Royal Hospital for Women (RHW)
BUSINESS RULE
COVER SHEET

Health
South Eastern Sydney
Local Health District

Ref: T25/20260

NAME OF DOCUMENT	In vitro Fertilisation (IVF) - Body Mass Index (BMI) for Fertility Treatment
TYPE OF DOCUMENT	Clinical Business Rule
DOCUMENT NUMBER	RHW CLIN125
DATE OF PUBLICATION	14/4/2025
RISK RATING	Medium
REVIEW DATE	April 2028
FORMER REFERENCE(S)	N/A
EXECUTIVE SPONSOR	Dr Rachael Rodgers – Clinical Director Fertility & Research Centre
AUTHOR	Dr Rachael Rodgers – Clinical Director Fertility & Research Centre A Rea – Clinical Nurse Consultant IVF
SUMMARY	This clinical business rule has been developed to guide clinical practice in fertility treatment at the Fertility & Research Centre, Royal Hospital for Women in the context of Body Mass Index (BMI). It assists in identifying women at risk of adverse outcomes due to BMI outside of the normal ranges and supporting staff in determining the appropriate management prior to commencing treatment.
Key Words	Invitro-fertilisation (IVF), Body Mass Index (BMI), Frozen embryo transfer (FET), Ovulation induction (OI), Intrauterine Insemination (IUI), Oncofertility

Royal Hospital for Women (RHW)
BUSINESS RULE

Health
South Eastern Sydney
Local Health District

In vitro Fertilisation (IVF) - Body Mass Index (BMI) for fertility treatment

RHW CLIN125

Contents

In vitro Fertilisation (IVF) - Body Mass Index (BMI) for fertility treatment

RHW CLIN125

This Clinical Business Rule (CBR) is developed to guide safe clinical practice at the Royal Hospital for Women (RHW). Individual patient circumstances may mean that practice diverges from this Clinical Business Rule. Using this document outside RHW or its reproduction in whole or part, is subject to acknowledgement that it is the property of RHW and is valid and applicable for use at the time of publication. RHW is not responsible for consequences that may develop from the use of this document outside RHW.

Within this document we will use the term woman, this is not to exclude those who give birth and do not identify as female. It is crucial to use the preferred language and terminology as described and guided by each individual person when providing care.

1 BACKGROUND

The aim of this clinical business rule is to provide guidance on the recognition and the management of women with a Body Mass Index (BMI) outside of normal ranges when undertaking fertility treatment at the Fertility & Research Centre. This clinical business rule also addresses clinical management for women with a history of bariatric surgery and/or have utilised weight loss medications for weight management when seeking fertility treatment.

2 RESPONSIBILITIES

2.1 Medical Director – Oversee all policy development and supports clinical practice of fellows/registrars

2.2 Medical staff –Provision of inclusive and individualised care, identifying risk, monitoring of results, consenting to treatment, escalation and referral

2.3 **Registered nurses –** coordination, education and support to patients undertaking fertility treatment inclusive of direct patient contact, counselling and monitoring.

3 PROCEDURE

3.1 Clinical Practice

General guidelines

- Obtain medical history from woman at initial medical consultation, ensure any history of bariatric surgery or use of weight management medication is disclosed

  Measure height and weight of woman and calculate the Body Mass Index (BMI) based on the below formula

$$\frac{\text{Weight (kg)}}{\text{Height (m}_2\text{)}}$$

e.g. For a woman 70kg and 1.70m tall the BMI is calculated as 70/(1.7)2 = 24.2kg/m2

- Document BMI in medical record
- BMI to be calculated at the commencement of every In-vitro Fertilisation cycle
- Determine referral pathway and initial plan of care based on BMI result:

	BMI < 18 kg/m2	BMI 18-35 kg/m2	BMI > 35 kg/m2
Management	• Refer woman to dietician, general practitioner +/- endocrine for weight optimisation prior to pregnancy • Consider referral to PLaN (Pregnancy planning, lifestyle and Nutrition) • If BMI 16 arrange obstetric medicine review	• Proceed with fertility treatment as planned Ensure medical history obtained and history of bariatric surgery or medical weight management not identified • If BMI >30 increase pre-conception folate supplementation is 5mg/day	• Ensure pre-conception folate supplementation is 5mg/day • Consider attending Vitamin D, HbA1c, fasting glucose • Medical team to consider referring woman to dietician, general practitioner +/- endocrine for weight optimisation prior to pregnancy • Consider referral to PLaN (Pregnancy planning, lifestyle and Nutrition) • Arrange anaesthetic review via pre-admission clinic (if applicable to cycle) • If BMI >38 arrange obstetric medicine review • Should be assessed for complications of their high BMI including for diabetes, hypertension, consideration of obstructive sleep apnoea, PCOS, NASH, eating disorders, depression

- Refer to **Appendix A and B** for specific cycle management

Women utilising pharmacological methods for weight loss

- GLP1 or GLP1-GIP agonist medications e.g. Semaglutide, Liraglutide, Tirzepatide, Dulaglutide should be ceased 2 months prior to commencing fertility treatment

Women with history of bariatric surgery

- **Types of bariatric surgery**

Restrictive	- Vertical banded gastroplasty - Laparoscopic adjustable gastric band - Sleeve gastrectomy
Malabsorptive	- Jejunoileal bypass - Biliopancreatic diversion (including duodenal switch)
Combination of restrictive and malabsorptive	- Roux -en-Y gastric bypass

