The ROYAL COLLEGE of SURGEONS of EDINBURGH

# Pregnancy in Surgery

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# I'm Pregnant and I Work In Surgery - What Happens Next?

Congratulations! If you are reading this then you are either thinking about or have started planning a family. Being pregnant can be a really exciting time, but it can also be fraught with worry. Your health must be a priority over the peri-partum period, and whilst some women can remain symptom free, many will experience uncomfortable side effects which could make working in a surgical environment more difficult. Please do not suffer in silence and feel that you need to hide or minimise your experiences. Your pregnancy is a brief period in your career and looking after yourself and your baby is particularly important.

Pregnancy and maternity are protected characteristics under the Equality Act 2010. Make sure you know your rights (see below) and check your employer's maternity policy for anything additional they offer above your legal rights – for example, they may offer paid time off for fertility treatment or specific leave for pregnancy loss.

Working in surgery during pregnancy can be particularly challenging. Sickness and fatigue are common early symptoms and may occur at a time when you want to keep your pregnancy a secret. You may decide to disclose your pregnancy to a supervisor early to get additional support.

# What Are My Legal Rights Around Conception & Pregnancy?

- ✓ In order to protect your health, you should inform your department as soon as you feel comfortable doing so, however you do not need to tell your employer straight away – to access maternity leave and pay, you must tell your employer no later than the 15th week before your estimated expected date of delivery (EDD).
- ✓ You have a right to confidentiality: any disclosure of your pregnancy should be with your consent and only if necessary.
- ✓ Your employer must conduct a risk assessment when you tell them you are pregnant. In most departments a line manager undertakes this; for residents this may be an educational supervisor or college tutor, while for senior or permanent staff it may be the head of service.
- ✓ You have a right to request a risk assessment regarding on call duties This may lead to a change in your working pattern, hours, or conditions – for example, to reduce work-related stress or prolonged periods of standing.
- ✓ You have a right to request a risk assessment regarding on-call duties, long shifts (>10 hours), and night shifts.
- ✓ If your hours or work is changed as a result of your risk assessment, your new work should be at the same rate of pay and similar terms.
- ✓ Employers must review your risk assessment when there has been a change to make any adjustments as your pregnancy progresses. Adjustments to timing of work, such as shift length and night work, need to be individualised to the person, the job, and the impact of the pregnancy.
- ✓ You are entitled to paid time off for antenatal care as recommended by your midwife or doctor, including medical appointments, pregnancy-related health or fitness classes and antenatal courses.
- ✓ Your partner is legally entitled to take time off work for two antenatal appointments.
- ✓ Pregnancy-related sickness absence is counted separately from usual sickness absence and will not contribute to any absence review process.

## Your Legal Rights – IVF

- ✓ There is no legal right to have paid time off work for IVF treatment, but many Trust and Health Boards will treat this in the same as any other medical appointment or grant paid fertility leave. Check your local policy.
- ✓ When you reach the embryo transfer stage, your rights are the same as if you were pregnant.
- ✓ If implantation is unsuccessful, you remain classed as pregnant until two weeks after the date you were informed of this.

## Your Legal Rights – Miscarriage & Stillbirth

- ✓ You do not need to tell your employer if you have had a miscarriage. However, if you do they can offer you support.
- ✓ If you lose a pregnancy before 24 weeks and need time off, this is likely to be considered 'pregnancy-related sickness': this therefore is counted separately to other sickness absence and will not contribute to any absence process.
- ✓ If you lose a pregnancy after 24 weeks (stillbirth) you are entitled to full maternity leave.

## Your Legal Rights – Termination of Pregnancy

- ✓ Most terminations take place before 24 weeks – you do not have to tell your employer the reason for sickness absence (ask for your 'fit note' to exclude this information), but if you choose to inform your employer, sick leave is protected as 'pregnancy-related' so recorded separately.
- ✓ If your termination takes place after 24 weeks (rarely, for medical reasons) then you are entitled to full maternity leave.

If you do not feel well enough to work, then you may need some time off during your pregnancy. Please do not feel ashamed by this. It is far safer for you, your baby, and the patients you are looking after for you to stay off work if you do not feel well enough. A period of sickness is very unlikely to affect your maternity pay and pregnancy-related sickness is not counted towards absence processes in the same way normal sickness is.

# Pregnancy & Surgery: An Evidence-Based Risk-Assessment Resource

We recognise that pregnancy-specific occupational risk assessment may fall outside the usual expertise of clinical supervisors and managers. Given the relative lack of high-quality evidence and the limited number of formal guidelines, we hope that this resource provides a practical summary of the current evidence and recommendations. The aim is to support both pregnant surgeons, theatre workers and those conducting risk assessments (other surgeons/managers in a position of responsibility), enabling informed decisions and empowering individuals to make choices that are right for them.

