

CADTH Health Technology Review

Body Mass Index as a Measure of Obesity and Cut-Off for Surgical Eligibility

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Key Messages

- This report sought to identify, list, and annotate sources that reported findings regarding the accuracy and/or validity of body mass index as a measure of obesity or a cut-off for surgical eligibility, including reported ethical issues.
- A limited literature search was conducted, and 35 eligible sources were selected and annotated.
- Most studies with relevant findings regarding validity and/or accuracy reported discrepancies between body mass index and other measurements of obesity, or highlighted concerns with current practices that limit surgical eligibility by body mass index for patients who may derive benefit that exceeds the risk of complications.
- Ethical issues reported included stigma, bias (particularly for racialized people), and the potential for body mass index and its use as a cut-off to create or exacerbate disparities in health care access.
- The guidelines identified made recommendations for the use of body mass index cut-off(s) for surgical eligibility, generally intended to limit the risk of post-surgical complications.
- Given the widespread use of body mass index as a measure of obesity and eligibility cut-off for surgical interventions, despite reported discrepancies in accuracy and validity, as well as ethical concerns, further consideration regarding its use is warranted.

Background

Body mass index (BMI) is a measure that uses an individual's weight in kilograms (kg) divided by height in metres squared (m^2).¹ BMI is 1 of the most commonly used measures of overweight and obesity in clinical practice and has been for decades.¹ However, the history of its development and use across time have raised questions as to its utility (including potential for benefit and/or harm)^{1,2} — particularly as it concerns its reliability and generalizability across populations with a variety of characteristics, including sex, age, body composition, race, and ethnicity.^{1,3-5}

These and other questions challenging the current broad use of BMI as a marker of overweight and/or obesity to inform clinical judgments concerning health (or lack thereof) and health care provision have been raised in the form of debate in the literature with increased frequency in the past several years.^{6,7} In particular, the use of BMI as an eligibility criterion, or cut-off, for the provision of surgical interventions has come under increased scrutiny,⁸⁻¹¹ and has raised concern over both the validity and accuracy of BMI as a measure of overweight and/or obesity, as well as ethical issues such as health care access and equity.^{2,4,12,13}

Given the widespread use of BMI as a clinical measure of overweight and obesity, its use as an eligibility criterion for surgical interventions, and the longstanding debate concerning these practices, a review of the literature in this area is warranted to help support and inform decision-making concerning the use of BMI in health care. The purpose of this report is to provide an annotated list of literature sources reporting issues around the use of BMI as a measure of obesity, a cut-off for surgical eligibility, as well as guidelines and recommendations concerning the use of BMI as a cut-off for surgical interventions.

Research Questions

1. What are the reported findings regarding the validity and/or accuracy of using body mass index as:
 - a) a measure of obesity, or
 - b) a cut-off for surgical eligibility?
2. What are the reported ethical issues regarding the use of body mass index as:
 - a) a measure of obesity, or
 - b) a cut-off for surgical eligibility?
3. What are the recommendations and guidelines on the use of body mass index as a cut-off for surgical eligibility?

Methods

This report presents an annotated list of citations reporting information and issues regarding the validity, accuracy, and ethics of using BMI to measure obesity, or as a cut-off for surgical eligibility, as well as guidelines with recommendations concerning the use of BMI as a cut-off for surgical eligibility. This report is not a systematic review and, as such, does not include a critical appraisal of included sources, or a detailed review of study findings, and is not intended to provide recommendations.

CADTH acknowledges that the language used when referring to BMI, body shape or size, and weight loss can be stigmatizing and harmful. The language used in the included sources has been retained when citing inclusion criteria and results, and care has been taken to use non-stigmatizing language whenever possible.

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the International HTA Database, and the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were body mass index, obesity, and surgery. CADTH-developed search filters were applied to limit retrieval to citations related to empirical and normative ethical considerations, guidelines, and validity studies. The search was completed on September 21, 2022, and limited to English-language documents published since January 1, 2017.

Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) of potentially relevant publications, according to the inclusion criteria presented in [Table 1](#). All eligible sources meeting these criteria were included and summarized in the annotated list. Data from eligible sources describing validity, accuracy, or ethics were collected from abstracts, available

summary information, and/or full-text reports as necessary and available, and guidelines were retrieved in full text for data abstraction.