- Ensure minimum of six months between bariatric surgery and the commencement of fertility treatment; women who have undergone weight loss surgery should not commence IVF or fertility treatment during times of rapid weight loss
- Present case to multidisciplinary team (MDT) for discussion with obstetric medicine physicians and fertility specialists; treatment is only to commence after review and approval by the obstetric medicine physicians and discussion at MDT.
- Consider prescribing long active contraceptive e.g. Mirena IUD during rapid weight loss timeframe
- Women 40 years of age in rapid weight loss timeframe, who's treatment commencement is delayed due to same, able to continue In vitro fertilisation (IVF) treatment until their 42nd birthday.
- Ensure woman daily supplemental intake includes:
    - Folic acid (5mg/daily)
    - Copper (2mg/daily)
    - Zinc (15mg/daily)
    - Selenium (50 µg)
    - Iron (45-60 mg or >18 mg after AGB)

- Thiamine (>12 mg)
- Vitamin E (15 mg)
- Beta – carotene (Vitamin A, 5000IU)

- Ensure following investigations are attended every 3 months during the pre-conception period:
  - Full blood count (FBC)
  - Electrolyte, urea, creatinine (EUC)
  - Liver function tests (LFTs)
  - Calcium, magnesium, phosphate (CMP)
  - Coagulation studies
  - Iron studies
  - Folate
  - Vitamin B12
  - Vitamin D
  - Zinc
  - Copper
  - Selenium

3.2 Documentation

- Artemis
- Patients file
- eMR

3.3 Education Notes

Body mass index (BMI) is defined as a person's weight in kilograms (kgs) divided by the square of the person's height in metres (m), ie, BMI = weight (kg) / height (m) squared

For example, an adult who is 1.75m tall and weighs 70kg would have a BMI of:

BMI = 70 / (1.75 * 1.75) = 22.9

The World Health Organization has made the following classification for adults over the age of 20 years[1]

- BMI below 18.5 – underweight
- BMI 18.5 – 24.9 – normal weight range
- BMI 25.0 – 29.9 – overweight
- BMI 30.0 – 34.9 – obesity class I
- BMI 35.0 – 39.9 – obesity class II
- BMI 40 and above – obesity class II[1]

Low BMI is associated with fertility and pregnancy risks, including:

- Reduced likelihood of achieving a pregnancy / reduced embryo implantation rate[2 3]

- Miscarriage[4]
- Reduced live birth rate after IVF treatment[4]

Elevated BMI is associated with fertility and pregnancy risks including:

Fertility and conception:

- Longer time to conceive[5 6]
- Infertility [6 7]
- Poorer egg and embryo quality [8 9 10]
- Decreased likelihood of embryo implantation[11 6 12 13]
- Miscarriage [14 16 6 13 12 15]
- Lower live birth rate after fertility treatment[13]

During pregnancy:

- Diabetes (type 2 diabetes and gestational diabetes) [17 18 19 16 20]
- Hypertension / pre-eclampsia [18 21 22 16 20]
- Thromboembolism (DVTs, pulmonary embolisms) [21 22]
- Depression and anxiety [23 24 25 26]
- Fetal congenital abnormalities including neural tube defects [21 27 16 10]
- Preterm birth [27 28 16 20 29]
- Fetal growth restriction [30 31]
- Macrosomia / large for gestational age [18 30 20]
- Stillbirth [16 10 20 31 32]
- Maternal death [22 34]

During delivery:

- Increased risk of for induction of labour [35 36]
- Prolonged labour, failure to progress in labour[37 38 39]
- Difficulties with fetal heart rate monitoring [40]
- Shoulder dystocia[15]
- Increased risk of caesarean section [18 21 31 16 41 20 39]
- Post-partum haemorrhage[42 43]
- Perinatal maternal death [22 44]

Anaesthetic risks:

- Difficulties with analgesia provision in labour[45 46]
- Need for general anaesthetic for caesarean section
- Difficulty maintaining an adequate airway / failed intubation[45 46 47 48]

After delivery:

- Increased risk of need for ICU care post-delivery [41 49]
- Delayed wound healing and infection[18]
- Thromboembolism (DVTs, pulmonary embolisms) [21]
- Greater likelihood of difficulties with breast feeding [50 51 52]
- Postnatal depression [26 25 52]

Impact on the baby / child:

- Birth trauma[18]
- Neonatal complications including jaundice, hypoglycaemia, respiratory distress, admission to neonatal intensive care and neonatal/infant death[18 32 27 31 41]
- Long term consequences for the baby including less favourable neonatal body composition, infant weight gain and increased likelihood of developing obesity, metabolic disease, diabetes, asthma or cardiovascular disease in later life[54 55 56 10 57]

Weight loss pre-pregnancy improves pregnancy outcomes but significant weight loss peri-conception may be inadvisable.

Bariatric surgery and pharmacological agents can be used to assist weight loss including GLP-1 and GLP-1/GIP agonists, phenteramine/topiramate, Naltrexone/bupropion and others have been proposed to improve pregnancy outcomes in women with high BMI. In most studies, bariatric surgery reduces rates of gestational diabetes and hypertensive disorders of pregnancy. It is also associated with increased rates of small for gestational age babies. There is less evidence available for the impact of pharmacological weight loss methods and the impact on pregnancy and its outcomes.

Where nutrition is compromised in the setting of rapid weight loss, conception is inadvisable. For example, most bariatric surgical guidelines suggest deferring pregnancy for 12-18 months following surgery. This relates primarily to the GLP-1 and GLP-1/GIP agonists and bariatric surgery, but rapid weight loss at the time of conception and in early pregnancy is not recommended regardless of method of weight loss.