## Key Principles of the Risk Assessment

An individual pregnancy risk assessment should:

- Be tailored to the individual and their specific role.
- Provide information about any occupational risks that may be encountered during pregnancy.
- Ensure that the pregnant individual understands their legal entitlements and statutory rights during pregnancy and following maternity leave.

## What Happens If A Risk Is Identified?

If a risk to the doctor or their baby is identified, the employer must first consider whether the risk can be eliminated or adequately controlled. Health professionals should advise on appropriate adjustments, and the employer decides if these are reasonable.

Where this is not possible, the employer should take risk control measures to working conditions, schedules, or hours to reduce or remove the risk.

If suitable adjustments cannot be made, the employer should, where appropriate, offer suitable alternative work in accordance with the Employment Rights Act 1996 before considering suspension from work. Any alternative role should be appropriate for the pregnant worker or new mother, should not expose them to the same identified risks, and must be offered on the same terms and conditions, including pay.

Where neither adjustments nor suitable alternative work are possible, the employer has a duty to suspend the individual on full paid leave in line with the Management of Health and Safety at Work Regulations 1999 for as long as necessary to protect the health and safety of both the mother and her child.

# Template Risk Assessment

There are few fixed rules about what to do, what not to do, and when, as a pregnant surgeon.

However, most women would come off the on-call rota at 28 weeks (pay protected); likewise, most would not undertake night shifts after this time, and replacing night shifts with additional day shifts is discouraged.

The evidence basis for the 28-week convention is discussed in section 3 below — it is a pragmatic norm rather than an evidence-derived threshold.

In order to structure a risk assessment in pregnancy, we suggest considering two domains:

## Work exposures (examples)

- X-Ray imaging.
- Infection – CMV, varicella, toxoplasmosis.
- Iodine scrub – should not be used in pregnancy.
- Exposure to or use of bone cement.

## Work duties (examples)

- Manual handling.
- Long working hours.
- Night shifts.
- When to come off on call, when to come off nights, and when to start maternity leave.
- Lone working.

# Common Questions: A Summary of the Current Evidence

The sections below summarise the current evidence on the questions most commonly raised, for most surgical specialties and procedures. A recurring theme is that the governing framework is individualised risk assessment rather than fixed rules, and that several widely quoted thresholds (28 weeks, a 40-hour week) are pragmatic anchors rather than points where the evidence shows a clear change in risk.

## Radiation exposure in Surgical Procedures

### Regulatory Framework (UK)

Under the Ionising Radiations Regulations 2017, once a worker declares pregnancy in writing, the employer must ensure the dose to the fetus for the remainder of the pregnancy stays below 1 mSv.[1] International guidance (ICRP) sets fetal protection as broadly equivalent to that of a member of the public.[2]

In practice this is applied as a supplementary equivalent-dose limit of 2 mSv to the surface of the woman's abdomen (lower trunk) for the remainder of the pregnancy[3] — because the fetus sits behind both maternal tissue and the lead apron, the abdominal-surface reading substantially overestimates the true fetal dose.

### Magnitude of Risk

The 1 mSv limit is deliberately conservative. Deterministic harm (miscarriage, malformation, growth restriction, neurodevelopmental effects) is only seen at high fetal doses above ~100 mSv.[4] The residual concern at occupational doses is stochastic (childhood cancer/leukaemia), with no assumed threshold, but the absolute excess at sub-1 mSv levels is negligible. Real-world dosimetry confirms this: across 74 declared pregnancies at one large centre, the mean recorded fetal dose was 0.15 mSv (maximum 0.89 mSv).[5]