Table 1: Selection Criteria

Criteria	Description
Population	Any adult population
Intervention	Body mass index used as: <ul style="list-style-type: none"> • a measure of obesity • a cut-off for surgical eligibility (any type of surgery)
Comparator	N/A
Outcomes	Information on the validity and/or accuracy of using body mass index as a measure of obesity or a surgical cut-off; reported ethical issues
Source type(s)	Q1, Q2: Any published or unpublished (i.e., grey literature) documents or reports, including empirical studies, or editorial or historical pieces Q3: Any recommendations and/or guidelines

N/A = not applicable; Q = question.

Exclusion Criteria

Sources were excluded if they did not meet the selection criteria outlined in [Table 1](#) (i.e., those limited to child or adolescent populations, those describing the use of BMI thresholds or cut-offs for non-surgical procedures, and those limited to describing cost outcomes only). Sources were also excluded if they were identified as duplicate publications or were published before 2017. Sources were also excluded if they were not specific to the use of BMI as a measure of obesity, or ethical or other issues regarding the use of BMI as a threshold for surgical eligibility, or did not make recommendations regarding the use of BMI as a threshold for surgical eligibility. Additional references of potential interest that did not meet the inclusion criteria are provided in [Appendix 1](#).

Annotated Reference List

Overall Summary

Thirty-four sources were included in this report.¹⁴⁻⁴⁷ Thirteen sources reported study findings concerning the validity and/or accuracy of BMI as a measure of obesity¹⁴⁻²⁶ and are summarized in [Table 2](#); 13 sources reported findings regarding the use of BMI as a surgical cut-off and are summarized in [Table 3](#);²⁷⁻³⁹ 5 reported ethical issues related to BMI⁴⁰⁻⁴⁴ and are summarized in [Table 4](#); and 3 guidelines were identified describing recommendations related to the use of BMI as a threshold or cut-off in determining eligibility for surgery (summarized in [Table 5](#)).⁴⁵⁻⁴⁷

With regard to validity and/or accuracy, most of the included studies either compared BMI to other measures of obesity and/or adiposity, or investigated the effects of BMI cut-offs for surgical eligibility on surgical outcomes. Most studies either found discrepancies between BMI and other measurements or concluded that there was insufficient evidence

to support BMI cut-offs for surgical eligibility. The sources explicitly reporting ethical issues related to the use of BMI as a measure of obesity or cut-off for surgical eligibility described concerns around stigma, bias (particularly for racialized peoples), and the potential to create or exacerbate disparities in health care access. Most recommendations and guidelines annotated in this report suggested 1 or more eligibility cut-off(s) for a variety of surgeries, often with associated guidance concerning comorbidities (e.g., type 2 diabetes).

Table 2: Reported Findings Regarding the Validity and/or Accuracy of BMI as a Measure of Obesity

Author, year, and source type	Population characteristics				BMI measure	Comparison measure(s)	Summary of relevant finding(s)	Relevant author conclusion(s)
	Sample size	Age and/or age group	Comorbid condition(s)	Other relevant feature(s)				
Stojkovic, 2022 ¹⁴ Cross-sectional	N = 103	21.46 years (method for generating summary statistic NR) (SD = 0.64)	NR	Police trainees, male only	BMI classification using score-specific categories	%BF and %SMM classification using BCA (i.e., InBody 370)	BMI classifications were less sensitive than BCA	“The information provided by this research could be used to help professionals understand the importance of measuring body composition, and the inaccuracies in BMI classification. In conclusion, whenever possible PSMM and PBF should replace the utilization of BMI to screen overweight and obesity in PTs.”
Gurevich, 2017 ¹⁵ Cross-sectional	N = 167	NR	NR	Russian firefighters, males only	BMI classification using score-specific categories	%BF and WC (measures NR)	BMI was less sensitive than measures of BF and WC	“Compared with BF% or WC standards, BMI-based obesity classification produced low rates of false positives but demonstrated high rates of false negatives.”
Hung, 2017 ¹⁶ Cross-sectional	N = 894	Young adults with ages ranging from 20 to 26 years	NR	Taiwanese male and female	BMI classification using score-specific categories	%BF using BCA (i.e., BIA)	Variable accuracy of BMI cut-offs was observed (particularly by sex)	“Disagreement between BMI and BFP was significant among young adults, especially young women. We suggest combining BMI and BIA for obesity and overweight screening in Asian young adults.”
Alammar, 2020 ¹⁷ DTA study	N = 942	NR	NR	Saudi Arabian, male and female	BMI classification using score-specific categories	%BF using BCA (i.e., DXA scan)	BMI classifications were less sensitive than BCA	“The accuracy of BMI 30 kg/m ² to diagnose obesity among the Saudi population is limited. We have to lower the BMI cut-off point to improve its sensitivity as a screening tool for obesity. Our study suggests that the BMI cut-off point among Saudis and possibly the Arab population should not exceed 27 kg/m ² for both sexes.”

