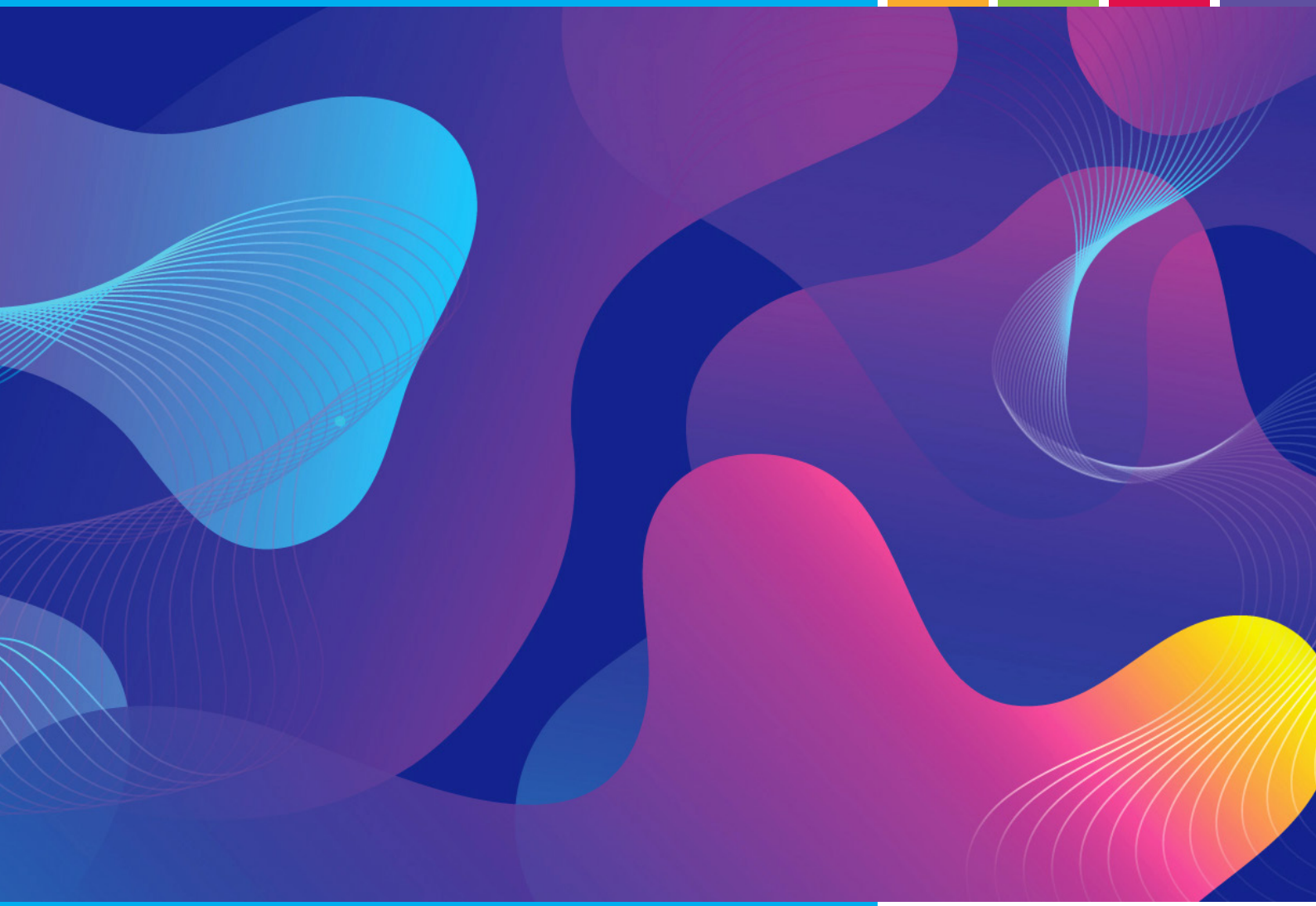
Royal College of Nursing

Male Factor Fertility

CLINICAL PROFESSIONAL RESOURCE



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This publication is endorsed by:

This publication was prepared with input from the British Fertility Society.

This document has been designed in collaboration with our members to ensure it meets most accessibility standards. However, if this does not fit your requirements, please contact corporate.communications@rcn.org.uk

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Notes

It is recognised that services may be provided by registered nurses and midwives, health care support workers, assistant practitioners, nursing associates and student nurses and midwives, and trainee nursing associates. For ease of reading, the generic terms 'nurse', 'nursing' and 'nurses' are used throughout this document.

The RCN recognises and embraces our gender diverse society and encourages this guideline to be used by and/or applied to people who identify as non-binary, transgender or gender fluid.

The RCN also recognises that not all those born female or male will identify with the same gender nouns, but for ease of reading use the term woman/man/men and where appropriate acknowledge non-binary terms.

1. Introduction

Male fertility is an essential aspect of human reproduction. In recent years, there has been growing concern about male fertility and declining sperm quality. Whilst there are just estimates of the proportion of fertility issues in heterosexual couples that is attributable to the male partner, most estimations would suggest relevance in at least half of cases though this is not always diagnosed. Male factor fertility has significant emotional and psychological impacts on those looking to get pregnant.

It is important for all nurses to have a good understanding of male factor fertility influences and the factors that can impact it, especially as nurses may often be the first point of contact for patients when they have questions. This guidance has been developed, taking into account that some nurses may have a limited knowledge or understanding of the issues relating to male fertility, and the tests and the treatments available.

Many factors including medical history and lifestyle may affect chances of successful conception and male factor fertility and further guidance is needed for nurses working in fertility care settings, and all nurses including, for example, those working in cancer care, urology, and general practice.

This guidance aims to raise awareness of:

- male reproductive anatomy and physiology
- relevant information for couples trying to conceive
- mental and physical challenges faced by men with male factor fertility
- care pathways for accessing information
- testing relating to male factor fertility, including how to interpret reports.
- identifying possible treatment options
- sources of further information.

By expanding nurses' knowledge of male factors in fertility, it is hoped that health care professionals can better support those who may be dealing with fertility issues and help them to access the care, emotional support and resources that they may need to start a family.

Communication skills

As health care professionals, understanding the impact of fertility on the patient (and on the partner), requires sensitivity. Men should be encouraged to escalate any concerns regarding their fertility. This will involve disclosure of personal information, which can be challenging; therefore, it is paramount to establish a rapport to foster an open and honest environment. Nurses should signpost men to the appropriate medical professionals accordingly.

It is important to be aware that not everyone can communicate effectively. Nurses need to be aware of barriers due to differing social and ethnic backgrounds; foreign languages particularly when English is not a first language; and disabilities such as hearing or sight loss, cerebral palsy or learning difficulties. Furthermore, the vocabulary used by health care professionals may sometimes need explaining; in this situation experienced translators and those with relevant social knowledge are key. The skills of being able to read and interpret verbal and non-verbal behaviours as well as understanding of social norms for a given community becomes an essential part of care provision. An ability to

paraphrase and explain details may also help some individuals and couples digest the potential psychosocial consequences of any diagnosis and treatment.

Providing evidence-based information can help reduce levels of anxiety and fears. Signposting to sources of support and evidence-based information should aid in the empowerment of decision making. This should include provision of information to help understanding of lifestyle options and possible fertility treatments.

At every stage, patients should be reassured that ongoing support is available, either individually or as a couple. Providing reassurance, support, and inclusion at every step of the way can help reduce the stigma that is sometimes associated with issues that arise when reproduction becomes medical rather than natural.

Competence for best practice

The RCN has previously produced guidance for nurses working in fertility care on the national standards for education and career progression. Please visit: **rcn.org.uk/professional-development/publications/rcn-education-and-career-progression-framework-for-fertility-nursing-009-926-uk-pub**

Appendix 1 of this publication outlines the knowledge competence required by nurses working in fertility care to enhance their skills around male factor fertility.

2. One man's journey

This section provides the view of a man who faced male factor fertility. Toby Trice is a British racing driver on a quest to raise awareness for fertility through motorsport. The RCN would like to thank Toby for sharing his patient journey, to increase understanding of how challenging male factor fertility can be.

Toby writes...

"My journey, although I hate the term, is one of the hardest things I have ever had to deal with emotionally. Let me rewind back to the start to give context of how one's emotions and desperation to have a child builds over time.

At the very start of our family planning, both of us young and healthy, we were ready to have our family. From our understanding of our education at school we assumed that we would stop our contraception and the following month we would fall pregnant, and our dreams come true. Little did we know at the time that we were about to embark on a six-year long rollercoaster that would really test us. Me, being a typical guy, I buried my head in the sand not wanting to accept the truth that we were going to have a struggle and tried my best to look as optimistic about the situation as one could.

Fertility treatment can be hugely isolating, feeling completely alienated from society. When one decides to have children, it is quite common that friends and family around will either have children, be pregnant or start trying themselves. When there is so much joy and celebration of their news one finds themselves being pushed away, almost silenced. The questions come, why haven't you had children yet? etc.

The first time I had any form of fertility test, a semen analysis, I felt hugely embarrassed. Dropping a pot of my semen off to a receptionist, hot flustered and a huge anxiety hoping that I had sperm present. The results came in and I vividly remember sitting in a room with my partner and a gynaecologist and it was like I was a fly on the wall. With the results being spelt out to my partner about the good and bad. As if I wasn't there, no care or consideration from the consultant about how my emotions were running so high. I just smiled and kept quiet similarly to a child being good at a hospital appointment. As if this situation wasn't bad enough, I just wish I was spoken to, like an adult and a simple "How are you?" would have made so many of those emotions go away.