## Risk By Specialty & Procedure (Operator Dose, Highest to Lowest)

| Specialty | Typical Fluoroscopic Procedures | Relative Operator Dose & Notes |
|---|---|---|
| Trauma and Orthopaedics | Pedicle screws, intramedullary nailing, DHS, spine. | Highest. Lumbar 4-screw fixation est. ~0.11 mGy/case to surgeon abdomen under apron; max ~0.044 mGy to fetus — ~23 cases approach 1 mGy, still far below any teratogenic threshold.[6] |
| Vascular / Endovascular | EVAR / FEVAR, angioplasty, embolisation. | High. Composite body dosimetry ~7.70 mSv/yr; high-volume operators can approach the 20 mSv/yr limit despite shielding.[7] |
| Urology (endourology) | PCNL, ureteroscopy, stent insertion. | Moderate; PCNL highest. Per-case operator dose ~73 µSv (PCNL), ~18.5 µSv (URS). Detailed in section 5.3.[8] |
| IR, interventional cardiology / EP | Ablations, angiography, device work. | Moderate, procedure - dependent. Fetal dose stays low with shielding and good technique. [9] |
| General / Upper GI | On-table cholangiogram, oesophageal/duodenal stenting, ERCP. | Low overall. ERCP is the exception — the one general-surgical activity with a regular, non-trivial operator dose; high-volume ERCP lists warrant specific dosimetry. |
| Breast (SLNB) | Sentinel node biopsy with Tc-99m | Very low occupational dose. Detailed in section 5.4.[10] |
| Laparoscopic / robotic | — | No ionising radiation; not a radiation concern. |

Practical position: a declared pregnant trainee issued an abdominal dosimeter and wearing a 0.5 mm Pb-equivalent apron can almost always continue operating. The roles where the 1 mSv limit genuinely constrains practice are heavy trauma fluoroscopy lists, endovascular sessions, and high-volume ERCP. [11, 12]

## Night Shifts: Evidence & When to Stop

A 2019 systematic review and meta-analysis of 196,989 women, cited by the RCOG, RCP and BMA showed that:

- Compared with fixed day shifts, fixed night shifts were associated with increased odds of preterm delivery (OR 1.21, 95% CI 1.03–1.42) and miscarriage (OR 1.23, 95% CI 1.03–1.47).[13]
- Working more than 40 hours per week raised miscarriage odds (OR 1.38), and more than 55.5 versus 40 hours gave a 10% increase in preterm delivery. [14]
- A dose-response signal exists miscarriage risk rose with cumulative night shifts during weeks 3–21, with a threshold effect at two or more night shifts per week[15], and frequent quick returns (under 28 hours 'recovery) in the first trimester carried a greater-than-twofold risk of preterm labour.[16]

**Caveat on certainty**: the evidence is graded low certainty and is inconsistent.

The largest objective study — a Danish payroll-linked register of 16,501 pregnancies — found no elevated preterm-birth risk among night-shift workers.[17] The proposed mechanism (light-induced melatonin suppression reducing progesterone and impairing placental function) is plausible but the human signal is weak.

There is no evidence-derived gestational threshold for stopping night shifts; the strongest (still modest) signals attach to first-trimester night frequency and to long weekly hours.

## On-Call Shifts & The 28 Weeks Figure

The key point is that 28 weeks is not an evidence-derived threshold. It comes from no dose-response curve, trial, or biological inflection. RCOG guidance (updated April 2026) states it as a pragmatic, conditional consideration: many doctors doing resident night shifts may decide to stop from around 28 weeks *if* they work in a unit without sufficient clinical support, or at an acuity where regular breaks cannot be accommodated.[18] The conditionals — lack of support and inability to take breaks — are doing the work, not the gestation itself.

In effect, 28 weeks is a sensible default bundling third-trimester fatigue, reduced mobility, physical vulnerability, and the reality that resident overnight cover is often solo and break-free. Practice varies in both directions: documented cases include on calls stopped completely at 23 weeks after risk assessment, as well as exemptions

requested from 28 weeks.[19] The underpinning RCP / Faculty of Occupational Medicine guidance (*Pregnancy: Occupational Aspects Of Management*) likewise specifies no gestation.[20]

Pregnancy and maternity are protected characteristics under the Equality Act 2010.14 Where a risk cannot be removed by adjusting duties, the employer must alter hours or conditions or, failing that, suspend on full pay under the Management of Health and Safety at Work Regulations 1999.[21]

## Stopping Work Before the Due Date

### Evidence

There is no universal evidence-based cut-off; a well, risk-assessed woman can work to term. The relevant exposures are physical rather than calendar-based: physically demanding work, prolonged standing and high work-fatigue scores are significantly associated with preterm birth, whereas long working hours alone are not.[22]

A large prospective cohort (Japan Environment and Children's Study, 99,744 pregnancies) found that long hours, standing more than two hours, and physically strenuous conditions were associated with threatened preterm labour, and that 36 or more hours per week combined with night shifts raised hypertensive disorders of pregnancy.[23]

Professional bodies remain cautious: any increased preterm risk from occupational characteristics may be due partly or entirely to bias and confounding given the observational data.[24] For surgical trainees the modifiable exposure is prolonged standing on long lists in the third trimester, more than the calendar date.