Author, year, and source type	Population characteristics				BMI measure	Comparison measure(s)	Summary of relevant finding(s)	Relevant author conclusion(s)
	Sample size	Age and/or age group	Comorbid condition(s)	Other relevant feature(s)				
Al Hammadi, 2020¹⁸ DTA study	N = 400	Adolescents and young adults with a mean age of 18.0 years (SD = 6.0)	None (i.e., healthy)	Kuwaiti, female only	BMI-for-age classification using z score specific categories	%BF using BCA (i.e., Tanita model TBF-310)	BMI-for-age classifications were less sensitive than BCA	“BMI-based measures substantially underestimate the prevalence of excessive fatness in Kuwaiti adolescent females. Obesity is even more prevalent, and requires more urgent attention, than is apparent from BMI-based measures used in most research and national surveys. BMI may also be too crude for use as an exposure or outcome variable in many epidemiological studies of Arab adolescent girls and adult women.”
de Oliveira, 2020¹⁹ DTA study	N = 3,398	Adolescents and young adults with ages ranging from 18 to 19 years and 21 to 23 years	NR	Brazilian, male and female	BMI classification using score-specific categories	%BF (method of measurement NR)	Variable accuracy of BMI cut-offs was observed (particularly by sex)	“The use of different references for the classification of a high %BF implied a difference in the diagnostic sensitivity of the BMI. Higher cut-off points resulted in greater sensitivity and ability to differentiate individuals with and without obesity.”
Silveira, 2020²⁰ DTA study	N = 132	Older adults with ages ranging from 60 to 91 years	NR	NR, male and female	BMI classification using score-specific, reference-value categories	BF using total body densitometry	Variable accuracy of BMI cut-offs was observed (particularly by sex)	Updated BMI cut-offs with improved accuracy were recommended by the authors
Pinheiro, 2019²¹ DTA study	N = 78	Mean 54.4 years (SD 13.9)	Non-dialysis chronic kidney disease	NR, male and female	BMI classification using score-specific categories	%BF using BCA (i.e., DXA scan) and ADP	Variable accuracy of BMI cut-offs was observed (particularly by sex)	“The prevalence of patients with excess body fat was high. The conventional cut-off points for BMI were not adequate in these patients and suggested that BMI ≥ 25 kg/m ² were (sic) more accurate for diagnosing obesity.”