Fast forward some time and now we were undergoing IVF treatment. It is important to note that by this point, everything has been exhausted and our hopes were even higher than before. Praying that this would finally be it. The process feels very much like walking on eggshells – you get to the other side and our life would change forever. However, there are so many hurdles and success rates are very low that I found it very difficult to believe it would work.

Egg collection day, and I remember feeling very anxious as my partner was taken down to theatre. Knowing she was taken good care of, and the nurses were incredibly reassuring I was soon asked to go to the room to produce my sample. I remember the nurse saying how much longer they would be before my partner was back. That put a psychological time constraint on producing my sample. These few words created huge pressure as I wanted to be done and out before she was back. I remember sobbing in this room for a while as it suddenly dawned on me that the years of trying naturally for a baby, which should have been a moment of romance we can remember. Yet here I was in a cold box room, with a pot and nothing but my own thoughts.

Quite often the focus is on the woman, and quite right as there is so much more they are going through. But the sensitivity towards men and in particular my experience felt very cold. Almost an attitude of go in there and just get what you need done, after all it is just the easy bit.

It is very important to really understand all the complex set of emotions a man is going through during a fertility journey.

Firstly, I wanted to do everything I could to take good care of my partner. Watching her body change through the treatment, her emotions run wild from the hormones. I just wanted her to be okay and pushed my feeling aside.

There is then the pressure to maintain a job, in my case a very high-pressured job that I couldn't risk losing as the further we go down this road, the more treatment would be necessary.

Which brings me quite nicely onto the financial strain this has. The cost of the treatment is huge, we gave up buying a house so we could throw everything at it. The pressure of this alone was occasionally overwhelming.

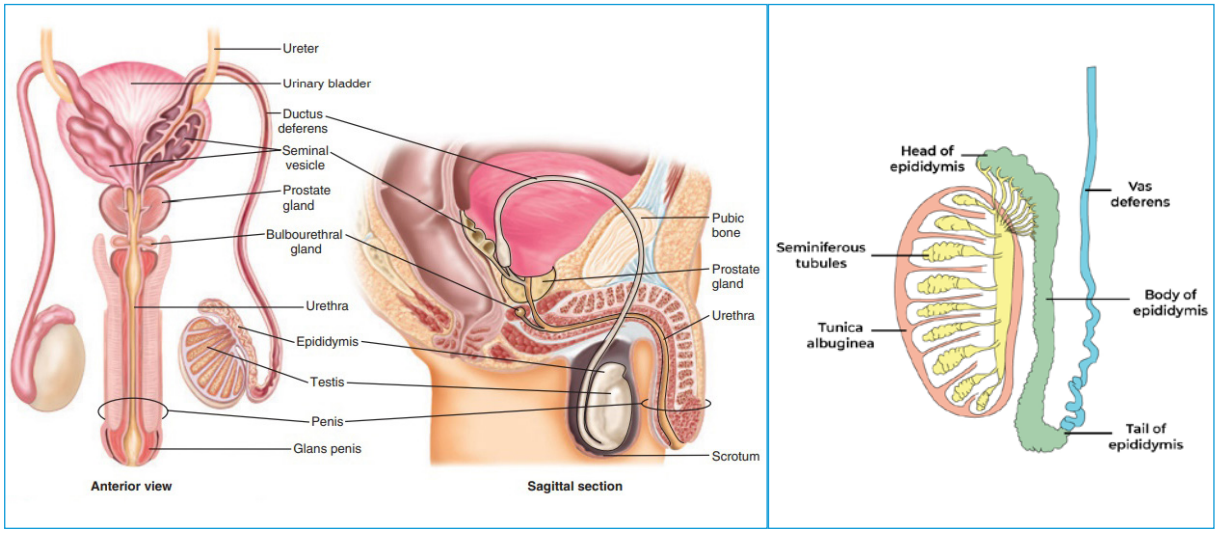
When we lost our IVF cycle and received the news, it was absolutely earth shattering, like the world had ended. So much energy had gone into the hope that this treatment would work and that empty feeling that comes after, to this day, haunts me.

I hope this publication gives some guidance and helps to enable health care professionals to better understand, that men need taking care of as well."

3. Anatomy and physiology

This chapter provides an overview of the anatomy and physiology related to male factor fertility, including consideration of genetic conditions, when issues arise, and how to manage them.

Image 1 Diagrammatic representation of male reproductive anatomy/ physiology



Left: image from: **pharmacy180.com/article/anatomy-of-the-male-reproductive-system-3707**
Right: image from: **geeksforgeeks.org/testes-anatomy-and-functions**

Further information on anatomy and physiology is available at:

teachmeanatomy.info/pelvis/the-male-reproductive-system

theurologyfoundation.org/urologyhealth/male-reproductive-organs

healthdirect.gov.au/male-reproductive-system

According to the Human Fertilisation and Embryology Authority, in the UK, male factor fertility is just as common as female factor fertility (HFEA, 2020).

Production of a healthy sperm (spermatogenesis) is a complex process and there are many stages where things can go wrong. It is worth remembering even in a healthy fertile male usually less than 10% of the sperm is 'normal'. Health professionals work to 'skew the odds' by improving the quality of any sperm that are made and improve the chance that they are delivered as healthy as possible to the egg.

Sperm is produced in the seminiferous tubules within the testes. Each sperm is connected to a Sertoli cell that protects and nourishes the sperm as it matures, with lots of its 'sibling' sperm being produced at the same time. The process from first division of a stem cell to delivery of an unattached sperm into the tubule takes around 74 days. Fertile men can produce 100 million sperm per day. The quality of every sperm depends on the man's health and lifestyle in those past 74 days.

Maturation

This is the process where an immature sperm, known as a spermatid, matures into a sperm cell. During this process, a spermatid undergoes a series of changes, including the formation of a head, midpiece and tail.

Firstly, the head of the sperm forms. The head contains the genetic material, including the DNA, that will be passed onto the ovum during fertilisation.

Next, the mitochondria of the spermatid migrate to the base of the head, where they form part of the midpiece. Mitochondria are the energy-producing organelles that will power the forward movement of the sperm.

A mature sperm is designed for a single purpose – to swim to the egg and fertilise it. However, as a result, the sperm loses its ability to repair any cellular damage that occurs along the way, particularly after it breaks away from the protection of the Sertoli cell. As maturation continues, sperm are moved through the epididymis where they acquire many key additional enzymes, the minimum time for this transit is around a week and is simply compared to the final tuning of the cell after it leaves the production-line. During this time sperm also acquire motility.

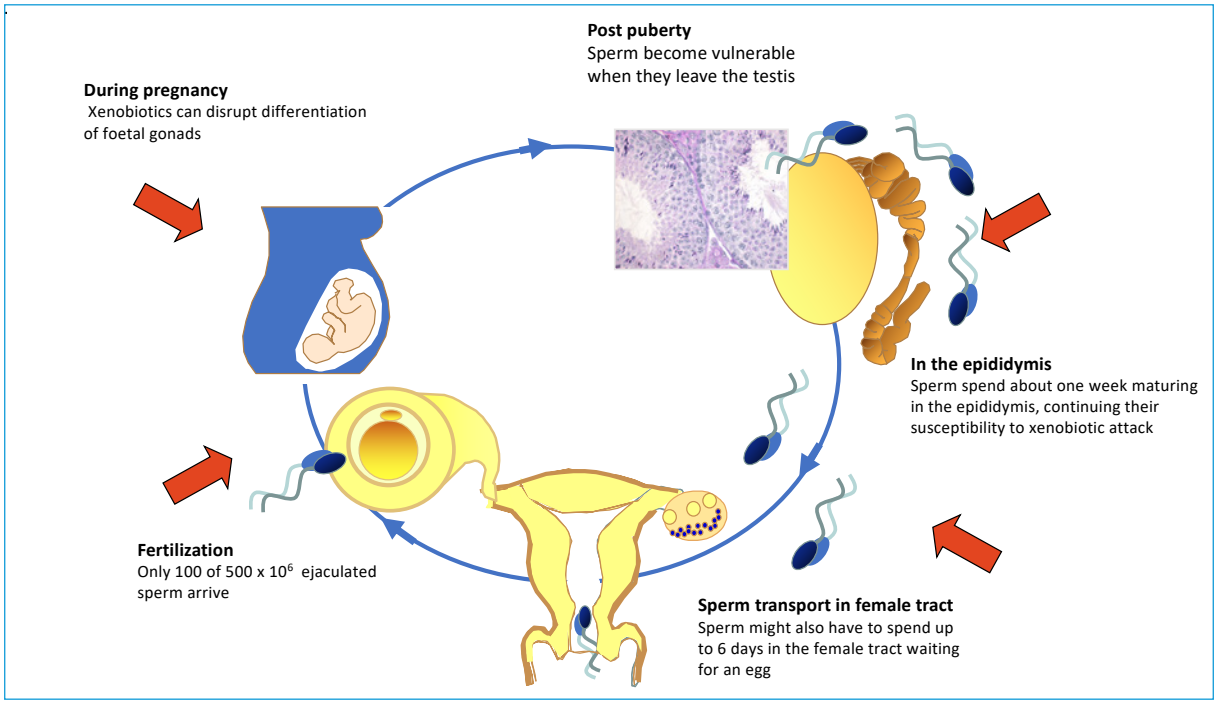
Depending upon frequency of ejaculation sperm can be stored in the epididymis and vas deferens in the male tract for a long time. Long storage is not good for quality and if men have longer abstinences of more than four days increasing numbers of dead and damaged sperm will be present in the ejaculate.