Background – GLP-1 agonist and other weight loss Medications

GLP-1 agonist and GLP-1/GIP agonist medications are gastrointestinal incretin hormones administered either as an injection or a tablet to improve blood sugar control in adults who have type 2 diabetes. They are also frequently used to aid weight loss. Weight loss during pregnancy is not recommended, nor is rapid weight loss immediately prior to pregnancy[58]

These medications may include:

- Semaglutide – brand names include Ozempic, Rybelsus, Wegovy
- Dulaglutide – brand names include Trulicity
- Tirzepatide – brand names include Monjarou
- Liraglutide - brand names include Saxenda

There are two main concerns relating to the use of the GLP1 or GLP1-GIP agonist medications whilst a patient is undergoing fertility treatment:

- Anaesthetic concerns relating to the delayed emptying of the stomach. The administration of sedation or general anaesthetic inhibits physiological mechanisms that usually prevent stomach contents refluxing back into the mouth and being aspirated into the lungs. Patients' who fast for six hours prior to surgery usually have minimal stomach contents, however whilst a patient is using a GLP1 or GLP1-GIP agonist weight loss medication, they may have a full stomach at the time of anaesthetic administration, despite fasting prior to their surgery. The delay in stomach emptying can persist for up to eight weeks after the cessation of these medications[59]
- The effect of GLP1 or GLP1-GIP agonist medications on fertility has not been established, although a higher rate of miscarriage in animals has been reported[60]. GLP1 or GLP1-GIP agonist medications are pregnancy category D indicating that there is evidence of risk to the fetus as a result of the use of GLP1 or GLP1-GIP agonist medications. In pregnant rats, there is evidence of embryo-fetal toxicity including lethality, impaired fetal growth and an increased rate of fetal malformations including kidney, liver and skeletal abnormalities. Abnormalities were also observed in the fetuses of pregnant monkeys and there was an increased rate of early pregnancy loss [61] GLP1 or GLP1-GIP agonist medications have a long half-life of approximately one week. This means that if a GLP1 or GLP1-GIP agonist medication is administered on one day with no subsequent administration, the circulating blood concentration one week later would be half of what it was at the time of initial administration. Thus, GLP1 or GLP1-GIP agonist medications remain in the blood and tissue for a prolonged amount of time after administration[61.] Consequently, the manufacturers of GLP1 or GLP1-GIP agonist medications recommend that patients use contraception whilst being treated with a GLP1 or GLP1-GIP agonist medication and that pregnancy should be avoided for at least two months after the cessation of use of a GLP1 or GLP1-GIP agonist medication[60 61]

To date, there have been no studies to determine whether the administration of GLP1 or GLP1-GIP agonist medications to male partners affects their fertility or if this administration increases the risk of fetal abnormalities. As a general rule, paternal exposures are unlikely to increase risks to a pregnancy, therefore current advice does not recommend the cessation of use of GLP1 or GLP1-GIP agonist medications by the male partner prior to commencing attempts to conceive or undergoing fertility treatment.[60]

Background – Bariatric Surgery

Bariatric surgical procedures may include:

- Sleeve gastrectomy in which the volume of the stomach is reduced by 75%; weight loss occurs due to the limitation on food intake capacity and the excision of ghrelin-secreting cells in the stomach[62]
- Roux-en-Y gastric bypass in which the volume of the stomach is reduced to 15-30mL and the proximal small intestine is surgically bypassed with food being diverted to the distal

small intestine; weight loss occurs due to the limitation on food intake capacity, the reduced absorption of nutrients and the increase in gut hormone secretion decreases appetite [62]
- Adjustable gastric band procedures which involve the placement of an inflatable restrictive band around the upper stomach, narrowing the opening to the lower stomach; weight loss occurs secondary to the limitation of food intake and a reduction in appetite [63]
- Biliopancreatic diversion with duodenal switch
- Intragastric balloon
- Vertical banded gastric gastroplasty

Whilst bariatric surgery has been demonstrated to result in weight loss and improvement in obesity-related comorbidities[62 63 58] it is associated with a number of adverse events including:

- Surgical complications
- Postprandial dumping syndromes[58]
- Micronutrient deficiencies[58]
- Derangements in endocrine and metabolic homeostasis [64 65 66]
- Pregnancy related complications including small for gestational age, preterm birth, congenital abnormalities, perinatal mortality and maternal morbidity/mortality[67 68]

Gastric bypass may lead to deficiencies in macronutrients including vitamin A, vitamin B12, vitamin D, calcium, iron, selenium, zinc and copper; and the patient may need to supplement their diet with a multivitamin. Protein intake should also be greater than 60g/day[78 79]

Risks in pregnancy associated with prior bariatric surgery include:

- Surgical complications – small bowel obstruction, internal herniation[58] gastric band erosion, cholelithiasis, gastric band slippage[58]
- Upper abdominal pain – occurs in 46% of pregnancies after bariatric surgery, with associated risk of preterm birth and lower birth weight in women in which abdominal pain occurs[69]
- Internal herniation – occurs in 32.8% of pregnancies[69]

Several consensus guidelines recommend the avoidance of pregnancy after bariatric surgery due to rapid post-operative weight loss,these include:

- Medical Journal of Australia – Pregnancy should be delayed by at least 12-18 months after bariatric surgery[69]
- New Zealand Ministry of Health – Women who have undergone bariatric surgery should not conceive for twelve months after surgery during the period of rapid weight loss[70 71]
- American Association of Clinical Endocrinologists, the Obesity Society, and American Society for Metabolic and Bariatric Surgery – Pregnancy should be delayed by at least 12-18 months after bariatric surgery[72]
- UK Consensus guidelines – Postpone pregnancy until a stable weight has been achieved[58]

As obesity is associated with impaired fertility secondary to PCOS and metabolic syndrome, many obese women may believe they are infertile and, consequently believe the use of contraception is not warranted. Spontaneous fertility improves after bariatric surgery [58 73 74] therefore contraception

should be discussed in women who plan to undertake or have recently undertaken bariatric surgery. Long active contraceptive methods such as the Mirena IUD are preferred due to the decreased efficacy of the oral contraceptive pill due to post-operative malabsorption[75 76 77 78] and the relative contraindication for combined oral contraceptive use in obese women due to the risk of venous thromboembolism[58]