Author, year, and source type	Population characteristics				BMI measure	Comparison measure(s)	Summary of relevant finding(s)	Relevant author conclusion(s)
	Sample size	Age and/or age group	Comorbid condition(s)	Other relevant feature(s)				
Banack, 2018²² DTA study	N = 1,329	Older women with ages ranging from 53 to 85 years	NR	Americans, post-menopausal females only	BMI classification using score-specific categories	%BF using BCA (i.e., DXA scan)	BMI was less sensitive than BCA	"Results demonstrate that a BMI cut-point of 30 kg/m ² does not appear to be an appropriate indicator of true obesity status in post-menopausal women."
Tello-Winniczuk, 2017²³ DTA study	N = 101	NR	Rheumatoid arthritis	NR	BMI scores	%BF using BCA (i.e., DXA scan)	BMI was less sensitive than BCA	Obesity according to DXA was underdiagnosed when the classic BMI cutoffs were used in well-controlled RA patients."
Wollner, 2017²⁴ DTA study	N = 856	Adults with ages ranging from 30 to 59 years	NR	Brazilian, male and female	BMI classification using score-specific categories	%BF using BCA (i.e., BIA)	Variable accuracy of BMI cut-offs was observed (particularly by sex)	"The BMI that corresponded to a BF% previously defining obesity was similar to that of other Western populations for men but not for women. Furthermore, gender and age specific cut-off values are recommended in this population."
Dybala, 2019²⁵ Retrospective cohort	NR	NR	NR	Americans, male and female	BMI classification using score-specific categories	%BF using BCA (i.e., DXA scan)	BMI was less sensitive than BCA	"A considerable proportion of subjects in the healthy BMI range 20-25 were found to have excess adiposity, including 33.1% of males and 51.9% of females."
Paek, 2019²⁶ Retrospective cohort	N = 18,706	Adults ≥ 20 years	NR	Korean, male and female	BMI classification using score-specific categories	%BF using BCA (i.e., DXA scan)	BMI misclassification rates were 27.8% in males and 45% in females	None

ADP = air displacement plethysmography; BCA = body composition assessment; BF = body fat; BFP = body fat percentage; BIA = bioelectrical impedance analysis; BMI = body mass index; CKD = chronic kidney disease; DTA = diagnostic test accuracy; DXA = dual energy X-ray absorptiometry; NR = not reported; PSMM = percent skeletal muscle mass; PTs = police trainees; SD = standard deviation; SMM = skeletal muscle mass; WC = waist circumference.

Table 3: Reported Findings Regarding BMI as a Cut-off for Surgical Eligibility

Author, year, and source type	Aim/purpose	Population characteristics	Summary of reported issues and/or relevant findings	Relevant author conclusion(s)
<p>Roth, 2021³⁰ Prospective cohort</p>	<p>To characterize rates of 90-day hospital readmission, 1-year mortality, and MCID in improvement of PROMs at 1 year following TKA across 5 BMI cut-offs</p>	<p>N = 4,126</p>	<p>90-day readmission No statistically significant difference in rates observed across all 5 BMI thresholds assessed (P > 0.05) PPVs across all models for all 5 BMI thresholds reported as “low” 90-day readmission-free TKAs denied/occurrence of 90-day readmission at a BMI threshold of 40 kg/m² (n/n): 18/1</p> <p>1-year mortality No statistically significant difference in rates observed across all BMI thresholds assessed (P > 0.05) PPVs across all models for all 5 BMI thresholds reported as “low” 1-year mortality-free TKAs denied/occurrence of 1-year mortality at a BMI threshold of 40 kg/m² (n/n): 194/1</p> <p>1-year MCID in improvement of PROMs No differences attributed to BMI thresholds alone were observed TKAs with a 1-year MCID improvement in PROMs denied/failure to achieve 1-year MCID improvement in PROMs at a BMI threshold of 40 kg/m² (n/n): 11/1</p>	<p>“Utilizing BMI cutoffs as the sole determinants of TKA ineligibility may deny patients complication-free postoperative courses and clinically important improvements. Shared decision-making supported by predictive tools may aid in balancing the potential benefit TKA offers to obese patients with the potentially increased complication risk and cost of care provision.”</p>
<p>Cleveland, 2020³¹ Prospective cohort</p>	<p>To characterize the impacts of BMI cut-offs on PROMs at 1 year following THA</p>	<p>N = 3,449</p>	<p>Pain and function Trend toward improved scores observed in patients with higher BMIs TKAs with meaningful improvements in pain denied/failure to improve pain prevented (n/n): BMI threshold of 30 kg/m²: 21/1 BMI threshold of 35 kg/m²: 18/1</p>	<p>“Patients with higher BMIs show greater improvements in PROMs. Using BMI alone to determine eligibility criteria did not improve the rate of clinically meaningful improvements. BMI thresholds prevent patients who may benefit the most from surgery from undergoing THA. Surgeons should consider PROMs improvements in determining eligibility for THA</p>