The process of arousal and ejaculation is complex. Only a tiny drop of the volume of semen that we see outside the body comes from vas and testicles. Most is made on demand by other glands during arousal. During the early stages of arousal, the bulbourethral glands produce a clear and colourless fluid, sometimes referred to as ‘pre-ejaculate’ or ‘pre-cum’ this passes through the urethra to make the environment sperm friendly (remembering usually urine passes this same pipe). Some men will have noticeable amounts of pre-ejaculate that leak from the penis during arousal, others may see none; both of these are normal.

The key glands making semen are the seminal vesicles which provide 60-70% of the volume and the prostate gland which provides the remaining 30%. As these secretions are produced on demand, regular ejaculation ensures these are balanced and healthy. It would therefore be recommended when trying for a child that men ejaculate at least every other day, more frequently that that will not be bad, but saving up sperm by longer abstinences does not help and should be discouraged.

4. Sperm production

Image 2 – The vulnerability of sperm



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It is important to take a full clinical history, preferably on his own if possible. This may reveal past illnesses and/or lifestyle factors that may have impacted on a male's fertility. Whenever history is taken it must be recorded in the medical records for the patient.

There are very few targeted health assessment templates for male factor fertility, but it is advised to focus on the key areas below.

- Surgical history (particularly relating to the testes, penis, prostate, retroperitoneal area).
- Medical history (considering cryptorchidism and if so, when this was corrected).
- Family history of fertility of disorders.
- Prescribed medications.
- Non-prescribed medications and recreational drug use.
- Illnesses (acute and chronic) – care should be taken to relate any semen analysis findings with these episodes to ensure there is no mismanagement of the couple due to transient infections.
- Reproductive history.
- Sexual history and function.
- Mental health and support.

Some topics will require further review depending on information provided. If a full urological review is required, this should be discussed with an andrologist or urological specialist.

There are two main categories of male fertility issues – those where sperm production is occurring but there is a problem with transmission, and those where an issue with sperm production.

Issues that can affect sperm transmission

In all these situations men should be encouraged to discuss with a relevant professional.

- **Blockages**: these can occur at any point in any of the tract from the testes to ejaculation. Vasectomy is the commonest cause of acquired obstruction, but infections such as chlamydia can be a cause.
- **Cystic fibrosis**: carrying just one genetic change for this common recessive disorder occurs in around one in 25 people, they will show no external signs of the disease as they only carry one mutation, but it causes a condition known as congenital bilateral absence of the vas deferens (absent vas deferens) in men.
- **Erectile dysfunction**: an inability to achieve or maintain an erection can impact on fertility.
- **Ejaculatory disorders**: these include anejaculation (inability to ejaculate) and retrograde ejaculation (when semen enters the bladder instead of exiting through the penis). Such disorders can result from nerve damage, surgery and/or medication.
- **Anorgasmia**: or difficulty in achieving orgasm can be caused by psychosexual or hormonal imbalances.

Issues that can affect sperm production or quality

- **Prolonged abstinence**: as described above, regular ejaculation is best for conception quality sperm.
- **Anabolic steroids and gym supplements**: if men use performance enhancing exogenous hormones, these will suppress the hypothalamic-pituitary-gonadal axis and affect sperm production. Use of anabolic steroids has been linked to shrunken testicles, decreased sex drive, poor erections and low sperm counts, it is also linked to increased aggression and excess acne. More commonly men may be taking gym supplements such as protein shakes or 'testosterone boosters', which may be linked to negative effects on sperm and male fertility and should be discouraged when trying to conceive.
- **Azoospermia** (the absence of sperm in the ejaculate) is the cause of failing to conceive in 1% of all men and as much as 10% of couples. Obstructive azoospermia is caused by a blockage in the reproductive system while non-obstructive azoospermia is caused by an apparent lack of sperm production. The type of azoospermia can be identified via physical examination, hormone tests (FSH, LH, testosterone and prolactin) and genetic testing. In some cases, it may be possible to obtain sperm for ICSI fertility treatment via testicular biopsy.
- **Environmental and lifestyle factors**: exposure to certain environmental factors, such as toxins, chemicals, and radiation, can affect sperm production and lead to male factor fertility. Lifestyle factors such as smoking, excessive alcohol and/or drug use can have a direct impact on sperm quality.

- **Genetic disorders**: some genetic conditions can affect sperm production and cause male factor fertility. Genetic testing is recommended if the man has a sperm concentration beneath 2-5 million per ml or has small testes. Common genetic disorders include Klinefelter syndrome and Y-chromosome microdeletions of genes and chromosomal translocations.
- **Kallmann syndrome**: this rare hormonal disorder is due to underdevelopment of specific neurons, or nerves, in the brain that signal the hypothalamus. There is often an impaired sense of smell and delayed puberty.
- **Hormonal causes**: A change to the levels of hormones that control sperm production may cause male factor fertility. Examples include hypothalamic and pituitary disorders or tumours. Hormonal imbalances can also affect sexual function. These should be managed in an integrated way with endocrinologist support.
- **Infections**: Historic infections including post-pubertal mumps can damage the testes and affect sperm production. Epididymal infections, caused by urinary tract or sexually transmitted infections, are the commonest cause of unplanned obstruction. Current bacterial or viral infections are common in men attending for fertility investigations with infections such as active Human Papillomavirus Virus (HPV) now considered to affect fertility (Capra et al., 2022).
- **Medications**: Many pharmaceutical medications may cause male fertility issues which is often treatable and reversible. The British National Formulary (BNF) should be referred to and/or pharmacist advice for any effects. It is worth noting that most medications taken for male pattern baldness and, or enlarged prostate will affect semen volume and sperm production, so it is worth asking whether men use these.

Studies of the effects of many medications on male fertility are limited. Counselling men, and undertaking pharmaceutical medications assessments, should include discussing the risks posed to their reproductive health and should be undertaken after pharmacist or local approved guidance specific to the medication, has been considered.

Medical conditions: sperm quality is one potential marker of male health, and men with acute (eg, COVID-19) or chronic health problems (eg, diabetes, obesity or cardiovascular disease) may have lower sperm quality. Improving general health, if possible, is always advisable whatever the sperm parameters observed.

Radiation treatment: this can suppress sperm production temporarily or permanently.

Temperature: sperm production is temperature dependent. The testes sit in the scrotum, outside the body to be maintained at a temperature slightly lower than the core body temperature of 37°C. Therefore, prolonged hot baths, saunas or wearing clothing that holds testicles tightly against the body is to be discouraged.

Trauma: certain operations on the general groin area or directly on the testicles can affect testicular function, particularly if the blood supply is compromised. Other causes can include sports injuries or testicular torsion (a medical emergency in which the spermatic cord that supplies blood to the testicle twists, causing a painful loss of blood flow.) Trauma from other causes, such as during hernia or orchidopexy, can also cause blockages.

Undescended testes: particularly if bilateral, undescended testes can affect sperm quality and reduce the chance of achieving biological paternity. This history also has an increased risk of developing testicular cancer.

Varicoceles: this is a common condition where the valves that prevent back flow in testicular veins are less competent, leading to the veins in the scrotum becoming enlarged and dilated, causing blood to pool in the veins around the testicles. Often men with varicoceles may describe a dull ache in their testicles. A varicocele increases testicular temperature, and this can affect sperm production and quality.

Varicoceles are present in 40% of men with primary fertility issues, increasing to 80% with secondary fertility issues, compared to only 13% in an unselected population of men (Lewis, 2022). Varicocele surgery decisions should be guided by urologists, so if suspected early a urologist review is advised, however, not all men will have varicoceles requiring surgery or necessarily qualify for NHS funding for this.

5. Testing and diagnosis

Men may wish to seek the help of a specialist to look at options available for assessing their fertility. Fertility testing can take place via several options.

- **GP referral**: patients can ask their GP for a referral to an accredited diagnostic laboratory such as a local NHS fertility clinic, andrology service or hospital in order to obtain a semen analysis. Results will be sent back to the GP to be discussed with the patient. Blood tests for hormone profiling can also be arranged in addition to a semen analysis if clinically indicated.
- **Private fertility clinics**: Private fertility clinics (who should be accredited by UKAS – see below) offer semen analysis services and men may be able to self-refer to these clinics. These clinics may also offer consultations as part of the semen analysis to discuss the results with the patient.
- **Private andrology laboratories**: These laboratories also offer semen analysis services where a man can attend to produce a sample for assessment. They usually require a referral from a GP or specialist.
- **At home testing services**: There are a number of companies now offering at home semen analysis kits that can be ordered online, to be either dropped to a pharmacy and or performed entirely at home. Kits will usually include instructions for collecting a sample at home and sending it back to the testing company for analysis.

However, it should be noted that such tests may be unreliable as they are not performed according to WHO guidelines. The Association for Reproductive and Clinical Scientists (ARCS) as the professional society for this speciality has issued a cautionary statement around their use as there is concern that patients may be wrongly re-assured or overly upset by an inaccurate result that is later not supported by correct testing.

United Kingdom Accreditation Service (UKAS) accreditation ensures that the laboratory analysis has been performed in a way that conforms to the interpretation according to WHO guidelines being possible and correct.

Some of these options may involve out-of-pocket expenses as not all patients will be able to access funding for semen analysis via the NHS. In many areas this diagnostic is separate from fertility as they may not meet the funding criteria (Fertility Network UK (FNUK), 2023). General practitioners may also have some specific criteria when referring for an NHS funded semen analysis as part of fertility investigations, for example, if they have been trying to conceive with their partner for a year or more and the female partner is under the age of 36 (NICE, 2017).

GPs may also carry out a consultation and take a medical history and discuss any concerns that the patient may have before referring for testing and the decision to refer may ultimately rely on the individual's circumstances.