### UK legal / practical framework (usually the deciding factor)

- Notify the employer by 15 weeks before the expected date of delivery (EDD) to qualify for Statutory Maternity Pay. [25]
- Maternity leave can start at the earliest 11 weeks before the EDD.[26]
- A pregnancy-related illness absence in the last 4 weeks before the EDD (~36 weeks) can automatically trigger the start of maternity leave [27]

In short: continue if well and risk-assessed, scrutinising standing and operating duration through the third trimester rather than fixing a stop date, with roughly 36 weeks being the point where a pregnancy-related absence converts to maternity leave by default.

# Specific Occupational Exposures

This section expands on individual exposures where there is specific evidence relevant to a surgical risk assessment.

## Bone Cement (Methyl Methacrylate)

Polymethyl methacrylate (PMMA) bone cement, used in arthroplasty and trauma, releases methyl methacrylate (MMA) vapour during mixing and curing, and is a long-standing concern among female orthopaedic surgeons.[28]

The reassuring point is that reproductive toxicity has been demonstrated only in animal studies, never in humans at occupational levels. MMA is not classified as a human carcinogen, and occupational exposure standards (e.g. an 8-hour time-weighted average of 50 ppm) are set to prevent respiratory irritation and sit well below any threshold for fetal tissue damage.[19] Direct measurement is reassuring: in volunteers exposed during routine cement mixing, serum MMA was undetectable at a detection limit of 0.5 ppm.[29]

**Advice**

Published advice suggests a pregnant primary or assistant surgeon can safely perform up to four arthroplasty cases over an 8-hour period, assuming vacuum mixing, adequate theatre ventilation/scavenging and standard PPE.[30] Reasonable mitigations are vacuum/closed mixing systems, good ventilation, and stepping back from the immediate area during the mixing and curing phase. There is no evidence-based requirement to avoid theatres where cement is used.

## Iodine - Based Surgical Scrub

Iodine-based antiseptic scrub solutions (e.g. povidone-iodine) are **not recommended during pregnancy**. The Joint Committee on Surgical Training's guidance for pregnant surgeons in training states there is sufficient evidence that iodine may be absorbed to affect the fetal thyroid in the second and third trimesters.[31] Absorption through the operator is real, not theoretical: scrubbing with iodine-containing solutions measurably raises the urinary iodine concentration of operating-room staff.[32] Excess maternal iodine crosses the placenta and, via the Wolff-Chaikoff effect, can cause fetal/neonatal hypothyroidism and goitre; the BNF and manufacturer guidance carry the same caution.[33]

**Advice**

Breastfeeding and practical guidance: iodine scrub near term and during breastfeeding raises breast-milk iodine and can cause transient neonatal hypothyroidism and interfere with newborn screening, so it is also discouraged while breastfeeding.[34] The straightforward mitigation is to **use a chlorhexidine-based scrub or skin-prep instead** — an equally effective, widely available

alternative that removes the exposure entirely.

## Endourological Fluoroscopy (Urology)

Endourology relies on fluoroscopy, and per-case operator doses rank PCNL > ureteroscopy > shock-wave lithotripsy. In one comparative study the surgeon dose per case was approximately 73 µSv for PCNL, 18.5 µSv for ureteroscopy and 2.4 µSv for ESWL.[35] PCNL is therefore the procedure to scrutinise, but the absolute doses remain low and highly modifiable. A cadaveric pregnancy model found that a surgeon could perform 12 PCNLs with no lead, or 189 with a 0.35 mm lead apron, before reaching the 1 mSv fetal limit — and that reducing pulse frequency from 30 to 1 pulse per second cut the dose by 96%, allowing over 6,000 cases when combined with low-dose fluoroscopy and shielding.[36]

**Advice**

With lead shielding, low-dose and pulsed fluoroscopy, and ALARA technique, pregnant endourologists can continue fluoroscopic operating throughout pregnancy within recommended limits.[37] However, as the operator's hands are frequently in or near the direct beam during endourology, attention to keeping extremities out of the field (and extremity/abdominal dosimetry) is worthwhile.[38]

## Breast Surgery: Sentinel Lymph Node Biopsy (Blue Dye & Tc-99m)

For a pregnant surgeon performing sentinel lymph node biopsy (SLNB), the occupational exposure is small. Radiation from the Tc-99m radiocolloid in the patient and excised node is minimal: dosimetry indicates a primary surgeon could perform about 2,000 hours of SLNB work before approaching occupational limits, and instruments, specimens and slides do not require special handling beyond routine local rules.[39]