Author, year, and source type	Aim/purpose	Population characteristics	Summary of reported issues and/or relevant findings	Relevant author conclusion(s)
			BMI threshold of 40 kg/m ² : 21/1 BMI threshold of 45 kg/m ² : 21/1	while balancing traditional metrics of preoperative risk stratification.”
Senker, 2018 ³² Prospective cohort	To compare complications of minimally invasive lumbar spinal surgery between patients by BMI category	N = 187	Overall complication rates No significant differences observed by BMI category	“We conclude that preobese and obese patients are good candidates for MAST because BMI did not affect complication rates or duration of surgery.”
Lasalle, 2017 ³³ Prospective cohort	To characterize the impact of BMI at the start of dialysis on access to kidney transplantation in patients with ESRD	N = 19,524	Likelihood of kidney transplant by BMI status at initiation of dialysis BMIs of > 31 kg/m ² were associated with reduced likelihood For patients with BMI ≥ 30kg/m ² , each 1 kg/m ² decrease in BMI during follow-up was associated with a 9% to 11% increase in likelihood	“We showed that obese patients with ESRD face barriers to the receipt of a kidney transplant without valid reasons. Greater attention to this issue would improve the fairness of the organ allocation process and might improve outcomes for obese patients with ESRD.”
De Mik, 2022a ³⁴ Retrospective cohort	To characterize the projected impacts of 3 BMI cut-offs on incidence rates of 30-day post-surgical complications following THA	Americans N = 192,394	Complication-free THAs/BMI threshold (%) 35 kg/m ² : 75.9 40 kg/m ² : 95.4 50 kg/m ² : 95.2 THA complications prevented/BMI threshold (%) 35 kg/m ² : 28.6 40 kg/m ² : 11.8 50 kg/m ² : 1.3	“Lower BMI cutoffs for THA can result in fewer complications although they will sequentially limit access to complication-free THA. Consideration of risks of obesity in THA may be best considered as part of a holistic assessment and shared decision-making when deciding on goals for weight reduction.”
De Mik, 2022b ³⁵ Retrospective cohort	To characterize the projected impacts of 3 BMI cut-offs on incidence rates of 30-day post-surgical complications following TKA	Americans N = 314,719	Complication-free TKAs/BMI threshold (%) 35 kg/m ² : 94.8 40 kg/m ² : 94.8 50 kg/m ² : 94.7 TKA complications prevented/BMI threshold (%)	“Lower BMI cutoffs can reduce complications, but will limit access to complication-free TKA for many patients. These data do not indicate TKA should be performed without consideration of risks from obesity; however, a holistic assessment and shared decision-making

Author, year, and source type	Aim/purpose	Population characteristics	Summary of reported issues and/or relevant findings	Relevant author conclusion(s)
			35 kg/m ² : 36.6 40 kg/m ² : 17.3 50 kg/m ² : 2.8	may be more valuable when deciding on appropriate goal weight reduction.”
Saini, 2022 ³⁶ Retrospective cohort	To characterize the impact of a BMI cut-off of 40 kg/m ² on major and clinically significant complications following TSA	Americans N = 23,284	Major complications PPV (%): 7 Complication-free TSAs denied/complication prevented (n/n): 14/1 Other clinically significant complications PPV (%): 4.9 Complication-free TSAs denied/complication prevented (n/n): 20/1	“The use of eligibility criteria for primary TSA or RSA based solely on BMI threshold values presents a potential limitation in access to care to these patients who otherwise would have a complication-free procedure.”
Gabriel, 2021 ³⁷ Retrospective cohort	To compare relative risk of same-day hospitalization or 30-day readmission following outpatient tonsillectomy of 3 BMI thresholds vs. BMI ≥ 30 to < 40 kg/m ²	Americans N = 12,287	Same-day hospitalization or 30-day readmission, RR (99% CI) BMI ≥ 40 to < 50 kg/m ² : 1.31 (1.03 to 1.65) BMI ≥ 50 to < 60 kg/m ² : 1.99 (1.43 to 2.78) BMI ≥ 60 kg/m ² : 1.80 (1.00 to 3.25)	“These results contribute data that may help practices - especially freestanding ambulatory surgery centers - decide appropriate BMI cut-offs for surgery involving the airway. Whether this is considered clinically significant enough to rule out eligibility will differ from practice-to-practice and will depend on surgical volume, resources available and financial interests.”
Giori, 2018 ³⁸ Retrospective cohort	To characterize trade-offs between reduced risk of complications vs. clinical benefit of using BMI cut-offs as an eligibility criterion for TJA	Severe OA N = 27,671	PPV of complications from TJA by BMI thresholds, % (95% CI) BMI threshold of 30 kg/m ² : 5.33 (4.99 to 5.71) BMI threshold of 40 kg/m ² : 6.74 (5.44 to 8.33) Patients denied a complication-free TJA at a BMI threshold of 40 kg/m² (n): 1,148 Patients who would avoid complication from TJAs at a BMI threshold of 40 kg/m² (n): 83	“Although the acceptable balance between avoiding complications and providing access to care can be debated, such a quantitative assessment helps to inform decisions regarding the advisability of enforcing a BMI criterion for total joint arthroplasty.”