3.4 CBR implementation plan

The revised CBR will be distributed to all medical, nursing and midwifery staff via @health email. The CBR will be discussed at ward meetings, education and patient quality and safety meetings. Education will occur through in-services, open forum and local ward implementation strategies to address changes to practice. The staff are asked to respond to an email or sign an audit sheet in their clinical area to acknowledge they have read and understood the revised CBR. The CBR will be uploaded to the CBR tab on the intranet and staff are informed how to access

3.5 Related Policies/procedures

- IVF – Management & Treatment of a superovulation cycle
  In Vitro Fertilisation (IVF) - Management and Treatment of a Superovulation Cycle
- IVF – Embryo transfer
  In Vitro Fertilisation (IVF) - Embryo Transfer

3.6 References

1. World Health Organization (WHO) A healthy lifestyle – WHO recommendations. 6th May 2010 https://www.who.int/europe/news-room/fact-sheets/item/a-healthy-lifestyle---who-recommendations#:~:text=Body%20mass%20index%20%2D%20BMI&text=It%20is%20defined%20as%20a,1.752%20(m2)%20%3D%2022.9%20BMI Retrieved 23/07/2024.
2. Wittemer C, Ohl J, Baillly M, Bettaahar-Lebugle K, Nisand I (2000) Does body mass index of infertile women have an impact on IVF procedure and outcome? J Assist Reprod Genet, 17(10): 547-552
3. Tang S, Huang J, Lin J, Kuang Y (2021) Adverse effects of pre-pregnancy maternal underweight on pregnancy and perinatal outcomes in a freeze-all policy. BMC Pregnancy and Childbirth, vol 21(1): 32
4. Cai J, Liu L, Zhang J, Qiu H, Jiang X, Pi P, Sha A, Ren J (2017) Low body mass index compromises live birth rate in fresh transfer in vitro fertilization cycles: a retrospective study in a Chinese population. Fertility and Sterility, vol 107(2): 422-429
5. Gesink Law DC, Maclehose RF, Longnecker MP (2007) Obesity and time to pregnancy, Human Reproduction, vol 22(2), pg 414-420
6. Amiri M, Tehrani FR (2020) Potential adverse effects of female and male obesity on fertility: a narrative review. Int J Endocrinol Metab, vol 18(3):e101776. Doi: 10.5812/ijem.101776
7. Zhu L, Zhou B, Zhu X, Cheng F, Pan Y, Zhou Y, Wu Y, Xu Q (2022) Association between body mass index and female infertility in the United States: Data from the National Health and Nutrition Examination Survey 2013-2018

8. Wu LL, Norman RJ, Robker RL (2011) The impact of obesity on oocytes: evidence for lipotoxicity mechanisms. Reprod Fertil Dev, vol 24(1): 29-34
9. Robker RL (2008) Evidence that obesity alters the quality of oocytes and embryos. Pathophysiology vol 15(2): 115-21
10. RANZCOG (2021) Pre-pregnancy counselling. Best Practice Statement (C-Obs-3a). Accessed 21/09/2024 https://ranzcog.edu.au/wp-content/uploads/2022/05/Pre-pregnancy-Counselling.pdf
11. Brewer CJ, Balen AH (2010) The adverse effects of obesity on conception and implantation. Reproduction, vol 140(3): 347-64
12. Pantasri T, Norman RJ (2014) The effects of being overweight and obesity on female reproduction: a review. Gynecol Endocrinol, vol 30: 90-94
13. Provost MP, Acharya KS, Acharya CR, Yeh JS, Steward RG, Eaton JL, Goldfarb JM, Muasher SJ (2016) Pregnancy outcomes decline with increasing body mass index: analysis of 239,127 fresh autologous in vitro fertilization cycles from 2008-2010 Society for Assisted Reproductive Technology registry. Fertility and Sterility, vol 105(3): 663-669
14. Lo W, Rai R, Hameed A, Brailsford SR, Al-Ghamdi AA, Regan L (2012) The effect of body mass index on the outcome of pregnancy in women with recurrent miscarriage. J Family Community Med, vol 19(3), pp 167-171
15. Zhang C, Wu Y, Zhang D (2018) Maternal prepregnancy obesity and the risk of shoulder dystocia: a meta-analysis, BJOG, vol 125(4): 407-13
16. Leddy MA, Power ML, Schulkin J (2008) The impact of maternal obesity on maternal and fetal health. Reviews in Obstetrics & Gynecology, vol 1(4)
17. Rahnemaei FA, Abdi F, Kazemian E, Shaterian N, Shaterian N, Aeen FB (2022) Association between body mass index in the first half of the pregnancy and gestational diabetes: a systematic review. SAGE Open Med, vol 10
18. D'Souza R, Horyn I, Pavalagantharajah S, Zaffar, Jacob CE (2019) American Journal of Obstetrics & Gynecology, vol 1(4)
19. Yao D, Chang Q, Wu QJ, Gao SY, Zhao H, Liu YS, Jiang YT, Zhao YH (2020) Relationship between maternal central obesity and the risk of gestational diabetes mellitus: a systematic review and meta-analysis of cohort studies. J Diabetes Res, doi: 10.1155/2020/6303820
20. McIntyre HD, Gibbons KS, Flenady VJ, Callaway LK (2012) Overweight and obesity in Australian mothers: epidemic or endemic? MJA, vol 196(3): 184-8
21. Davies GAL, Maxwell C, McLeod (2010) Obesity in pregnancy. J Obstet Gynaecol Can, vol 32(2): 165-173
22. Saucedo M, Esteves-Pereira AP, Pencole L, Rigouzzo A, Proust A, Bouvier-Colle MH, CNEM study group, Deneux-Tharaux C (2021) Understanding maternal mortality in women with obesity and the role of care they receive: a national case-control study. Int J Obes, vol 45(1): 258-265
23. Dachew BA, Ayano G, Betts K, Alati R (2021) The impact of pre-pregnancy BMI on maternal depressive and anxiety symptoms during pregnancy and the postpartum period: a systematic review and meta-analysis. J Affect Disord, vol 281: 321–30