Even for a pregnant patient undergoing SLNB (a higher exposure than the surgeon receives), the fetal dose from a conventional Tc-99m injection is only about 0.011–0.025 mSv, far below any threshold of concern.[40] Studies measuring the surgeon's lower-abdominal dose during SLNB confirm exposures well within limits.[41]

**Advice**

Blue dye — an important distinction: the frequently cited caution about blue dye (patent blue / isosulfan / methylene blue) in pregnancy relates to the pregnant patient, because of a roughly 1–2% risk of anaphylaxis and uncertain fetal effects — not to the operating surgeon, for whom handling the dye carries no meaningful occupational or fetal risk.[42] Where a unit wishes to avoid radioisotope altogether, indocyanine green (ICG) fluorescence is an effective non-radioactive alternative for nodal mapping.[43]

## Radioactive Iodine (I-125) Seed Localisation in Breast Surgery

This is a distinct question from the iodine scrub discussed above. Here, the "iodine" is a sealed, low-activity radioactive iodine-125 seed radioactive/radioguided seed localisation, RSL or ROLL) implanted to mark an impalpable lesion before excision, so the issue is radiation, not the fetal thyroid.

The occupational dose to the operating surgeon is small. The seed is a low-activity sealed source emitting soft photons in the 27–31 keV range, most of whose energy is absorbed within the breast and the seed's titanium capsule. In a series of over 25,000 RSL procedures, more than 95% of staff dosimetry readings fell below the 0.1 mSv annual recording threshold, and the authors concluded that routine radiation monitoring of staff was unnecessary.[44] The dose to the patient's residual breast tissue is of the order of a single mammogram. [45]

**Advice**

For a pregnant surgeon, operating on a patient with an implanted I-125 seed requires no restriction beyond routine local radiation rules — the occupational fetal dose is negligible.

A separate question, relevant when a pregnant surgeon is advising on a patient's management, concerns the pregnant patient undergoing seed-guided surgery: modelling shows the cumulative fetal dose stays below 1 mSv, and always far below the ~100 mSv teratogenic threshold, provided implantation and excision are appropriately timed (within roughly two weeks for a seed implanted from 26 weeks ' gestation, and within one week beyond 32 weeks).

A seed therefore need not be withheld from a pregnant patient, although many units still prefer a non-radioactive marker (magnetic seed or wire) in that setting.[46]

## Surgical Smoke & Diathermy

Electrosurgery (monopolar and bipolar diathermy), lasers and ultrasonic dissectors vaporise tissue and generate "surgical smoke" — an aerosol of more than a thousand combustion products that includes compounds classed as carcinogenic, mutagenic and potentially teratogenic (for example polycyclic aromatic hydrocarbons, benzene and formaldehyde), ultrafine particles (the mean electrocautery particle is around 0.07 µm), and, for some tissues, viable bacteria and viral DNA.[42,43] Electrosurgical smoke has tested positive in the Ames mutagenicity assay, and polycyclic aromatic hydrocarbon concentrations measured at the surgeon's breathing height during mastectomy have been reported at 20–30 times ambient outdoor levels.[47] [48]

The translation from these laboratory signals to real occupational disease is, however, uncertain. Critical reviews note that pollutant concentrations actually measured in the breathing zone are low, that no clear excess of malignancy or other disease has been demonstrated in exposed surgical staff, and that the case for universal mandatory smoke evacuation remains debated.[49] There is no direct evidence that surgical smoke

specifically harms a pregnancy, nor that pregnancy increases susceptibility; the concern is precautionary, resting on the reprotoxic classification of some constituents rather than on outcome data.

**Advice**

The sensible precaution for a pregnant surgeon is to ensure local smoke evacuation is used at source (which reduces ultrafine-particle exposure several-fold), that theatre ventilation is functioning, and that a well-fitted FFP3/N95 respirator rather than a standard surgical mask is worn for prolonged or high-plume dissection — surgical masks do not filter the smallest particles.[50] [51]

There is no evidence-based reason for a pregnant surgeon to avoid diathermy or electrosurgery altogether.

## ENT Surgery: Open-Airway Anaesthesia & HPV Laser Plume

### Waste Anaesthetic Gases

Studies from before modern gas scavenging linked chronic occupational exposure to waste anaesthetic gas (nitrous oxide and volatile agents) with roughly a 50% increase in early miscarriage.[52]

Contemporary systematic reviews, in theatres with functioning scavenging and ventilation, find no significant association with spontaneous abortion or congenital malformation.[53,54]

The ENT-specific point is that airway work — laryngeal biopsy, subglottic and laser cases — is sometimes conducted with an open or shared airway (jet ventilation, spontaneous-ventilation, or tubeless techniques) rather than a sealed closed circuit, which can raise volatile-agent levels in the immediate field.