Author, year, and source type	Aim/purpose	Population characteristics	Summary of reported issues and/or relevant findings	Relevant author conclusion(s)
Li, 2017 ³⁹ Retrospective cohort	To characterize post-operative functional gain and pain by obesity status using BMI scores at 6 months following TJA	Mean age for THR patients: 65 years (SD = NR); mean age for TKR patients: 69 years (SD = NR); most patients were Caucasian; male and female N = 5,004	Functional gain Higher levels of obesity were associated with a lower level of post-surgical function Pain Higher levels of obesity were associated with greater post-operative pain relief	“Six months after total joint replacement (TJR), severely or morbidly obese patients reported excellent pain relief and substantial functional gain that was similar to the findings in other patients. While obesity is associated with a greater risk of early complications, obesity in itself should not be a deterrent to undergoing TJR to relieve symptoms.”
Azimi, 2018 ²⁷ Case control	To compare surgical success in patients undergoing LSCS by BMI status using a threshold of 30kg/m ²	Mean age 61.5 years (SD = 9.6) N = 189	Post-surgical complication rates Similar between BMI groups Measure of surgical success Favoured patients with a BMI < 30kg/m ² Improvement in post-surgical disability at 2 years Similar between BMI groups	“This study showed that the BMI can be considered a parameter for predicting surgical success in patients with LSCS and can be useful in clinical practice.”
Shaw, 2018 ²⁸ Commentary/ response	To present a countervailing opinion to the conclusions drawn by Giori, 2018 ³⁸	Severe OA	Shared decision-making around TJA involves both the patient and the surgeon Post-surgical complications that may be associated with a high BMI are serious and can have devastating outcomes for the patient; these deleterious outcomes also have negative impacts on the surgeon	“The complexity of the surgical decision-making process remains a conundrum with good arguments that both the patient and the surgeon should hold preemptive responsibility. This article does not resolve the debate, but provides data for informed discussion regarding the process of shared decision-making.”
Crossan, 2022 ²⁹ Discussion paper	Broad discussion regarding obesity, including the implications of BMI	NR	BMI thresholds may reduce or prohibit access to beneficial surgical interventions for conditions that are comorbid to obesity; bariatric surgery may be used to reduce obesity, which may increase access to these beneficial surgical interventions	“If a patient has been disqualified from another surgery due to obesity, such as surgery for osteoarthritis or ventral hernia repair, this serves as the qualifying

Author, year, and source type	Aim/purpose	Population characteristics	Summary of reported issues and/or relevant findings	Relevant author conclusion(s)
	thresholds as an eligibility criterion for bariatric surgery			serious comorbidity for bariatric surgery consideration.”

BMI = body mass index; CI = confidence interval; ESKD = end-stage kidney disease; ESRD = end-stage renal disease; LSCS = lumbar spinal canal stenosis; MCID = minimal clinically important difference; N/A = not applicable; NR = not reported; OA = osteoarthritis; PPV = positive predictive value; PROM = patient-reported outcome measure; RSA = reverse shoulder arthroplasty; THA = total hip arthroplasty; TJA = total joint arthroplasty; TJR = total joint replacement; TKA = total knee arthroplasty; TSA = total shoulder arthroplasty.