24. Holton S, Fisher J, Nguyen H, Brown WJ, Tran T (2019) Pre-pregnancy body mass index and the risk of antenatal depression and anxiety. Women and Birth, vol 32(6): e508-14
25. Griffiths A, Shannon OM, Brown T, Davison M, Swann C, Jones A, Ells L, Matu J (2023) Associations between anxiety, depression and weight status during and after pregnancy: a systematic review and meta-analysis. Obesity Reviews, vol 25(3): e13668
26. Molyneaux E, Poston L, Ashurst-Williams S, Howard LM (2014) Obesity and mental disorders during pregnancy and postpartum: a systematic review and meta-analysis. Obstet Gynecol, vol 123(4): 857-67
27. Johansson S, Villamor E, Altman M, Edstedt Bonamy AK, Granath F, Cnattingius S (2014) Maternal overweight and obesity in early pregnancy and risk of infant mortality: a population based cohort study in Sweden. BMJ, Dec 2:349:g6572. doi: 10.1136/bmj.g6572
28. Kurz CF, Konig AN (2020) The causal influence of maternal obesity on preterm birth, The Lancet Diabetes Endocrinol, vol 8(2): 101-3
29. Liu B, Xu G, Sun Y, Du Y, Gao R, Snetselaar LG, Santillan MK, Bao W (2019) Association between maternal pre-pregnancy obesity and preterm birth according to maternal age and race or ethnicity: a population-based study. Lancet Diabetes Endocrinol, vol 7(9): 707-14
30. Lewandowska M (2021) Maternal obesity and risk of low birth weight, fetal growth restriction and macrosomia: multiple analyses. Nutrients, vol 36
31. Radulescu L, Munteanu O, Popa F, Cirstoiu (2013) The implications and consequences of maternal obesity on fetal intrauterine growth restriction. J Med Life, vol 6(3): 292-8
32. Meehan S, Beck CR, Mair-Jenkins J, Leonardi-Bee J, Puleston R (2014) Maternal obesity and infant mortality: a meta-analysis. Pediatrics, vol 133(5):863-71
33. Kristensen J, Vestergaard M, Wisbord K, Kesmodel U, Jorgen Secher N (2005) Pre-pregnancy weight and the risk of stillbirth and neonatal death. BJOG, vol 112(4): 403-8
34. Knight M, Bunch K, Tuffnell D, Shakespeare J, Kotnis R, Kenyon S, Kurinczuk JJ (Eds.) on behalf of MBRRACE-UK (2019) Saving Lives, Improving Mothers' Care - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2015-17. Oxford: National Perinatal Epidemiology Unit, University of Oxford
35. Arrowsmith S, Wray S, Quenby S (2011) Maternal obesity and labour complications following induction of labour in prolonged pregnancy. BJOG, vol 118: 578-588
36. Ashraf R, Maxwell C, 18 Induction of labour in pregnant individuals with obesity. Best Pract Res Clin Obstet Gynaecol, vol 79:70-80
37. Hautakangas T, Uotila J, Kontiainen J, Huhtala H, Palomaki O (2022) Impact of obesity on uterine contractile activity during labour: a blinded analysis of a randomised controlled trial cohort. BJOG, vol 192: 1790-97
38. Carlhäll S, Källén K, Blomberg M (2013) Maternal body mass index and duration of labor. Eur J Obstet Gynecol Reprod Biol, vol 171:49–53
39. Cedergren MI (2009) Non-elective caesarean delivery due to ineffective uterine contractility or due to obstructed labour in relation to maternal body mass index. Eur J Obstet Gynecol Reprod Biol, vol 145: 163–6

40. Frolova AI, Stout MJ, Carter EB, Macones GA, Cahill AG, Raghuraman N (2021) Internal fetal and uterine monitoring in obese patients and maternal obstetrical outcomes, Am J Obstet Gynecol MFM vol 3:100282
41. Sullivan EA, Dickinson JE, Vaughan GA, Peek MJ, Ellwood D, Homer CSE, Knight M, McLintock C, Wang A, Pollock W, Jackson Pulver L, Li Z, Javid N, Denney-Wilson E, Callaway (2015) Maternal super-obesity and perinatal outcomes in Australia: a national population-based cohort study. BMC Pregnancy and Childbirth, 15, article number 322
42. Butwick AJ, Abreo A, Bateman BT, Lee HC, El-Sayed YY, Stephansson O, Flood P (2018) The effect of maternal body mass index on postpartum hemorrhage. Anesthesiology, vol 128(4): 774-783
43. Blomberg M (2011) Maternal obesity and risk of postpartum hemorrhage. Obstetrics & Gynecology, vol 118(3): 561-68
44. Australian Institute of Health and Welfare (2024) Media Release: Maternal Body Mass Index. Australia's Mother's and Babies. Last updated Jul 2024. Accessed 21/09/2024 https://www.aihw.gov.au/reports/mothers-babies/australias-mothers-babies/contents/antenatal-period/maternal-body-mass-index
45. Vallejo MC (2007) Aesthetic management of the morbidly obese parturient. Curr Opin Anaesthesiol, vol 20(3): 175-80
46. Roofthooft E (2009) Anesthesia for the morbidly obese partuirient. Curr Opin Anaesthesiol, vol 22(3): 341-6
47. Soens MA, Birnbach DJ, Ranasinghe JS, van Zundert A (2008) Obstetric anaesthesia for the obese and morbidly obese patient: an ounce of prevention is worth more than a pound of treatment. Acta Anaesthesiol Scand, vol 52(1): 6-19
48. Saravanakuman K, Rao SG, Cooper GM (2005) Obesity and obstetric anaesthesia. Anaesthesia, vol 61(16): 36-48
49. Smid MC, Dotters-Katz SK, Vaught AJ, Vladutiu CJ, Boggess KA, Stamilio DM (2017) Maternal super obesity and risk for intensive care unit admission in the MFMU caesarean registry. Acata Obstetricia et Gynecologica Scandinavica, vol 96(8): 976-83
50. Perez MR, de Castro LSA, Chang YS, Sanudo A, Marcacine KO, Amir LH, Ross MG, Coca KP (2021) Breastfeeding practices and problems among obese women compared with nonobese women in a Brazilian hospital. Womens Health Rep, vol 2(1): 219-26
51. Turcksin R, Bel S, Galjaard S, Devlieger R (2014) Maternal obesity and breastfeeding intention, initiation, intensity and duration: a systematic review. Matern Child Nutr, vol 10(2): 166-83
52. Amir LH, Donath S (2007) A systematic review of maternal obesity and breastfeeding intention, initiation and duration. BMC pregnancy and childbirth, vol 7: 9
53. Ertel KA, Huang T, Rifas-Shiman SL, Kleinman K, Rich-Edwards J, Oken E (2017) Perinatal weight and risk of prenatal and postpartum depressive symptoms. Ann Epidemiol, vol 27(11):695–700e1
54. Eriksson JG, Sandboge S, Salonen MK, Kajantie E, Osmond C (2014) Long-term consequences of maternal overweight in pregnancy on offspring later health: findings from the Helsinki Birth Cohort Study. Ann Med, vol 46(6): 434-8