**Advice**

Where this is a concern, total intravenous anaesthesia (TIVA) removes volatile exposure entirely, and scavenging plus ventilation otherwise keep levels within limits; a surgical mask gives no protection against anaesthetic vapour.[55]

### HPV in Laser Plume

$CO_2$-laser ablation of laryngeal papillomas — recurrent respiratory papillomatosis, usually HPV 6/11 — releases a plume in which intact HPV DNA has repeatedly been detected. This is a documented, if rare, occupational hazard: laryngeal papillomatosis has been formally recognised as an occupational disease in a laser surgeon and a theatre nurse, and HPV-16-positive oropharyngeal cancers have been reported in two surgeons after years of laser plume exposure.[56] [57]

The risk is not specific to pregnancy — there is no evidence that pregnancy amplifies

it, nor that maternal plume inhalation poses a discrete fetal risk — but it is a genuine reason for plume precautions for any operator doing regular laser papilloma work.

**Advice**

For laser airway work, use plume evacuation held close to the ablation site, a well-fitted FFP3/N95 respirator (not a surgical mask) and eye protection; HPV vaccination is increasingly recommended for staff who regularly treat HPV-related lesions. For open-airway volatile cases, TIVA and effective scavenging are the substantive controls.[58,59]

## Cytotoxic Agents in Surgery (HIPEC, Intraperitoneal And Intravesical Chemotherapy)

Hyperthermic Intraperitoneal Chemotherapy (HIPEC) instils heated cytotoxic drugs — commonly mitomycin C, cisplatin or oxaliplatin — into the abdomen after cytoreduction, and the newer pressurised intraperitoneal aerosol chemotherapy (PIPAC) delivers them as an aerosol at laparoscopy.

Intravesical chemotherapy for non-muscle-invasive bladder cancer most commonly uses mitomycin C or gemcitabine, both are administered directly into the bladder, so systemic absorption in the patient is typically low when the urothelium is intact, but they remain hazardous cytotoxic drugs for healthcare workers. These antineoplastic agents are established occupational hazards, several are IARC group 1 carcinogens, and the relevant exposure routes for theatre staff are inhalation, skin, and mucosal contact.[60]

Biomonitoring and surface-wipe studies are broadly reassuring with closed technique, dedicated PPE and adequate ventilation, airborne platinum concentrations are very low, although surface contamination of gloves, instruments and floor is variable and can be substantial. [61]

The specific reproductive-safety evidence, however, is thin, and this is the exposure in this document where a precautionary line is most clearly warranted. A 2025 editorial reviewing intraperitoneal chemotherapy safety explicitly flagged the absence of reproductive-outcome data and highlighted the concerns of pregnant, breastfeeding and trying-to-conceive staff; the OSHA and NIOSH frameworks for hazardous drugs include work-reassignment provisions for exactly this situation.[62]

**Advice**

Chemotherapeutic agents are not governed by dose monitoring or trimester thresholds. The first trimester carries the greatest theoretical concern because of miscarriage and organogenesis, but second-and third-trimester exposure may still affect fetal growth, bone marrow, and rapidly dividing tissues. With regard to intravesical chemotherapy pregnant surgeons can continue general urology work and care for patients receiving intravesical therapy but should not directly handle cytotoxic agents or contaminated urine. Mitigations for all staff include pharmacy

preparation where possible, closed delivery systems, cytotoxic PPE, spill kits, staff training only and clear waste management streams. For HIPEC or PIPAC a pregnant surgeon or theatre practitioner should not participate in the drug-handling phases — the mixing, instillation, circulation, and drainage of the cytotoxic agent — and reassignment away from that phase is the standard and appropriate precaution. The cytoreductive surgery that precedes drug instillation carries no cytotoxic exposure, so it is only the chemotherapy phase, not the whole operation, that a pregnant staff member needs to step out of.[63]

## Orthopaedic Power Tools: Drilling, Sawing & Aerosolisation

High-speed drills, oscillating saws, burrs, reamers and pulsed lavage are among the highest aerosol-generating activities in surgery, producing a mix of bone dust and aerosolised blood and irrigation fluid; bone sawing and diathermy have been specifically confirmed as high-yield aerosol procedures, and high-speed cutters in revision arthroplasty can disperse aerosol across an entire theatre.[64] [65]

The principal occupational concern is blood-borne rather than particulate: haemoglobin is detectable in these aerosols, and a single in-vitro study showed that HIV could be carried in saw and burr aerosol, although direct evidence that orthopaedic bioaerosols actually transmit infection is low-quality and uncertain.[66]

There is no evidence of a discrete fetal hazard from bone or blood aerosol beyond the general blood-borne-virus concern, and no evidence that pregnancy increases susceptibility. Because maternal acquisition of hepatitis B, hepatitis C or HIV carries vertical-transmission implications, the relevant point is that standard blood-borne-virus precautions matter — not that a pregnant surgeon should avoid power tools.