Outcome of testing

The ejaculate should be produced after a period of 2-7 days abstinence from sexual activity, this is longer than for conception abstinence and is to ensure result standardisation to the WHO data values. The results of the evaluation in terms of sperm concentration and sperm motility may be affected if outside this time period.

The sample should be analysed against WHO (2021) reference values. These include:

- volume
- sperm count
- total sperm number
- total motility (percentage of moving sperm)
- progressive motility (sperm that swim progressively in a straight line)
- normal morphology (shape of the head, neck and tail).

It is important to understand the WHO values describe the usual semen analysis result for 95% of men who have achieved a pregnancy with a partner within a year, hence there is a 5% chance of a result outside this range and achieving a pregnancy within a year.

Semen analysis testing

Table 1 WHO (WHO 2021) Lower Reference Values for Semen Analysis

Recommended to be used by NICE in the UK – minimum parameters from men in couples starting a pregnancy within one year of unprotected sexual intercourse leading to a natural conception.

Semen volume	≥1.4 ml
Sperm concentration	≥15 million per ml
Total sperm number	≥39 million per ejaculate
Total motility (progressive and non-progressive)	≥42 %
Progressive motility	≥30 %
Sperm morphology	≥ 4%

A diagnostic semen analysis represents the initial evaluation of male fertility sperm quality. The evaluation of semen parameters is currently based on the standards defined in the laboratory manual for the examination and processing of human semen created by the WHO (2021). Semen analysis is a useful investigation, as well as monitoring sperm production during and following treatment and other medical/non-medical interventions (WHO, 2021). There may be additional information provided by the laboratory and advice should be sought if clarification is required.

Other supplementary tests available for male factor fertility include:

- **male hormone profiling**: these tests measure the levels of hormones that play a critical role in male reproductive health, including testosterone, follicle-stimulating hormone (FSH), luteinising hormone (LH), and prolactin. The tests are performed via a blood sample and can help identify hormonal imbalances that may contribute to male factor fertility, such as low testosterone or high prolactin levels. Results can guide treatment options, such as hormone replacement therapy
- **male chromosome testing**: chromosome testing examines the genetic material in a man's sperm cells to identify chromosomal abnormalities that may be affecting fertility.

The tests are performed via a blood sample and can help identify conditions such as translocations, Klinefelter syndrome or Y chromosome microdeletions, which can affect sperm production.

An array of further tests are available and the majority are usually self-funded by patients. These are different from each other, and their use and interpretation is not interchangeable. The evidence base for some of these tests is still emerging.

Some of these sperm tests available include:

- **DNA integrity testing**: these tests measures the level of DNA fragmentation in sperm cells. High levels of DNA fragmentation may be indicative of oxidative stress or other factors that may impair sperm function. The tests involve analysing the DNA strands in the sperm cells using specialised laboratory technique
- **oxidative stress testing**: this measures the level of molecules called reactive oxygen species (ROS). High levels of ROS can damage sperm DNA and affect fertility. As for sperm DNA integrity testing there is concern about standardisation and meaning of these tests, less evidence exists linked to outcome than for DNA integrity testing.

The WHO manual recognises these as 'advanced' tests, but across medical professionals there is controversy about whether the results mean anything as their correlation to outcome is often poor for the majority of tests offered. It is particularly the case that different tests have widely different evidence for their use, relevance and subsequent decision making. Some clinics will suggest that results can help guide treatment options, such as antioxidant therapy or in vitro fertilisation (IVF) with intracytoplasmic sperm injection (ICSI), but there is a lack of robust trial data to support this. There is specific data to suggest certain tests may be of use once specific events have been seen such as recurrent miscarriage, but again evidence for subsequent decisions or therapy is currently lacking.

6. Emotional wellbeing

Some people mistakenly believe men are not as emotionally impacted by concerns with their fertility, however issues can infiltrate into every aspect of their lives, resulting in a variety of complex psychosocial and emotional reactions, such as feelings of failure, shame, helplessness, anxiety, depression, isolation, grief and loss, together with a negative impact on their masculine self-identity (Hadley, 2021) This may extend to issues with mental health, self-esteem, relationships, sexual functioning, career and finances, and emotional support can be in short supply. One study (Hanna et al., 2018) has demonstrated that as many as 93% of men reported their wellbeing had been affected by the experience of concerns about fertility, causing poor mental wellbeing and self-esteem issues, with one participant describing it as '...the most upsetting, dark and emasculating experience of my life'.

Throughout the treatment pathway from arriving at reception, to undergoing tests and having consultations, men consistently report feeling that they have little to contribute and feeling marginalised and/or excluded by the multidisciplinary team. Often being side-lined in favour of addressing and focusing on the woman/partner, regardless of whether there is a male or female factor diagnosis or investigation, thus leading to feelings of decreased self-esteem and powerlessness (Hanna et al., 2020). Some men highlighted a lack of sensitivity among clinical staff about the experience or news they were receiving within fertility clinics (Hanna et al., 2018). Unintentionally excluding men and their participation in the pathway can lead them to feel the same type of marginalisation and stigma they experience in their social networks.

Receiving social support is an important factor in reducing psychological distress whilst navigating fertility issues. However, it is often reported that friends lack the understanding as to why fertility issues can be so distressing. Men may be more likely to worry about the response of peers to issues with fertility. This can sometimes lead to being unable to share feelings, which may in turn have a detrimental impact on receiving support from their networks, leaving them more likely to try and cope on their own.

Men may be at a loss as to how to express their feelings, not only within their social network but also within their intimate relationships, and some report feelings of guilt, or of letting their partner down. These feelings are attributed to both partners, but they disproportionately report the need to remain strong and be their partner's protector leading to a misbelief that sharing their feelings will only serve to cause further upset, not be supportive, or solve their struggles. This lack of openness highlights how men can feel isolated and unsupported (Dolan, et al., 2017), emphasising the differences between some men and women in how they experience and cope differently with fertility issues. It is important to note that dealing with fertility issues can also strengthen bonds in the longer term.

Health care professionals are in a unique, privileged and influential position to support men cope with the stresses of fertility issues. Recognising and being mindful of how men may be feeling emasculated, self-conscious and experiencing a wide range of emotions can be useful when talking with men in clinic. Being mindful of the terminology used is very important; using neutral language and avoiding language that suggests blame whilst ensuring men are involved/giving them permission to be involved in the treatment process can improve their journey and enhance their overall emotional wellbeing throughout their fertility experience. All HFEA licenced centres will have a patient support policy which should be followed, including flagging the support available, and the potentially emotional nature of a fertility journey.

Providing written information at the start of treatment which outlines and summarises the emotional roller coaster and how they are likely to respond to treatment including in cases of female factor fertility is highly valued, reduces stress, may increase openness and can improve their experience (Arya and Dibb, 2016).

Whilst it has sometimes been assumed that men do not want or need to share their experiences, the landscape is changing and whilst historically men were less likely to attend in-person support groups or seek fertility counselling more men are now open to participating without hesitancy. The emerging evidence is that men value the opportunity to have a space to connect with others and share unique aspects of their male experiences (Hanna et al., 2020). Health care professionals should signpost men to both online forums and in person groups and other resources which can provide a dedicated space for men to share their experiences with autonomy and privacy.

Appropriate referrals to accredited fertility counsellors are essential and a normal part of the treatment pathway. Counselling may help navigate the fertility journey by providing individuals and couples with tools and strategies to cope with this unexpected life. Men can attend alone or with their partner, to explore their feelings and/or discuss relational issues such as communication, coping, decision making, and decreasing sexual stress.

Further support groups are identified at the end of the document.

7. Lifestyle and treatments

Lifestyle factors that affect reproductive health may be under the control of the individual and can be modified to improve wellbeing (Ilacqua et al., 2018). However, not all male factor fertility issues can be addressed through lifestyle changes. Men with a totally normal semen analysis will still potentially benefit their child's health by having a healthy lifestyle.

Where adverse male factor fertility exists, improving diet and lifestyle (if possible) will potentially improve outcomes. However, low or poor semen analysis results are usually due to the entire male sperm production process having a reduced function. Lifestyle and diet may change the likelihood of poor outcomes but may not change overall sperm production.

Heat exposure or radiation can alter a range of semen parameters, affecting men in occupations such as welding, baking, construction and long-distance driving. Wearing loose fitting clothing, getting up and walking around can help to reduce the scrotal temperature, which should be lower than core body temperature. Other, more controllable factors can be avoided, such as heat from saunas, hot tubs, hot baths or even the use of laptops on the lap and the prolonged use of heated seats in cars.

Exposure to toxic chemicals, which includes pesticides, organic volatiles and other environmental, endocrine disrupting chemicals, can negatively impact male reproductive health affecting sperm production. Precautions include avoiding skin contact and always wearing the appropriate PPE (personal protective equipment) provided.

Paternal smoking at the time of conception has been linked to increased rates of childhood leukaemia and miscarriage so is to be strongly discouraged. Vaping currently has unknown consequences and should be treated in the same manner. Excessive alcohol consumption and the use of recreational drugs can also negatively impact sperm quality (Holmboe et al., 2020).

Problems with ejaculation or erectile dysfunction are complex and can be associated with differing health conditions including high blood pressure, excessive alcohol consumption, performance anxiety or weight gain.

Diets that are high in fats and animal proteins have been shown to be harmful to sperm, whilst those high in sugars may lead to diabetes, which is known to affect sperm health and erectile function. A healthy diet and eating more organically may positively affect sperm health. A Mediterranean style diet has also been shown to help with higher sperm concentration, total sperm count and sperm motility (Karayiannis et al., 2017).