55. Eriksson JG, Sandboge S, Salonen M, Kajantie E, Osmond (2015) Maternal weight in pregnancy and offspring body composition in late adulthood: findings from the Helsinki Birth Cohort Study (HBCS), Ann Med, vol 47(2); 94-9
56. Godfrey KM, Reynolds RM, Prescott SL, Nyirenda M, Jaddoe VWV, Eriksson JG, Broekman BFP (2017) Influence of maternal obesity on the long-term health of offspring. Lancet Diabetes Endocrinol, vol 5(1): 53-64
57. Whitaker RC (2004) Predicting preschooler obesity at birth: the role of maternal obesity in early pregnancy. Pediatrics, vol 114(1): e29-36
58. Shawe J, Ceulemans D, Akhter Z, Neff K, Hart K, Neslehurst N, Stotl I, Agrawal S, Steegers-Theunissen R, Taheri S, Greenslade B, Rankin J, Huda B, Douek I, Galjaard S, Blumenfeld O, Robinson A, Whyte M, Mathews E, Devlieger R (2019) Pregnancy after bariatric surgery: consensus recommendations for periconception, antenatal and postnatal care. Obesity Reviews, vol 20: 1507-22
59. Australian and New Zealand College of Anaesthetists (ANZCA) 2023. Media Release – Surgery warning on use of popular weight loss drugs. https://www.anzca.edu.au/resources/media-releases/2023-media-releases/gastric-emptying-mr.pdf
60. MotherToBaby, 2024. Semaglutide. In MotherToBaby online. https://mothertobaby.org/fact-sheets/semaglutide/ Retrieved August 1, 2024
61. MIMS Australia, 2024. Ozempic – Semaglutide. In MIMS Online. https://app.emimselite.com.acs.hcn.com.au/medicineview?id=12401b0e-e691-4596-97eb-abd500c6c944&type=abbpi Retrieved August 1, 2024.
62. Peterli R, Steinert RE, Woelnerhanssen B, Peters T, Christoffel-Courtin C, Gass M, Kern B, von Fluee M, Beglinger (2012) Metabolic and hormonal changes after laparoscopic Roux-en-Y gastric bypass and sleeve gastrectomy: a randomized, prospective trial. Obesity Surgery, vol 22(5): 740-8
63. Cobourn CS and Dixon JB (2023) Laparoscopic Adjustable Gastric Banding: The Technique. In: Agrawal, S. (eds) Obesity, Bariatric and Metabolic Surgery. Springer, Cham. https://doi.org/10.1007/978-3-030-60596-4_30
64. Ikramuddin S, Korner J, Lee WJ (2103) Roux-en-Y gastric bypass vs intensive medical management for the control of type 2 diabetes, hypertension and hyperlipidaemia in the Diabetes Surgery Study randomized clinical trial. JAMA, vol 309(21): 2240-49
65. Jakobsen GS, Smastuen MC, Sandbu R (2018) Association of bariatric surgery vs medical obesity treatment with long-term medical complications and obesity-related comorbidities. JAMA, vol 319(3): 291-301
66. Gloy VL, Briel M, Bhatt DL (2013) Bariatric surgery versus non-surgical treatment for obesity: a systematic review and meta-analysis of randomised controlled trials. BMJ, vol 347: f5934
67. Parent B, Martopullo I, Weiss NS, Khandelwal S, Fay EE, Rowhani-Rahbar A (2017) Bariatric surgery in women of childbearing age, timing between an operation and birth, and associated perinatal complications. JAMA Surg, vol 152(2):1-8

