-	-	<p><b>A:</b> <b>Strong</b>  <b>B:</b> <b>Weak</b></p>	-
Gallstone prevention	-	<p>Ursodeoxycholic acid should be considered for 6 months after bariatric surgery for patients without gallstones at the time of surgery</p>	-	<p><b>Moderate</b></p>	-	-	<p><b>Strong</b></p>	-

**Strong Recommendations with a Low LoE (Table 1)**

This was noted nine times in G16 and fourteen times in G22.

(Preoperative consulting G22; alcohol G16, G22; postoperative weight loss G16, G22; diabetes G22; glucocorticoids G16; preoperative fasting (2 sub-elements) G22; carbohydrate loading G16; PONV G16; ventilation strategy (2 sub-elements) G22; deep neuromuscular block G22; nasogastric tube G16; early postoperative nutrition G22; prophylactic oxygen G16 and G22; non-invasive positive pressure G16/G22; surgical technique G16 (2 sub-elements) and G22).

**Strong Recommendations with a Moderate LoE (Table 1)**

This was noted thirteen times in G16 and fourteen times in G22.

(Preoperative consulting G16; indications/contraindications G22, smoking G22, preoperative weight loss/postoperative complications G22; DM autonomic neuropathy G16; carbohydrate loading G16; preoperative fluid management G16 (3 sub-elements) and G22; airway management (2 sub-elements) in G16 and G22; ventilation strategy/lung-protective ventilation G16 and G22; reversal neuromuscular block and monitoring (2 sub-elements) in G16 and G22; early postoperative nutrition/dietetic assessment G16 and (2 sub-elements) G22; non-invasive OSA and CPAP G16 and G22; PPI RYGB G22; gallstone prevention G22).

**Strong Recommendations with a High LoE (Table 1)**

This was noted eleven times in G16 and six times in G22.

(Smoking G16; post-operative complications G16; preoperative fasting G16; perioperative fluid management/open surgery G16; PONV G22; monitoring anesthesia depth (BIS) G16; surgical technique/laparoscopic G16 and G22; postoperative analgesia management G16 and G22; thromboprophylaxis/LMWH G16 and G22; early postoperative nutrition/glycemic control G16; postoperative oxygenation by position and monitoring apnea G16 (2 sub-elements) and G22; supplementation of vitamins and minerals G22).

**Weak Recommendations with a Low LoE (Table 1)**

This was noted eight times in G16 and eight times in G22.

(Prehabilitation and exercise G16 and G22; glucocorticoids G22; preoperative fasting G16; carbohydrate loading G22; perioperative fluid management G22; standardized anesthetic protocol G16 and G22; ventilation strategies G16 and G22; neuromuscular block G16; abdominal drainage and nasogastric decompression G16; postoperative analgesia G16 and G22; thromboprophylaxis G16; PPI prophylaxis sleeve G22).

**Weak Recommendations with a Moderate LoE (Table 1)**

This was noted twice in G16 and 0 times in G22.

(Preoperative fasting G16; non-invasive positive pressure ventilation G16).

**Weak Recommendations with a High LoE (Table 1)**

This was noted 0 times in G16 and 0 times in G22.

**Changes/Improvements in LoE of Elements Between 2016 and 2022 (Table 1)**

Low LoE in G16 that remained low in G22 was noted for 13 elements.

(Prehabilitation and exercise, smoking and alcohol cessation, preoperative weight loss, glucocorticoids, preoperative fasting, carbohydrate loading, standardized anesthetic protocol, ventilation strategies, neuromuscular block, abdominal drainage and nasogastric decompression, postoperative analgesia, postoperative oxygenation, non-invasive positive pressure ventilation).

Low LoE in G16 that increased to moderate LoE in G22 was noted once.

(Non-invasive positive pressure ventilation element).

Low LoE in G16 that changed to high LoE in G22 was noted for two elements.

(PONV and thromboprophylaxis).

Moderate LoE in G16 that reduced to low LoE in G22 was noted for six elements.

(Preoperative information, education, and counselling, preoperative fasting, carbohydrate loading, perioperative fluid management, ventilation strategies, non-invasive positive pressure ventilation).

Moderate LoE in G16 that remained moderate in G22 was noted for six elements.

(Perioperative fluid management, airway management, ventilation strategies, neuromuscular block, early postoperative nutrition, non-invasive positive pressure ventilation).