**Advice**

Standard aerosol and splash precautions cover this exposure — eye and face protection, a fitted FFP3/N95 respirator where high aerosol generation coincides with known or suspected blood-borne virus, and double-gloving — together with attention to sharps.

A well, risk-assessed pregnant surgeon can continue orthopaedic power-tool work with these measures in place. Hearing protection and awareness of hand-transmitted vibration are reasonable general considerations, though neither is a pregnancy-specific risk.

## Prolonged Standing

Of the physical exposures relevant to a surgeon, prolonged standing rests on some of the weakest-certainty evidence. Meta-analyses associate standing or walking for more than three to four hours a day with a modestly increased risk of preterm delivery (odds ratios around 1.3), but the estimate is graded low-to-very-low certainty, shrinks in the largest and best-conducted studies, and is plausibly explained in part by confounding.[67] [68]

The RCP / Faculty of Occupational Medicine concise guidance is broadly reassuring but concludes it is prudent to advise against prolonged standing, long hours, and heavy physical work, particularly in late pregnancy.[69]

There is no firm evidence-derived hourly cut-off; roughly four hours of continuous standing is the pragmatic anchor that appears in the literature rather than a point where risk demonstrably changes.

Reducing the risk: the practical levers are to break up standing rather than to stop operating — sitting to operate or assist where the procedure allows (including at the robotic console), scheduled breaks and position changes on long lists, anti-fatigue matting, and hydration. Graduated compression stockings are a simple, evidence-based measure: they reduce occupational lower-limb oedema and venous pooling (15–20 mmHg is sufficient for oedema, with higher grades more effective), and they are additionally relevant because pregnancy is a hypercoagulable state, so compression also contributes to venous thromboembolism prevention.[70]

**Advice**

A well, risk-assessed pregnant surgeon can continue operating; the modifiable exposure is long continuous standing on lists in the third trimester, addressed by list scheduling, seating and console use, breaks and compression hosiery, rather than by a fixed calendar date or a blanket restriction on operating.

# Key Principles to Take Away

The guidance is individualised risk assessment, not fixed rules; named thresholds (28 weeks, 40 hours) are pragmatic anchors, not evidence inflection points.

- Evidence-supported levers: first-trimester night frequency, weekly hours above 40, and prolonged standing in the third trimester.
- Radiation — declare in writing, use an abdominal dosimeter, lead shielding, and low-dose/pulsed fluoroscopy; routine laparoscopic/robotic and most general/UGI work pose no radiation concern. PCNL and heavy fluoroscopy lists are the ones to scrutinise.
- Iodine scrub — avoid in pregnancy and while breastfeeding; substitute a chlorhexidine-based scrub.
- Bone cement — no human evidence of harm at occupational levels; vacuum mixing, ventilation and standard PPE are sufficient.
- Breast SLNB — occupational Tc-99m dose to the surgeon is negligible; blue-dye cautions concern the pregnant patient, not the operating surgeon.
- Individual cases are governed by local trust policy, the Radiation Protection Adviser and Occupational Health; the BMA can advise trainees directly.
- Radioactive I-125 seeds — occupational dose to the surgeon is negligible; note this is a radiation question, distinct from the iodine-scrub thyroid caution above.
- Surgical smoke, laser plume, and drill/saw aerosol — real laboratory hazards but low measured occupational dose; the answer is local evacuation at source and a fitted FFP3/N95 respirator, not avoidance of the technique.
- Cytotoxic agents (HIPEC/PIPAC) — the one exposure warranting reassignment: a pregnant surgeon should step out of the drug-handling phase, not the whole operation.
- Prolonged standing - no fixed hour limit; break up standing, sit or use the robotic console where possible, and wear graduated compression stockings (which also aid VTE prevention).

# Returning After Maternity Leave

How to plan safely coming back after maternity leave.