It is acknowledged that patients/partners will want to engage with every suggestion to support their health, regardless of the quality of the evidence to support their wellbeing through their fertility journey. Nurses are in a good position to support discussions about diet and wellbeing and navigate the evidence available to them.

Diet should always be the first area to look at when considering improving lifestyle for sperm health as many beneficial vitamins and minerals can be found in food. Supplementation should be approached with caution due to limited evidence and the benefits, counterindications, dosage and side effects should also be discussed with a health care practitioner prior to commencing any supplementation regime (Cochrane, 2022).

Vitamins and supplements: The health of sperm is largely dependent on a balanced and nutritious diet (Skoracka et al., 2020), although caution should be taken to ensure that men/couples are aware of the limitations in evidence to support sperm quality improvement. It is always better to consider overall health and wellbeing as many contributing factors can influence sperm quality and endocrine function.

Table 2 outlines some foods that may support overall general health, and therefore sperm health. Consuming processed foods, sugary drinks, and excessive amounts of alcohol or caffeine may have a negative impact on sperm health (Salas-Huetos et al., 2017).

Table 2

Food type	Benefit
Fruits and vegetables	Provide antioxidants, vitamins, and minerals that may protect against oxidative stress
Nuts and seeds	High in healthy fats, protein, and minerals like zinc, which is important for general health as well as sperm production.
Whole grains	Provide fibre, B vitamins, and minerals such as selenium.
Fish and seafood	Rich in Omega-3 fatty acids.
Lean protein	Provide amino acids that are essential for sperm production.
Water	Drinking plenty of water ensures good hydration which is vital for overall general health.

Several vitamins and minerals may be useful for sperm health and production (Table 3), however should be taken with caution (and take account of an individual's health and medical history) due to limited available evidence.

Table 3

Vitamin	Benefit (Salas-Huetos, A. et al 2017)
Vitamin C	An antioxidant that may protect sperm from damage and may improve sperm quality.
Vitamin E	An antioxidant that may improve sperm motility and reduce sperm damage.
Zinc	A mineral that can help production of healthy sperm and may help improve sperm count and motility.
Folate	A vitamin that may help DNA synthesis and prevent sperm abnormalities.
Vitamin D	Deficiency has been associated with poor sperm quality, so it is important to maintain adequate levels.
Selenium	A mineral that can help with healthy sperm production and motility.
Vitamin B12	A vitamin that may help sperm count and sperm motility and reduce sperm DNA damage.

There are several supplements that have been suggested to support male fertility, and nurses need to understand those which patients/partners may request information and guidance on. Cochrane (2022) remains inconclusive with regard to supplements.

The landscape of evidence supporting effectiveness is complex, and not all supplements have peer reviewed scientific evidence supporting their effectiveness (Cilio et al., 2022), consequently they should always be taken as instructed. Supplements with studies showing possible benefits for improving sperm count or quality include:

- **Coenzyme Q10 (CoQ10)**: an antioxidant that plays a crucial role in energy production in cells. Studies have suggested that CoQ10 may improve sperm count, motility, and morphology (Alahmar and Sengupta, 2020, Salvio et al., 2021, and Agarwal et al., 2022)
- **L-carnitine**: an amino acid that plays a role in energy production in cells. Some studies have suggested that L-carnitine supplementation may improve sperm motility (Shen Chuen Khaw, 2020 and Szymański et al., 2021)

Further information is available in Cochrane's (2022) review of evidence on antioxidants for male subfertility.

The Male Reproductive Health Initiative (MRHI) is a global consortium, whose goals are to raise awareness about the significance of male reproductive health. More detail is available at: **eshre.eu/Specialty-groups/Special-Interest-Groups/Andrology/MRHI**

Treatments

Treatments for male factor fertility vary based on the underlying cause of the problem.

Medications may be useful to treat some male fertility issues, including infections, hormone imbalances and erectile dysfunction.

Surgery may be useful to correct or repair anatomic abnormalities or damage to reproductive organs. Surgery may also be effective for repairing blockages. Surgical sperm extraction may be used to obtain sperm for assisted reproductive technologies, such as In vitro Fertilisation (IVF) with Intracytoplasmic Sperm Injection (ICSI).

Treating infections

Where an infection or inflammation has been identified in the genital tract of a man with poor sperm quality, antibiotic treatment might be helpful. However, caution should be exerted with this to prevent unnecessary treatment with antibiotics.

Treatments for sexual disfunction

Many cases of sexual dysfunction can be corrected by treating the physical and/or the psychological issues that cause it. Medication, counselling, and/or psychosexual therapy may help improve fertility in conditions such as erectile dysfunction or premature ejaculation. This may be more complex in patients with psychological disorders where treatment may be preventing sexual dysfunction.

Hormonal treatment

In situations where the hormones that regulate sperm production are missing, hormone replacement therapy can be used under medical supervision to improve male fertility. The best approach to any consideration for hormonal intervention is via a multi-disciplinary team (MDT) that includes gynaecology, endocrinology and urology/andrology.

The treatment will depend on the cause and will benefit from ongoing monitoring of success, using semen diagnostics from an accredited laboratory.

The overall aim should be considered carefully, but falls into one of two categories:

- induce spermatogenesis
- increase spermatogenesis.

The cause of the initial hormonal imbalance is vital in understanding, as well as the treatment that they may be under. To illustrate this, cases of Kallmann Syndrome patients can be used. Please visit: **medlineplus.gov/genetics/condition/kallmann-syndrome**

In secondary testicular failure, the aim is to replace hormonal deficiencies involved in spermatogenesis (FSH and LH) (Madhukar and Rajender, 2009). This is a temporary schedule, which must be monitored to check treatment success, so that physiological levels of testosterone are maintained.

Gonadotropin releasing hormone (GnRH) is rarely used in medical settings due to difficulties in its administration and high costs (Stewart, 2019), therefore, the use of FSH/LH replacements are usually selected.

Clomiphene citrate may also be used in certain circumstances; for example, if a man has symptoms of low testosterone, clomiphene treatment (unlike testosterone treatment) does not harm sperm production. This medication can be used in situations like late-onset hypogonadism to improve testosterone production (Huijben et al 2022). Therapy works by binding to oestrogen receptors and stopping testosterone from converting to oestradiol, which leads to an increase in the production of hormones that stimulate testosterone production.

Surgical treatment

For some men, surgical treatments may be an option, including:

- **blockage or abnormality of the reproductive tract** – if there is a blockage in delivery of the sperm at ejaculation, corrective surgery may be helpful
- **vasectomy reversal** – a vasectomy blocks the path of sperm going into your semen in order to prevent any future pregnancy. Over 50% of couples can achieve pregnancy following vasectomy reversal. However, the more time that has passed after the vasectomy, the less likely vasectomy reversal is to restore fertility
- **varicocele** – varicocele (swollen veins in the scrotum) are associated with poor sperm quality and may be treatable with surgery or angiographic embolisation. Surgery does not always improve fertility and is not recommended unless there is a large varicocele that can be easily felt. According to the National Institute for Health and Care Excellence (NICE) men should not be offered surgery for varicoceles as a form of fertility treatment because it does not improve pregnancy rates (NICE, 2017)

- **sperm retrieval techniques** – these are surgical methods to obtain sperm directly from the epididymis or the testicles when there are no sperm present in the semen. After the sperm has been successfully retrieved it can be used for ICSI in fresh treatment or cryopreserved for future use.

Different types of surgical sperm retrieval include:

- **percutaneous epididymal sperm aspiration (PESA)** is a method of sperm retrieval for obstructive azoospermia. During the procedure, sperm is collected from the epididymis using a syringe and fine needle. It can be a quick and relatively painless procedure and can be performed under local anaesthetic
- **testicular sperm aspiration (TESA)** involves a fine needle being inserted into the testicle and tissue/sperm are then aspirated and may be performed under a local anaesthesia or sedation
- **testicular sperm extraction (TESE)** single or multi-site involves making an incision into the testicle to take a small sample (biopsy), from which sperm can hopefully be recovered. TESE can be performed under local or general anaesthetic when multiple samples are taken from different areas
- **microsurgical epididymal sperm aspiration (MESA)** uses an operating microscope to examine the epididymis and retrieve sperm (fluid samples) from the epididymal tubes. MESA is usually performed under general anaesthetic and is used in men who have obstructive azoospermia
- **microscopic testicular sperm extraction (MicroTESE)** – this involves making an incision in the middle of the scrotum to open the testicles and examine them to find areas (tubules) where sperm are hopefully being made. The larger tubules are removed and passed to an embryologist who attempts to identify if sperm are present. MicroTESE is performed under general anaesthetic and is used in men who have non-obstructive azoospermia.

If sperm is successfully retrieved via surgery, this does not guarantee fertilisation. The sperm will need to be used via ICSI (HFEA, 2022).

These treatments will not work for men with certain genetic conditions. Men who must undergo a procedure to retrieve sperm have a small risk of bleeding, damage to the testes, and infection. More detail is available at:
hfea.gov.uk/treatments/explore-all-treatments/infertility-surgery-for-men

Assisted reproductive technology

Further information on assisted reproductive technology such as sperm cryopreservation, IUI, IVF and ICSI can be found in the RCN's Transition from Fertility to Maternity Care, available at: **rcn.org.uk/Professional-Development/publications/transition-fertility-maternity-care-uk-pub-010-338** and on the HFEA's website at: **hfea.gov.uk/treatments/explore-all-treatments/#:~:text=There%20are%20a%20number%20of,embryos%20and%20having%20treatment%20abroad**

If the semen is abnormal or contains no or few normal sperm, assisted reproductive technologies can often help these couples to achieve a pregnancy. These treatments involve obtaining sperm through ejaculation, surgical extraction or from donor individuals.