Moderate LoE in G16 that increased to high LoE in G22 and high LoE in G16 that reduced to low LoE in G22 were noted 0 times.

High LoE in G16 that reduced to moderate LoE in G22 was noted once.

(Preoperative weight loss).

High LoE in G16 that remained high in G22 was noted for four elements.

(Laparoscopy/surgical technique, postoperative analgesia, thromboprophylaxis, postoperative oxygenation).

## Discussion

This review analyzed two guidelines to see how they scored their results across all elements over both periods and what improved or worsened between the two publication periods. This review also investigated how the risk of bias (RoB) was presented or extracted and how this involved the LoE.

Between the two guidelines publication periods, the extracted research papers still showed 13 times LoE as low, and therefore, there was no improvement in research quality or lowering of bias. In six instances, a moderate LoE decreased to lower LoE in G22. Four elements had high LoE that remained so; the same was applicable for six elements with moderate LoE.

After analyzing all the results, this review created new possible recommendations for the future. This will be the discussion of a Global Consortium of Bariatric Care and Research, points of interest towards improving RoB and FAIR, and metadata incorporation for lowering BIAS and increasing research quality.

This review looked at the GRADE assessment for RoB. This RoB has five topics: selection bias, detection bias, attrition bias, reporting bias, and confounding bias. This generally will be scored as – (low RoB), + (high RoB), and ? (unclear RoB). The LoE in GRADE has four categories, high, moderate, low, or very low. In summary, the LoE relies on how the RoB is scored. Therefore, every study must evaluate and highlight the LoE and how this conclusion is drawn to know if a study has a “good” or “bad” methodology background.

Both G16 and G22 present LoE and recommendations. Both guidelines did not explain how the LoE conclusions were reached regarding RoB with all the mentioned chapters above. There was no discussion on how requests with low LoE can be avoided in future studies or if this was important.

A possible explanation can be that this was never the purpose of both guidelines to present all the in-depth improvements in methodology in research. Therefore, this review highlighted this aspect to move forward with a new chapter on methodology improvements in bariatric care research.

The solution should be that all presented research papers get a new assessment on the RoB topics and summarize how this new assessment can affect the results of the individual studies and, therefore, the followed recommendations. Furthermore, this review and evaluation of all the results can help other researchers conduct further research to understand where, how, and what can be changed to increase the level of evidence and lower any possible risk of bias. Still, 13 LoE stayed low between both guidelines’ searches.

## GCBCR

There should be an opportunity for IFSO and all the local societies to collaborate and therefore create a team of experts that comes together in creating a framework in the perhaps possible to mention Global Consortium of Bariatric Care and Research (GCBCR) Network (or any suitably named organization). This is necessary because it is essential to gain insight into how the G16 and G22 established their LoE. Which of the five elements of the RoB was the “problem,” and what can and could be done in the future? For now, this question stays unanswered, and this was the central research question of this review. A framework can help every researcher increase methodology and outcome in research for ERABS guidelines and use this information in all new studies as a new fundament. Since not all biases can be solved and are always present in a study, a clear overview and solution in a framework can help answer these raised questions.

Also, we want to acknowledge both teams in conducting the guidelines [4, 5]. The guidelines significantly improved care, lowering the duration of hospitalization and reducing complications [11–16]. The reason why scientists conduct research is to remain critical and evaluate where improvements can be made. In both G16 and G22, there was some lack of description of how studies were assigned low or high LoE; also, how a strong recommendation with a low LoE was justified.

## Points of Interest Towards Improving RoB

Since bias is the main unanswered question in the results from both G16 and G22 in the quality of research, it is necessary to formulate solutions to prevent this in the future. Therefore, within the GCBCR, a new framework with five improvements or recommendations for lowering RoB and increasing the LoE should be performed and discussed: With a little impetus, (1) selection bias, for how random sequence generation, and allocation concealment, if occurring if randomization is not possible, can be corrected with good fundamentals in knowing what statistical tests can be used, in combination with the distinction between selection and information bias in conducting a study; (2) detection bias, in how good selection and distinguishing between selection and information bias can help increase the quality [18–21]; (3) attrition bias, in how “low-hanging fruit” can be tackled relatively easily and can increase the study quality fast, is the different rates of losses to follow-up in the exposure groups, which may change the characteristics of these groups irrespective of the studied intervention [22, 23]; (4) reporting bias on how selective reporting threatens the validity of the published data if the decision to report depends on



the nature of the results and how this can be resolved. [24–26]; and last to discuss is how (5) confounding bias can arise from completely unmeasured confounders with errors specific to observational research, common in the bariatric trials performed by Ciocănea-Teodorescu and Sjölander [17].