68. Galazis N, Docheva N, Simillis C (2014) Nicolaides KH. Maternal and neonatal outcomes in women undergoing bariatric surgery: a systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol, vol 181: 45-53
69. Petersen L, Lauenborg J, Svare J, Nilas L (2017) The impact of upper abdominal pain during pregnancy following a gastric bypass. Obes Surg, vol 27(3): 688-693
70. New Zealand Ministry of Health (2014) Guidance for healthy weight gain in pregnancy. Wellington: Ministry of Health. Accessed 21/09/2024 https://ranzcog.edu.au/wp-content/uploads/2022/05/Guidance-for-Healthy-Weight-Gain-in-Pregnancy.pdf
71. Guelinckx I, Devlieger R, Vasant G (2009) Reproductive outcome after bariatric surgery: a critical review. Human Reproduction Update, vol 15(2): 189–201
72. Mechanick JI, Youdim A, Jones DB, et al (2013) Clinical practice guidelines for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient — 2013 update: cosponsored by American Association of Clinical Endocrinologists, the Obesity Society, and American Society for Metabolic and Bariatric Surgery. Obesity, vol 21 (Suppl): S1–S27.
73. Mengesha B, Griffin L, Nagle A, Kiley J (2016) Assessment of contraceptive needs in women undergoing bariatric surgery. Contraception, vol 94(1): 74-77
74. Casas RS, Tong I, Bourjelly G (2014) Contraceptive use in women having bariatric surgery. J Gen Intern Med, vol (29): 558
75. Schiatter J (2017) Oral contraceptives after bariatric surgery. Obes Facts, vol 10(2): 303-306
76. Gerrits EG, Ceulemans R, van Hee R, Hendrickx L, Totte E (2003) Contraceptive treatment after biliopancreatic diversion needs consensus. Obes Surg, vol 13(3): 378-382
77. Victor A, Odlind V, Kral JG (1987) Oral contraceptive absorption and sex hormone binding globulins in obese women: effects of jejunoileal bypass. Gastroenterol Clin North Am, vol 16(3): 483-491
78. Andersen AN, Lebech PE, Sorensen TI, Borggaard B (1982) Sex hormone levels and intestinal absorption of estradiol and D-norgestrel in women following bypass surgery for morbid obesity. Int J Obes, vol 6(1):91-96
79. RANZCOG (2019) Vitamin and mineral supplementation in pregnancy. College Statement. Accessed 21/09/2024 https://www.sdb.unipd.it/sites/sdb.unipd.it/files/Obesity%20and%20Pregnancy%20Guide%20Line%20Australian%202014.pdf

ABORIGINAL HEALTH IMPACT STATEMENT DOCUMENTATION

- Considerations for culturally safe and appropriate care provision have been made in the development of this Business Rule and will be accounted for in its implementation.
- When clinical risks are identified for an Aboriginal and/or Torres Strait Islander woman or family, they may require additional supports. This may include Aboriginal health

professionals such as Aboriginal Liaison Officers, health workers or other culturally specific services

4 CULTURAL SUPPORT

1. For a Culturally and Linguistically Diverse CALD woman, notify the nominated cross-cultural health worker during Monday to Friday business hours
2. If the woman is from a non-English speaking background, call the interpreter service: NSW Ministry of Health Policy Directive PD2017_044-Interpreters Standard Procedures for Working with Health Care Interpreters.