Table 4: Reported Ethical Issues Regarding BMI as a Measure of Obesity and/or a Cut-Off for Surgical Eligibility

Author, year, and source type	Aim/purpose	Population characteristics	Summary of reported issues	Relevant author conclusion(s)
BMI as a measure of obesity				
ACOG, 2019 ⁴⁰ Committee opinion paper	Discussion of the ethical considerations concerning gynecological and obstetric care for patients with obesity, with reference to BMI and BMI cut-offs	People seeking gynecology and obstetric care	<p>Social stigmatization of obesity may result in barriers to accessing optimal care, despite BMI cut-offs not being an adequate measure of health (or lack of health)</p> <p>Physician bias concerning obesity may manifest in patient blame or other negative attitudes that can result in a reduced quality of care</p> <p>It is unethical for obstetrician–gynecologists to refuse a referral due to obesity as represented by a BMI cut-off</p>	“It is unethical for obstetrician–gynecologists to refuse to accept a patient or decline to continue care that is within their scope of safe practice solely based on an arbitrary body mass index (BMI) cut-off or because the patient has obesity.”
MacLaughlin, 2019 ⁴¹ Discussion paper	Discussion of issues regarding the use of BMI thresholds as an eligibility criterion for kidney transplant surgery in ESKD	NR	<p>There is insufficient evidence to support the use of BMI as an eligibility criterion for kidney transplant surgery</p> <p>There is variability in the recommendations and approaches to limiting eligibility for surgery by BMI</p> <p>BMI cut-offs are arbitrary</p> <p>Technology has advanced such that the risk once thought to be posed by obesity (as measured by BMI) has been reduced</p>	“Centers that limit transplants to those meeting arbitrary levels of body mass, rather than adopting an individualized assessment approach, may be unfairly depriving many ESKD patients of the survival and quality of life benefits derived from kidney transplantation.”
Humbyrd, 2018 ⁴² Opinion column	A discussion of virtue ethics as they bear upon the use of BMI as a measure of obesity in orthopedic patients, and the bias or stigma this can create in the provision of their health care	Patients seeking orthopedic care	<p>BMI scores indicating obesity are often highlighted in a patient’s medical record and can create a risk of bias, stigma, and/or discrimination in the mind of a treating physician/surgeon</p> <p>Patients with a BMI that indicates obesity may be treated as a class instead of as an individual, and this can compromise their care</p> <p>The denial of potentially beneficial health care interventions based on a classification of obesity should be considered in the context of all risks, and whether risks are being weighed judiciously or through the lens of bias, stigma, and/or discrimination</p>	“There is a moral hazard here: If we approach patients with biases—conscious or unconscious—we may miss diagnoses, contribute to healthcare disparities, and fail to fulfill our obligations to our patients.”

Author, year, and source type	Aim/purpose	Population characteristics	Summary of reported issues	Relevant author conclusion(s)
BMI as a cut-off for surgical eligibility				
New Zealand Ministry of Health, 2021⁴³ Clinical guideline	To provide guidance on clinical best practice for all forms of breast reconstruction surgery in the New Zealand context	Women	Limits on access to breast reconstructive surgery by BMI status produce inequities for women of Pacific and/or Māori origin Different breast units apply various BMI criteria to limit surgical eligibility	“At the referral acceptance stage for breast reconstruction, some breast units apply eligibility criteria, such as being a non-smoker and BMI of under 30; both parameters are equity reducing measures that disproportionately affect Māori and Pacific women. Different breast units accept different BMIs for immediate and/or delayed breast reconstructions.”
Carender, 2022⁴⁴ Retrospective cohort	To assess disparities in BMI-specified eligibility for TKA and THA by race, ethnicity, and gender	Americans, male and female N = 399,746	Female and Black patients were statistically significantly more likely than other subgroups to be ineligible for surgery at multiple BMI thresholds Hispanic patients were disproportionately likely to be ineligible for surgery at a BMI threshold of < 35 kg/m ²	“Using BMI cutoffs alone to determine the eligibility for primary THA and TKA may disproportionately exclude women, Black persons, and Hispanic persons. These data raise concerns regarding further disparity and restriction of arthroplasty care to vulnerable populations that are already marginalized.”

ACOG = American College of Obstetricians and Gynecologists; BMI = body mass index; N/A = not applicable; NR = not reported; THA = total hip arthroplasty; TKA = total knee arthroplasty.