## FAIR

As mentioned in the solutions toward a new framework within the GCBCR, the introduction of FAIR data (findable, accessible, interoperable, and reusable data) and metadata must be considered as the new standard in future research for an excellent basic fundament, better level of evidence, the possibility for data sharing, and a better understanding of how the risk of bias is constantly reacting between and within studies.

In 2021, Springer Nature [27] published a white paper whereby the evaluation of 5-year FAIR data was described and looked at the real-world impact of FAIR and the considerations of what will be next for research data and open science. In March 2016, the FAIR was introduced [28], and the G20 leaders endorsed the FAIR principles in future research. [29]. In 2018, the European Commission published its report and action plan to turn FAIR into reality [30]. But at the same time, a survey in 2020 that asked nearly 5000 researchers in over 190 countries showed that 39.4% of survey respondents had never heard of the FAIR principles before taking the survey, and 36.2% had heard of the FAIR principles but were not familiar with them, compared with only 24.4% who are familiar with the FAIR principles. From another field, the pandemic has made a case for data sharing and increased the need for FAIR. As the virus spread in early 2020, many governments and their research funding agencies had a significant and rapid response. One novel addition to COVID-19 funding opportunities was the adoption of both FAIR and open data principles [31].

Data and the possibilities of increasing quality and working together are now known to governments. However, they are not yet sufficiently for scientists.

In this context, to better understand the effect of FAIR data, FAIR has four critical elements to improve research infrastructure, making it easier for researchers to collaborate, ultimately improving healthcare quality. A quick look at the four elements shows us findable — data and metadata that humans and computer systems should quickly locate; accessible — what is stored long term, so that they can easily be accessed and downloaded with well-defined licenses and access conditions; interoperable — ready to be combined with other datasets by humans or computers; and reusable — ready to be used for future research and further processed using computational methods [32–35].

## Barriers and Limitations

A point of emphasis for the GCBCR and FAIR data is how to implement this global research consortium with the ownership of data, privacy concerns, and variations in how countries treat such data requests etcetera.

Start addressing that not only the bariatric surgeon (at the end responsible for the patient) is the main stakeholder within ERABS guidelines. This is a truly multi-disciplinary approach. Because every discipline dietician, psychologist, anesthesiologist, etc., within the GCBCR should be a part of this discipline, sub-teams should therefore be created to lower the workload and possibilities to have a clear outcome within all the elements. Therefore, good communication between all the sub-teams is challenging but necessary.

A limitation within this project could be the factors of inter-cultural and inter-continental differences, respectively. Examples are that medication is not the same or present, protocols are possible not be approached the same everywhere, and medical ethical boards within every country or hospital could have different opinions on how “good” research should be approached or carried out. Therefore, a good alignment is the main goal for a better level of evidence, and therefore the inter-cultural and inter-continent differences should also be addressed when a GCBCR is created and not only focus on the elements from a guideline. A possible solution to have a good overview is that all elements can be scored as a “traffic light” approach (green, orange, red) low-hanging fruit and easy implementation as green to very difficult because of all the points mentioned above as a GCBCR bias. In the end, barriers and limitations are something that can be resolved if we want to increase the level of evidence of all the studies and get a good understanding of how the RoB is constructed in every element.

## Conclusion

The 2016 and 2022 editions of the ERABS guidelines reveal that there are still significant qualitative improvements to be made in the LoE and an RoB concerning the recommendations provided. It would be advantageous for the bariatric surgical community to establish a global research consortium with all the multi-disciplinary stakeholders combined and working together. Along with creating an exemplary data storage system that is FAIR compliant and more attention to statistical and methodological implementation, better guidelines and improved patient care are achievable in the future.

## Declarations

**Ethical Approval Statement** This article does not contain any studies with human participants or animals performed by any of the authors.

**Informed Consent Statement** Informed consent does not apply.

**Conflict of Interest** The authors declare no competing interests.

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