IVF (In vitro fertilisation) – involves the use of fertility drugs to make the ovaries produce eggs which are retrieved via a minor surgical procedure and then mixed with sperm and fertilised. The best quality embryo is selected for transfer to the uterus while remaining embryos can be frozen.

ICSI (Intracytoplasmic sperm injection) – is similar to IVF except that instead of sperm being mixed with the eggs the best sperm is injected directly into the egg to fertilise it so less sperm are required. If there is a problem with the semen production or there is no sperm in the semen caused by a block or testicular failure that can't be corrected, sperm may be collected surgically ICSI does carry some additional risks. It is known that abnormal sperm production, as is the case in men with very low sperm count or absent sperm in the ejaculate, can be associated with genetic disorders.

The success rates depend on many factors, including the female partner's fertility, the quality of the sperm retrieved from the male partner, and the number of times IVF with ICSI is performed.

Sperm storage (cryopreservation) – for patients who are planning to undergo fertility-affecting medical treatment, such as certain operations, chemotherapy or radiotherapy, sperm storage can play a vital role in allowing patients to have biological children through fertility treatment, should the man's fertility be irreversibly damaged by his medical treatment. Even when medical intervention only allows enough time to freeze a single poor sperm sample, ICSI treatment can enable numerous treatments in the future. Posthumous use of sperm is possible – but only where the sperm-provider has clearly provided detailed consent around all aspects of use in advance, so this is never usually possible in UK law outside planned treatment or preservation.

Sperm selection methods used in ICSI

As research continues, there is no conclusive evidence as to the benefits and effectiveness of these techniques, however they may be techniques that patients inquire about in practice and an understanding of their theory will be beneficial to the nursing team when asked about them.

It is important to note that they are considered add-ons with limited evidence and the HFEA has clear guidance available at: **hfea.gov.uk/treatments/treatment-add-ons**

- **Hyaluronan-sperm binding prior to ICSI** – is a technique used to try to select the more mature sperm to use in ICSI treatment. This involves placing sperm in a specialised dish containing hyaluronan, a natural compound found in the body. If sperm bind to hyaluronan, they are thought to be more mature and are selected for ICSI. This treatment may be used in cases of previous implantation failure or low fertilisation even after ICSI, low embryo quality (not related to poor egg quality), high levels of sperm DNA fragmentation and recurrent miscarriages.
- **Intracytoplasmic morphologically selected sperm injection** – is a sperm selection method used in ICSI. The technique involves using a microscope to view sperm under very high magnification, allowing the embryologist to select the best sperm with which to fertilise the egg. IMSI can be used as an enhanced sperm selection tool, in severe male factor, when sperm quality or morphology is sub-optimal, for men with previous poor outcomes with ICSI and recurrent miscarriages. IMSI does not carry any additional known risks over and above those known from ICSI.

Artificial insemination or IVF with donor sperm

If the testicles are unable to produce sperm, an alternative option is sperm donation. Donor sperm may be obtained from a known donor or from a sperm bank, which screens men for infections and certain genetic problems and provides a complete personal and family history.

In the UK, sperm banks are obliged in legislation to keep the identity of their donors confidential at the time of treatment. However, some details can be released following a request from the person conceived by donor sperm, from the age of 16 (non-identifiable information) and from the age of 18 (identifiable information). Visit: **hfea.gov.uk/donation/donor-conceived-people-and-their-parents** for further information.

In the UK, donated sperm can be used to create up to 10 families with licenced treatment centres. Internationally, this limit will vary in different countries.

The decision to use donor sperm is rarely an easy one but for some couples may be their preferred option. The emotional burden on a couple is considerable and counselling may be helpful for both partners to discuss their feelings and the potential implications of using donor sperm including whether and when to talk to a child about their genetic origins. Guidelines recommend telling children if they were conceived with the help of donated sperm. See: **hfea.gov.uk/donation/donor-conceived-people-and-their-parents** for further details.

The emotional impact of fertility treatment can be considerable, and individuals/couples should be offered therapeutic counselling and implications counselling to explore their thoughts and feelings in relation to the potential consequences of creating a family with the use of donor sperm including openness with any child conceived. The RCN's *Fertility Care and Emotional Wellbeing* publication provides further information and is available at: **rcn.org.uk/Professional-Development/publications/fertility-care-and-emotional-wellbeing-uk-pub-011-054**

Conclusion

As nurses, it is essential to have a good understanding of male factor fertility and the influences that can impact on male fertility. By expanding knowledge in this area, all nurses can play a crucial role in supporting patients who may be struggling to conceive by enabling them to access the care and resources they need to either start a family or come to terms with any diagnosis or treatment they may have had.

By providing compassionate and informed care to patients, a knowledgeable and competent nurse can make a real difference to outcomes and better support the reproductive health of all individuals and couples.

Key elements to supporting male factor fertility

- **Maintain a healthy lifestyle**: A healthy lifestyle is essential including regular exercise, a balanced diet rich in fruits, vegetables, and whole grains, and avoiding smoking, excessive alcohol consumption, and drug use.
- **Recognise and manage stress**: High levels of stress can negatively impact male fertility. Stress management can be best supported by recognising its impact on health and wellbeing and managing it through relaxation techniques such as yoga, meditation, or deep breathing exercises.
- **Get regular check-ups**: Men should be encouraged to have regular check-ups with their healthcare provider to ensure that any medical issues that could affect fertility, such as hormonal imbalances or chronic illnesses, are identified and treated early.
- **Avoid exposure to environmental toxins**: Exposure to toxins such as pesticides, heavy metals, and industrial chemicals can negatively impact male fertility. Men should avoid exposure to these toxins whenever possible and take necessary precautions when working in environments where exposure is unavoidable.
- **Make sure patients are well informed**: Certain medications can have a negative impact on male fertility. These medications include chemotherapy drugs, some antibiotics, antifungal agents, and testosterone replacement therapy. It is important for men to be aware of the potential impacts of these medications on fertility, and that stopping or changing prescribed medications should only be considered in consultation with their healthcare practitioner.
- **Consider fertility treatments**: In some cases, medical interventions such as assisted reproductive technologies or medications may be necessary to improve male fertility. It is important to speak with a knowledgeable health care professional to discuss these options and determine the best course of action for each individual case.

Male factor fertility is a complex issue that can have many underlying causes: recognising it as an issue, that it needs attention and the right care plan (working with the multi professional teams) will support best practice and better meet the specific needs of each individual.

References

Agarwal, Ashok; Majzoub, Ahmad; Parekh, Neel; Henkel, Ralf (2020) A Schematic Overview of the Current Status of Male Infertility Practice. *The World Journal of Men's Health*. 38 (3): 308-322. doi:10.5534/wjmh.190068. PMC 7308239. PMID 31385475. Available at: **https://wjmh.org/DOIx.php?id=10.5534/wjmh.190068** (accessed 12 October 2023)

Agarwal A et al., (2022) *Meta-Analysis of Double-Blind Placebo Control Trials Evaluating the Role of Coenzyme Q10 on Semen Parameters*. Available at: **www.cochranelibrary.com/central/doi/10.1002/central/CN-02404054/full** (accessed 12 October 2023)

Aluka JPI and Lamb DJ (2008) Intracytoplasmic Sperm Injection (ICSI) – What are the risks? *Urol Clin North Am*. 2008 May; 35(2): 277–288. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC2424218** (accessed 12 October 2023)

Arya ST and Dibb B (2016) The experience of infertility treatment: the male perspective. *Human Fertility* 2016;19(4):242-248. Available at: **https://pubmed.ncbi.nlm.nih.gov/27563936** (accessed 12 October 2023)

Alahmar AT and Sengupta P (2020) *Impact of Coenzyme Q10 and Selenium on Seminal Fluid Parameters and Antioxidant Status in Men with Idiopathic Infertility*. Available at: **www.cochranelibrary.com/central/doi/10.1002/central/CN-02138787/full** (accessed 12 October 2023)

Alahmar AT (2019) The Impact of Two Doses of Coenzyme Q10 on Semen Parameters and Antioxidant Status in Men with Idiopathic Oligoasthenoteratozoospermia. *Clin Exp Reprod Med*. 2019 Sep; 46(3): 112–118. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC6736512** (accessed 12 October 2023)

Boeri et al., (2020) Semen infections in men with primary infertility in the real-life setting. *Fertil Steril*. 2020 Jun;113(6):1174-1182. **https://pubmed.ncbi.nlm.nih.gov/32299615/** (accessed 12 October 2023)

Boitrelle F et al., (2021) The Sixth Edition of the WHO Manual for Human Semen Analysis: A Critical Review and SWOT Analysis. *Life* (Basel). 2021 Dec 9;11(12):1368. doi: 10.3390/life11121368. PMID: 34947899; PMCID: PMC8706130. Available at: **https://pubmed.ncbi.nlm.nih.gov/34947899** (accessed 12 October 2023)

Brezina PR, Yunus FN, Zhao Y. (2012) Effects of pharmaceutical medications on male fertility. *J Reprod Infertil*. 2012 Jan;13(1):3-11. PMID: 23926519; PMCID: PMC3719368. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC3719368** (accessed 12 October 2023)

Capra et al., (2022) Human Papillomavirus (HPV) Infection and Its Impact on Male Infertility. *Life* (Basel) 2022 Nov 18;12(11):1919. Available at: **https://pubmed.ncbi.nlm.nih.gov/36431054** (accessed 12 October 2023)