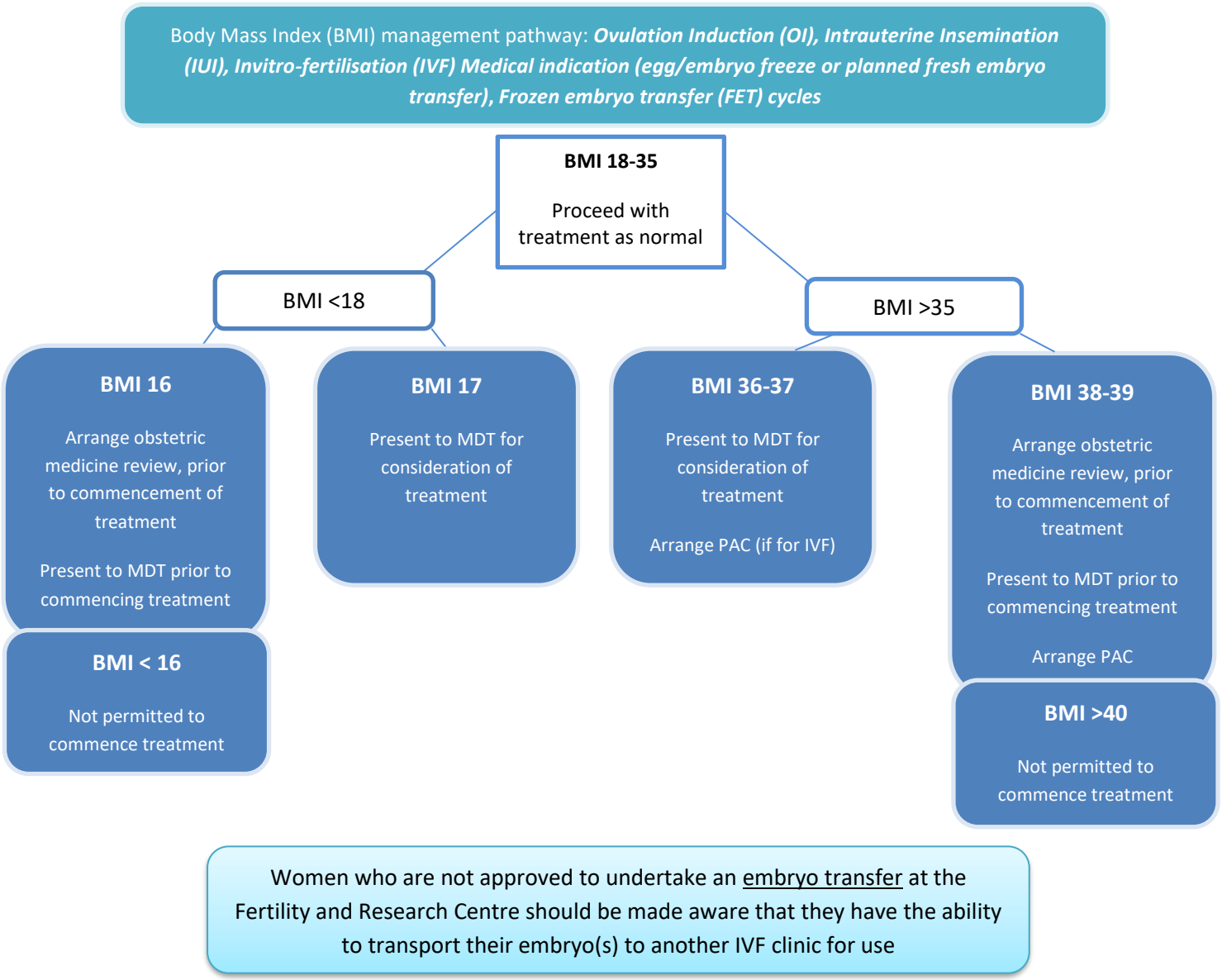
5 NATIONAL STANDARDS

- Standard 5 -Comprehensive Care

6 REVISION AND APPROVAL HISTORY

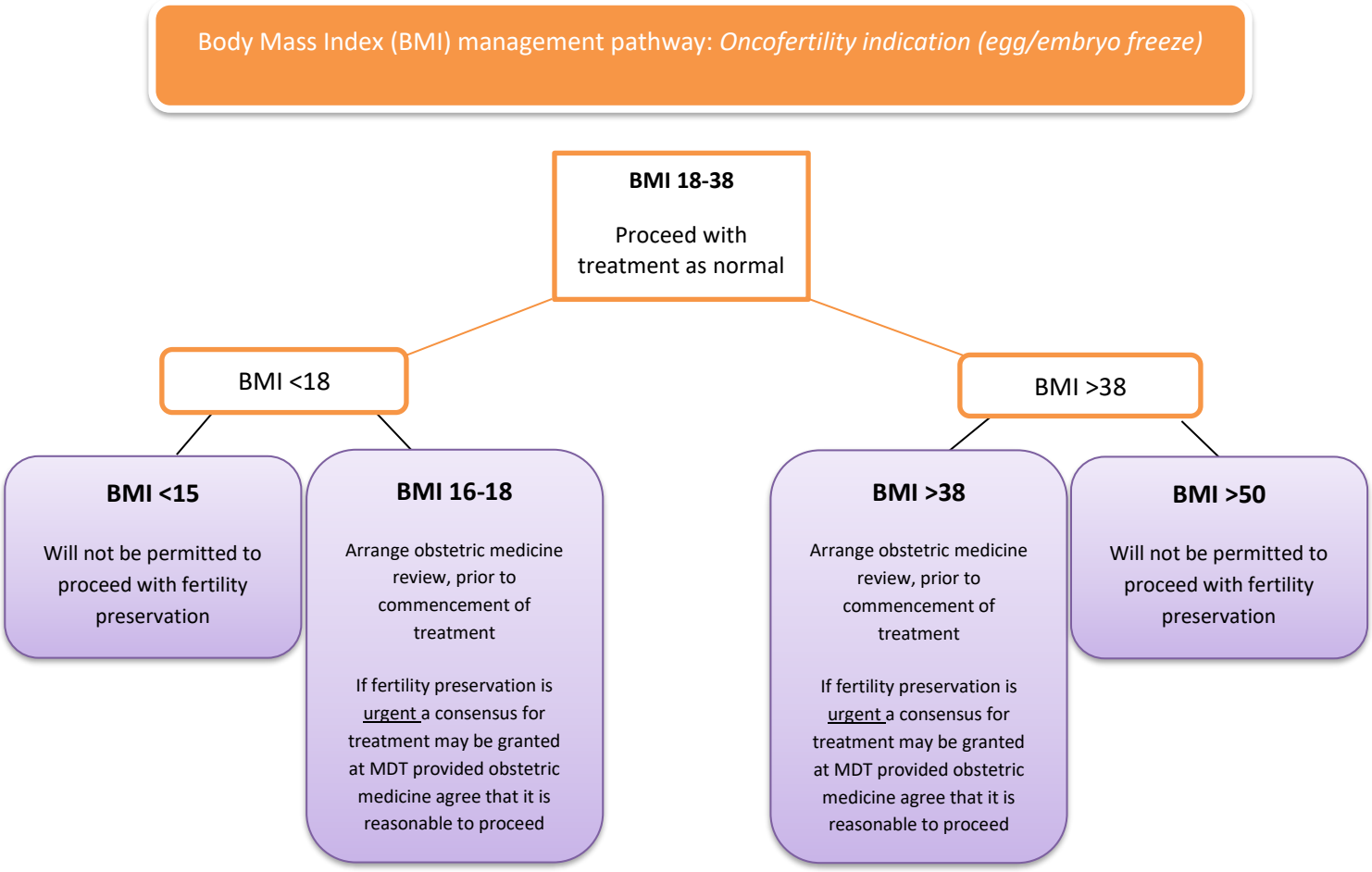
Date	Revision No.	Author and Approval
6.2.25	1	Dr Rachael Rodgers
17.3.25	1	BRGC

Appendix A



Women who are not approved to undertake an embryo transfer at the Fertility and Research Centre should be made aware that they have the ability to transport their embryo(s) to another IVF clinic for use

Appendix B


Body Mass Index (BMI) management pathway: *Oncofertility indication (egg/embryo freeze)*
BMI 18-38
Proceed with treatment as normal
BMI <18
BMI >38
BMI <15
Will not be permitted to proceed with fertility preservation
BMI 16-18
Arrange obstetric medicine review, prior to commencement of treatment
If fertility preservation is urgent a consensus for treatment may be granted at MDT provided obstetric medicine agree that it is reasonable to proceed
BMI >38
Arrange obstetric medicine review, prior to commencement of treatment
If fertility preservation is urgent a consensus for treatment may be granted at MDT provided obstetric medicine agree that it is reasonable to proceed
BMI >50
Will not be permitted to proceed with fertility preservation