## 2–3 Months Before Returning

Arrange a return-to-work meeting with your Educational Supervisor, Clinical Supervisor or Clinical Lead

- Confirm your intended return date.
- Review your proposed rota, resident, and non-resident on call commitments.
- Consider whether a phased return or temporary flexible working/Less Than Full Time (LTFT) training would be beneficial.
- Arrange an Occupational Health review if appropriate.
- Inform your employer if you intend to breastfeed or express milk following your return.
- Review annual leave accrued during maternity leave and plan how this will be taken.
- Discuss childcare arrangements and contingency plans for emergencies.
- Identify any mandatory training or life support courses requiring renewal.
- Review ARCP, appraisal or revalidation requirements.
- Explore available support, including NHS England's Supported Return to Training (SuppoRTT) programme, simulation, and mentoring.

## 4–6 Weeks Before Returning

Ensure practical arrangements are in place.

- Occupational Health review completed where required.
- Individual postnatal and breastfeeding workplace risk assessment arranged.
- Mandatory training completed or booked.
- IT access, smartcard, ID badge, and parking reinstated.
- Job plan, theatre lists, and on-call rota finalised.
- Return-to-work induction arranged if departmental changes have occurred during your absence.
- Facilities available for expressing and storing breast milk if required.

## Your First Week Back

Returning to surgery should focus on rebuilding confidence rather than immediately resuming a full workload.

- Departmental induction and updates to local policies.
- Meet new colleagues and reviewing service changes.
- Familiarise oneself with new equipment, electronic records, and clinical pathways.
- Start with elective operating lists before progressing to emergency surgery where possible.
- Operate with a familiar consultant or trainer initially if appropriate.
- Observe or assisting before undertaking complex procedures independently if this would increase confidence.
- Schedule a review meeting with your supervisor at the end of the first week.

## The First Three Months

Review progress regularly.

- Confidence in clinic and theatre.
- Fatigue and wellbeing.
- Breastfeeding arrangements.
- Operative exposure and training opportunities.
- Progression back to emergency operating and on-call commitments.
- Educational objectives and portfolio progression.
- Additional simulation or supervised operating if required.

Formal review meetings should ideally take place at approximately 2 weeks, 6 weeks, and 3 months.

## Returning to Theatre

Time away from operating may affect confidence but should not be assumed to affect competence.

- Returning initially to shorter or less complex operating lists where appropriate.
- Working alongside familiar consultants during the transition.
- Access to simulation, cadaveric courses, or technical skills laboratories if available.
- Rebuilding confidence before undertaking complex or emergency cases independently.

- Fair access to theatre lists and operative opportunities following return.
- Avoiding prolonged periods allocated solely to clinics or ward work unless requested.
- Reviewing operative numbers and educational opportunities during the first few months back.

## Breastfeeding & Expressing at Work

- Inform your employer before returning to work.
- Ensure a suitable private room is available for expressing (not a toilet).
- Ensure refrigeration is available for milk storage.
- Agree protected expressing breaks within clinics and operating lists.
- Discuss theatre scheduling where prolonged operating sessions may interfere with expressing.
- Ensure a breastfeeding-specific workplace risk assessment has been undertaken.

## Fatigue & Wellbeing

Fatigue following maternity leave is common and should be recognised as both a wellbeing and patient safety issue both because of the nature of the work, re-acclimatising after a period of time off and sleep disruption associated with caring for an infant(s). Seek support early if physical recovery, mental health, or fatigue are affecting your work.

## Know Your Rights

Women returning after maternity leave are protected by employment law and NHS contractual provisions. You have the right to:

- Return to your substantive post following maternity leave (or, in limited circumstances, a suitable alternative role on no less favourable terms).
- Continue to accrue annual leave throughout maternity leave.
- Request flexible working arrangements, including LTFT training where appropriate. Requests should be considered reasonably.
- A personalised return-to-work discussion before recommencing duties.
- An individual workplace risk assessment if you have recently given birth or are breastfeeding.
- Appropriate workplace adjustments where required for your health and safety.
- Suitable facilities and reasonable breaks to breastfeed or express milk at work.
- Fair access to operating lists, clinics, educational opportunities, and career progression.
- Protection from discrimination because of pregnancy, maternity leave, breastfeeding, or flexible working.
- Access to Occupational Health where appropriate.

Maternity leave should never disadvantage a surgeon's training, operative opportunities, or career progression.

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## Contributors


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# Disclaimer.

This document is an evidence summary for educational and risk-assessment discussion only. It is not individual medical, occupational-health, or legal advice. The certainty of much of the occupational evidence is low, and figures are drawn from observational studies subject to confounding.

Individual circumstances, complicated pregnancies, and local arrangements must be assessed by an Occupational Health service, supervisor and (for radiation) the trust Radiation Protection Adviser, in line with current NHS Trust or Health Board policy.

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