Cilio S, Rienzo M, Villano G, Mirto B.F, Giampaglia G, Capone F, Ferretti G, Di Zazzo E, Crocetto F. Beneficial Effects of Antioxidants in Male Infertility Management: A Narrative Review. *Oxygen* 2022, 2, 1-11. Available at: **www.mdpi.com/2673-9801/2/1/1** (accessed 12 October 2023)

Cochrane (2022) *Antioxidants for male subfertility.* Available at: **www.cochrane.org/CD007411/MENSTR_antioxidants-male-subfertility#:~:text=Oral%20supplementation%20with%20antioxidants%20is,for%20their%20effectiveness%20is%20uncertain** (accessed 12 October 2023)

Dabaja AA and Schlegel PN (2014) Medical treatment of male infertility. *Transl Androl Urol* 2014;3(1):9- 16. doi: 10.3978/j.issn.2223-4683. Available at: **https://pubmed.ncbi.nlm.nih.gov/26816749** (accessed 12 October 2023)

Durairajanayagam D (2018) Lifestyle causes of male infertility. *Arab Journal of Urology* volume 16, issue 1 pages 10-20. Updates in Male Factor Infertility. Available at: **https://doi.org/10.1016/j.aju.2017.12.004** (accessed 12 October 2023)

De Jonge CLR, Barratt (2019) The present crisis in male reproductive health: an urgent need for a political, social and research roadmap. *Andrology* volume 7. Issue 6. November 2019. Pages 762-768. Available at: **https://doi.org/10.1111/andr.12673** (accessed 12 October 2023)

Dolan A, Lomas T, Ghobara T, Hatshorne G (2017) It's like taking a bit of masculinity away from you. *Social Health Illness* 2017;39(6):878-892. Available at: **https://pubmed.ncbi.nlm.nih.gov/28271530** (accessed 12 October 2023)

Esteves SC, et al., (2013) An update on sperm retrieval techniques for azoospermic males. *Clinics* (Sao Paulo) 2013;68 (Suppl 1):99–110. Available at: **https://pubmed.ncbi.nlm.nih.gov/23503959** (accessed 12 October 2023)

Fertility Network UK (2023) Access to NHS Funding. Available at: **https://fertilitynetworkuk.org/access-support/nhs-funding** (accessed 12 October 2023)

Foresta et al., (2002) Guidelines for the appropriate use of genetic tests in infertile couples. *European Journal of Human Genetics* volume 10, pages303–312. Available at: **www.nature.com/articles/5200805** (accessed 12 October 2023)

Hannah E, Gough B and Coan S (2018) *Men's experiences of infertility: Findings from a qualitative questionnaire*. Study Survey conducted by Fertility Network UK and Leeds Beckett University in 2017. Available at: **https://fertilitynetworkuk.org/wp-content/uploads/2018/01/FNUK-4-sider-maleinfertilitysurveyFINAL_.pdf** (accessed 12 October 2023)

Hanna E and Gough B (2020) The social construction of male infertility; a qualitative questionnaire study of men with a male factor infertility diagnosis. *Social Health Illness* 202;42(3):465-480. Available at: **https://pubmed.ncbi.nlm.nih.gov/31773768** (accessed 12 October 2023)

Hansen, Karl R et al., (2020) Intrauterine insemination performance characteristics and post-processing total motile sperm count in relation to live birth for couples with unexplained infertility in a randomised, multicentre clinical trial, *Human Reproduction*, Volume 35, Issue 6, June 2020, Pages 1296–1305. Available at: **https://pubmed.ncbi.nlm.nih.gov/32432326** (accessed 12 October 2023)

Hamada AJ, Esteves SC, Agarwal A (2013) A comprehensive review of genetics and genetic testing in azoospermia. *Clinics* (Sao Paulo) 2013;68 (Suppl 1):39–60. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC3583155** (accessed 12 October 2023)

Hadley, RA (2021) *How is a Man Supposed to be a Man? Male Childlessness – a Life Course Disrupted*, published by Berghahn New York and Oxford.

Human Fertilisation and Embryology Authority (2020) *State of the Fertility Sector 2019/2020*. Available at: **www.hfea.gov.uk/about-us/publications/research-and-data/state-of-the-fertility-sector-2019-2020** (accessed 12 October 2023)

Human Fertilisation and Embryology Authority (2023) *Surgical Sperm Extraction*. Available at: **www.hfea.gov.uk/treatments/explore-all-treatments/surgical-sperm-extraction** (accessed 12 October 2023)

Human Fertilisation and Embryology Authority (2023) *Treatment Add-ons with Limited Evidence*. Available at: **www.hfea.gov.uk/treatments/treatment-add-ons** (accessed 12 October 2023)

Human Fertilisation and Embryology Authority (2023) *Infertility Surgery for Men*. Available at: **www.hfea.gov.uk/treatments/explore-all-treatments/infertility-surgery-for-men** (accessed 12 October 2023)

Human Fertilisation and Embryology Authority (2023) *Intracytoplasmic Sperm Injection (ICSI)*. Available at: **www.hfea.gov.uk/treatments/explore-all-treatments/intracytoplasmic-sperm-injection-icsi** (accessed 12 October 2023)

Holmboe SA, Priskorn L, Jensen TK, Skakkebaek NE, Andersson A, Jørgensen N (2020) Use of E-cigarettes associated with lower sperm counts in a cross-sectional study of young men from the general population. *Human Reproduction*, Volume 35, Issue 7, July 2020, Pages 1693–1701. Available at: **https://doi.org/10.1093/humrep/deaa089** (accessed 12 October 2023)

Huijben M, Lock MTWT, de Kemp VF, de Kort LMO, van Breda HMK (2022) Clomiphene citrate for men with hypogonadism: a systematic review and meta-analysis. *Andrology*. 2022; 10: 451-469. Available at: **https://pubmed.ncbi.nlm.nih.gov/34933414** (accessed 12 October 2023)

Ilacqua A, Izzo G, Emerenziani GP, Balari C and Aversa A (2018) Lifestyle and fertility: the influence of stress and quality of life on male fertility. *Reproductive Biology and Endocrinology* 16 115. Available at: **https://pubmed.ncbi.nlm.nih.gov/30474562** (accessed 12 October 2023)

Jayasena CN, Anderson RA, Llahana S, et al., (2022) Society for Endocrinology Guidelines for Testosterone Replacement Therapy in Male Hypogonadism. *Clin Endocrinol* (Oxf). 2022; 96. Available at: **https://pubmed.ncbi.nlm.nih.gov/34811785** (accessed 12 October 2023)

John Hopkins Medicine (2023) *Sperm Retrieval Techniques*. Available at: **hopkinsmedicine.org/health/treatment-tests-and-therapies/sperm-retrieval-procedures** (accessed 12 October 2023)

Jose-Miller AB, Boyden JW, and Frey KA (2007) Infertility. *American Family Physician*, 75, 849–856. Available at: **https://pubmed.ncbi.nlm.nih.gov/17390595** (accessed 12 October 2023)

Karayiannis D, et al., (2017) Association between Adherence to the Mediterranean Diet and Semen Quality Parameters in Male Partners of Couples attempting Fertility. *Hum Reprod*. 2017 Jan;32(1):215-222. Available at: **https://pubmed.ncbi.nlm.nih.gov/27994040** (accessed 12 October 2023)

Lewis S (2022) Revisiting the Impact of Varicocele and its Treatments on Male Fertility. *Reprod Biomed Online* 2022 Dec;45(6. Available at: **https://pubmed.ncbi.nlm.nih.gov/36207252** (accessed 12 October 2023)

Madhukar D and Rajender S (2009) Hormonal Treatment of Male Infertility: Promises and Pitfalls. *Journal of Andrology*, 30: 95-112. Available at: **https://doi.org/10.2164/jandrol.108.005694** (accessed 12 October 2023)

Mazzilli R, et al., (2022) Severe Male Factor in In Vitro Fertilisation: definition, prevalence, and treatment. An update. *Asian J Androl*. 2022 Mar-Apr;24(2):125-134. Available at: **https://pubmed.ncbi.nlm.nih.gov/34259196** (accessed 12 October 2023)

Mettler et al., (2020) Male Age is Associated with Sperm DNA/chromatin integrity. *Aging Male* Dec 2020;23(5):822-829. Available at: **https://pubmed.ncbi.nlm.nih.gov/30964371** (accessed 12 October 2023)

Michelmann HW (1995) Minimal Criteria of Sperm Quality for Insemination and IVF Therapy. *Int J Androl*. 1995 Dec;18 Suppl 2:81-7. PMID: 8719866. Available at: **https://pubmed.ncbi.nlm.nih.gov/8719866** (accessed 12 October 2023)

National Institute of Clinical Excellence (NICE) (2017) *Fertility Problems: assessment and treatment: Clinical guideline [CG156].* Available at: **www.nice.org.uk/guidance/cg156** (accessed 12 October 2023)

NHS (2023) *Low Sperm Count*. Available at: **www.nhs.uk/conditions/low-sperm-count** (accessed 12 October 2023)

Pitteloud N, et al., (2002) Predictors of Outcome of Long-Term GnRH Therapy in Men with Idiopathic Hypogonadotropic Hypogonadism, *The Journal of Clinical Endocrinology & Metabolism*, Volume 87, Issue 9, 1 September 2002, Pages 4128–4136. Available at: **https://pubmed.ncbi.nlm.nih.gov/12213860** (accessed 12 October 2023)

Royal College of Nursing (2021) *An RCN Education and Career Progression Framework for Fertility Nursing*. Available at: **www.rcn.org.uk/professional-development/publications/rcn-education-and-career-progression-framework-for-fertility-nursing-009-926-uk-pub** (accessed 12 October 2023)