Table 5: Summary of Relevant Recommendations in Included Guidelines

Relevant recommendation(s)	Evidence and strength of recommendation(s)
Canadian Association of Bariatric Physicians and Surgeons: Guidelines for Canadian Bariatric Surgical and Medical Centres (2022)⁴⁵	
<p>Recommendations:</p> <p>Eligibility for bariatric/metabolic surgery:</p> <p>“Patients with a BMI of 40 kg/m² or greater without coexisting medical problems and for whom bariatric surgery would not be associated with excessive risk should be eligible for at least 1 of the procedures.</p> <p>Patients with a BMI of 35 kg/m² or greater and 1 or more severe obesity-related comorbidities remediable by weight loss, including T2D, hypertension, hyperlipidemia, obstructive sleep apnea (OSA), obesity hypoventilation syndrome (OHS), Pickwickian syndrome, nonalcoholic fatty liver disease (NAFLD), nonalcoholic steatohepatitis (NASH), pseudotumour cerebri, gastroesophageal reflux disease (GERD), asthma, venous stasis disease, severe urinary incontinence, debilitating arthritis, or considerably impaired quality of life, may also be offered a bariatric procedure.^{7,10}</p> <p>In addition, bariatric surgery should be considered for patients with poorly controlled T2D and class I obesity (BMI 30 to 35 kg/m²) despite optimal medical management.” (p. E171 to E172)</p>	<p>Evidence supporting the recommendation:</p> <p>Literature was consulted but a formal literature review was not conducted; lead authors of the guideline were responsible for identifying relevant and timely sources of evidence to inform development of the guideline.</p> <p>Strength of the recommendation:</p> <p>NR</p>
AIM Specialty Health: Clinical Appropriateness Guidelines: Small Joint Surgery (2021)⁴⁶	
<p>Recommendation (specific to the foot and ankle):</p> <p>“It is recommended that any patient with a BMI equal to or greater than 40 attempt weight reduction prior to surgery.” (p. 7)*</p> <p>*The guideline does not provide an explicit recommendation informing a decision regarding surgical eligibility if the recommended BMI cut-off is achieved.</p>	<p>Evidence supporting the recommendation:</p> <p>None indicated</p> <p>Strength of the recommendation:</p> <p>NR</p>
European Renal Association: Management of Obesity in Kidney Transplant Candidates and Recipients (Clinical Practice Guideline) (2021)⁴⁷	
<p>Recommendations:</p> <p>Influences of BMI on kidney transplant outcomes in patients with ESKD:</p> <p>“We suggest accepting people with ESKD and a BMI of 30–34 kg/m² for kidney transplantation if they are otherwise considered suitable (2C).</p> <p>There are insufficient data to make a recommendation in the higher BMI categories (–D).” (p. i4)</p> <p>Impact of obesity on decisions regarding dialysis vs. kidney transplantation in patients with ESKD:</p> <p>“We suggest that kidney transplantation, either from a deceased or living donor, is the optimal treatment for people</p>	<p>Evidence supporting the recommendations:</p> <p>Evidence supporting the relevant recommendations summarized here is graded, per recommendation, as C (i.e., low) and D (i.e., very low).</p> <p>Strength of the recommendations:</p> <p>Recommendations graded as 2 are weak; the statement without a grade is not intended as a recommendation.</p>

Relevant recommendation(s)	Evidence and strength of recommendation(s)
<p>with a BMI of 30–39 kg/m² and ESKD who are otherwise considered suitable for kidney transplantation (2C).</p> <p>We suggest not delaying wait-listing or transplantation solely on the basis of increased BMI in people with a BMI of 30 to 39 kg/m² and ESKD who are otherwise considered suitable for kidney transplantation (2C).” (p. i6)</p>	

BMI = body mass index; CV = cardiovascular; ESKD = end-stage kidney disease; GFR = glomerular filtration rate; NR = not reported; RCT = randomized controlled trial; T2D = type 2 diabetes.

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Appendix 1: References of Potential Interest

Note that this appendix has not been copy-edited.

Previous CADTH Work

None

Guidelines Without Explicit Recommendations Regarding BMI as a Cut-Off for Surgical Eligibility

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