Royal College of Nursing (2022) *Transitions from Fertility to Maternity Care*. Available at: **www.rcn.org.uk/Professional-Development/publications/transition-fertility-maternity-care-uk-pub-010-338** (accessed 12 October 2023)

Royal College of Nursing (2023) *Fertility Care and Emotional wellbeing*. Available at: **www.rcn.org.uk/Professional-Development/publications/pub-007770** (accessed 12 October 2023)

Rozati H, Handley T, Jayasena CN (2017) Process and Pitfalls of Sperm Cryopreservation. *J Clin Med*. 2017 Sep 19;6(9):89. doi: 10.3390/jcm6090089. PMID: 28925939; PMCID: PMC5615282. Available at: **https://pubmed.ncbi.nlm.nih.gov/28925939** (accessed 12 October 2023)

Salas-Huetos A. et al., (2017) Dietary Patterns, Foods and Nutrients in Male Fertility Parameters and Fecundability: a systematic review of observational studies, *Hum Reprod* Update 2017 Jul 1;23(4):371-389. Available at: **https://pubmed.ncbi.nlm.nih.gov/28333357** (accessed 12 October 2023)

Samplaski and Nangia, (2015) Adverse effects of common medications on male fertility. *Nat Rev Urol*. 2015 Jul;12(7):401-13. Available at: **https://pubmed.ncbi.nlm.nih.gov/26101108** (accessed 12 October 2023)

Salvio G et al., (2021) Coenzyme Q10 and Male Infertility: A Systematic Review. *Antioxidants* (Basel). 2021 Jun; 10(6): 874. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC8226917** (accessed 12 October 2023)

Schlegel PN, et al. (2021) Diagnosis and treatment of infertility in men: AUA/ASRM guideline part II. *Fertil Steril*. 2021;115:62–9. Available at: **https://pubmed.ncbi.nlm.nih.gov/33309061** (accessed 12 October 2023)

Sharma, A et al 2020 Endocrine-disrupting chemicals and male reproductive health. *Reproductive Medicine and Biology* Jul; 19(3): 243–253. Available at: **https://pubmed.ncbi.nlm.nih.gov/32684823** (accessed 12 October 2023

Shen Chuen Khaw, et al., (2020) l-carnitine and l-acetylcarnitine Supplementation for Idiopathic Male Infertility. *Reprod Fertil*. 2020 Jul; 1(1): 67–81. 2020 Dec 23. doi: 10.1530/RAF-20-0037. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC8812460** (accessed 12 October 2023)

Skoracka K, et al., (2020) Diet and Nutritional Factors in Male (In)fertility-Underestimated Factors. *J Clin Med*. 2020 May 9;9(5):1400. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC7291266** (accessed 12 October 2023)

Stewart JA (2019) *Subfertility, Reproductive Endocrinology and Assisted Reproduction*. Cambridge University Press.

Szell AZ, et al., (2013) Live Births from Frozen Human Semen Stored for 40 years. *J. Assist. Reprod. Genet*. 2013;30:743–744. doi: 10.1007/s10815-013-9998-9. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC3696447** (accessed 12 October 2023)

Szymański M, et al., (2021) Comparison of 3- and 6-Month Outcomes of Combined Oral L-Carnitine Fumarate and Acetyl-L-Carnitine Therapy, Included in an Antioxidant Formulation, in Patients with Idiopathic Infertility. *Am J Mens Health*. 2021 Sep-Oct; 15(5): 15579883211036790. 2021 Sep 13. doi: 10.1177/15579883211036790. Available at: **www.ncbi.nlm.nih.gov/pmc/articles/PMC8442503** (accessed 12 October 2023)

Tomlinson M, Lewis S, and Morroll D (2013) Sperm quality and its relationship to natural and assisted conception: British Fertility Society Guidelines for practice, *Human Fertility*, 16:3, 175-193. Available at: **https://pubmed.ncbi.nlm.nih.gov/23862664** (accessed 12 October 2023)

Tournaye H, Krausz C, Oates RD (2017) Concepts in diagnosis and therapy for male reproductive impairment. *Lancet Diabetes Endocrinol* ;5:554–64. Available at: **https://pubmed.ncbi.nlm.nih.gov/27395770** (accessed 12 Octpber 2023)

Vaughan et al., (2020) DNA fragmentation of sperm: a radical examination of the contribution of oxidative stress and age in 16 945 semen samples. *Human Reproduction*, Volume 35, Issue 10, October 2020, Pages 2188–2196. Available at: **https://academic.oup.com/humrep/article/35/10/2188/5903064** (accessed 12 October 2023)

Vaziri MH, Sadighi Gilani MA, Kavousi A, Firoozeh M, Khani Jazani R, Vosough Taqi Dizaj A, Mohseni H, Bagery Lankarani N, Azizi M, Salman Yazdi R (2011) The Relationship between Occupation and Semen Quality. *International Journal of Fertility and Sterility*. Jul;5(2):66-71. Available at: **https://pubmed.ncbi.nlm.nih.gov/24963361** (accessed 12 October 2023)

Vogt PH (2004) Molecular genetics of human male infertility: from genes to new therapeutic perspectives. *Curr Pharm Des*. 2004; 10(5): 471– 500. Available at: **https://pubmed.ncbi.nlm.nih.gov/14965334** (accessed 12 October 2023)

World Health Organization (2021) *WHO laboratory manual for the examination and processing of human semen*. Available at: **www.who.int/publications/i/item/9789240030787** (accessed 12 October 2023)

Further reading and useful links

Association of Reproductive and Clinical Scientists **arcscientists.org**

British Fertility Society **britishfertilitysociety.org.uk**

British Infertility Counselling Association **bica.net**

British Society for Sexual Medicine **bssm.org.uk**

Donor Conception Network **dcnetwork.org**

European Society of Human Reproduction and Embryology **eshre.eu**

Him Fertility **fertilitynetworkuk.org/male-fertility-group**

Fertility Network UK **fertilitynetworkuk.org**

Men's Health Forum **menshealthforum.org.uk/about-us**

RCN Fertility Nursing Forum **rcn.org.uk/Get-Involved/Forums/Fertility-Nursing-Forum**

Senior Infertility Nurse Group (SING) **www.sing.co.uk**

Toby Trice **twitter.com/toby_trice tobytriceracing.com/bio**

Appendix 1: RCN fertility nursing competency assessment tool for male factor fertility

The following competencies are recommended for best practice in supporting male factor fertility, and should be used in conjunction with the instructions and information contained in the *RCN Education and Career Progression Framework for Fertility Nursing* at: **rcn.org.uk/professional-development/publications/rcn-education-and-career-progression-framework-for-fertility-nursing-009-926-uk-pub**

Male factor fertility assessment

Knowledge	Self-assessment (circle as appropriate)	Minimum standard for achievement	Expected date of achievement	Evidence submitted	Date of completion	Level achieved	Assessor sign-off (print and sign)
Can demonstrate a good understanding of anatomy and physiology in relation to male factor fertility.	N,AB,C,B,E	Competent					
Can demonstrate a good understanding the causes of male factor fertility.	N,AB,C,B,E	Competent					
Be able to provide the patient with clear and concise information regarding the tests available for male factor fertility.	N,AB,C,B,E	Competent					
Understands the emotional impact of male factor fertility and can refer to appropriate emotional support services including counselling as required.	N,AB,C,B,E	Competent					
Understands how diet and lifestyle can impact sperm health and can discuss appropriate lifestyle changes.	N,AB,C,B,E	Competent					
Understands hormonal treatments available.	N,AB,C,B,E	Advanced beginner					
Understands the surgical treatment options available.	N,AB,C,B,E	Advanced Beginner					
Can provide the patient with clear and concise information regarding ART procedures available.	N,AB,C,B,E	Competent					

This tool uses Benner's Stages of competence to assess competence:

Benner's Stages of competence

Code	Novice to expert continuum	Description
N	Novice or beginner	No experience in the situation in which they are expected to perform and depend on rules to guide their actions. Lacks confidence to demonstrate safe practice and requires continual verbal and physical cues.
AB	Advanced beginner	Demonstrates marginally acceptable performance because the nurse has had prior experience in actual situations. Often needs help setting priorities and cannot reliably sort out what is most important in complex situations and will require help to prioritise.
C	Competent	Demonstrates efficiency, is co-ordinated and has confidence in their actions. Able to plan and determine which aspects of a situation ate important and which can be ignored or delayed. The practitioner lacks the speed and flexibility of a proficient practitioner but they show an ability to cope with and manage contingencies of practice.
P	Proficient	Someone who perceives the situation as a whole rather than in parts. They have a holistic understanding of clinical situations which makes for quick and more accurate decision making. They consider fewer options and quickly hone in on accurate issues of the problem.
E	Expert	No longer relies on rules, guidelines, etc. to rapidly understand the problem. With an extensive background of experience demonstrates an intuitive grasp of complex situations. They focus on the accurate region of the problem without first considering fruitless possibilities.

RCN quality assurance

Publication

This is an RCN practice guidance. Practice guidance are evidence-based consensus documents, used to guide decisions about appropriate care of an individual, family or population in a specific context.

Description

Male factor fertility is important, and all nurses and midwives should have a good understanding of the influences and the factors that can impact fertility, especially as they may often be the first point of contact for patients when they have questions. This guidance has been developed to enhance understanding of the anatomy, physiology, diagnosis and possible treatments available to support best practice, as well as an overview of the emotional issues associated with male factor fertility.

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Evaluation

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