




Stillbirth: prevention and supportive bereavement care

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ABSTRACT

Around half of the two million stillbirths occurring worldwide each year are preventable. This review compiles the most up-to-date evidence to inform stillbirth prevention.

Many general maternal health interventions also reduce the risk of stillbirth, for example, antenatal care attendance. This review focuses on specific aspects of care: glucose metabolism, targeted aspirin prophylaxis, clotting and immune disorders, sleep positions, fetal movement monitoring, and preconception and interconception health. In the past few years, covid-19 infection during pregnancy has emerged as a risk factor for stillbirth, particularly among women who were not vaccinated. Alongside prevention, efforts to address stillbirth must include provision of high quality, supportive, and compassionate bereavement care to improve parents' wellbeing. A growing body of evidence suggests beneficial effects for parents who received supportive care and were offered choices such as mode of birth and the option to see and hold their baby. Staff need support to be able to care for parents effectively, yet, studies consistently highlight the scarcity of specific bereavement care training for healthcare providers. Action is urgently needed and is possible. Action must be taken with the evidence available now, in healthcare settings with high or low resources, to reduce stillbirths and improve training and care.

Introduction

Stillbirth is devastating for parents, families, communities, and care providers.¹ Around two million stillbirths occur worldwide annually, around half potentially preventable.² However, some stillbirths are not currently preventable with evidence based interventions, and some might never be. Prevention efforts are essential but, equally as important, all parents who experience a stillborn baby must receive high quality, supportive bereavement care.

This review compiles current and emerging evidence on stillbirth prevention and bereavement care, and describes steps to reduce the impact of stillbirth worldwide. Some aspects of stillbirth prevention (eg, the use of aspirin to prevent pre-eclampsia) have been well researched, however, these remain the exception. We highlight the many aspects of prevention are neglected in this

review (figure 1). Bereavement care provision remains a lesser research focus, particularly as regards the impact of interventions on long term outcomes for families.

Incidence and prevalence

Of the two million stillbirths that occur annually, 84% are in low and middle income countries.² More than 40% of stillbirths occur intrapartum and are likely preventable. In 2019, the stillbirth rate in high income countries was 3.0 per 1000 total births, compared with 22.7 per 1000 total births in low income countries.²

Stillbirth incidence is typically based on WHO's definition: the death of a baby in utero at 28 weeks or more of gestation.² Definitions vary globally but in this review we consider stillbirth as the in utero death of a baby at 20 weeks or more of gestation.

The 2016 Every Newborn Action Plan was ratified by 193 countries.³ Each country committed to reducing the number of stillbirths to 12 or fewer per 1000 total births by 2030, and to end inequities within their respective country in stillbirth rates. When reviewed in 2020, 56 countries were predicted to still have more than 12 stillbirths per 1000 births by 2030.

Substantial inequities in stillbirth rates persist within countries; for example, in the UK, black and black British babies are twice as likely to be stillborn or die in the neonatal period compared with white babies. Furthermore, people living in the most deprived areas are 80% more likely to have a perinatal death of a baby than those in the least deprived areas.⁴

Sources and selection criteria

We synthesise some of the breadth of evidence regarding stillbirth prevention and bereavement care, to provide a reference for clinicians and researchers and to highlight areas for future work. Many included topics merit addressing with one or more systematic reviews where this level of evidence is currently lacking, however, comprehensive systematic review of each topic is beyond the scope of this paper.

Review topics were defined by consensus among the authorship team as areas of particular relevance to either prevention of stillbirth or care after stillbirth. Prevention focused topics were selected according to those most prevalent (eg, diabetes and pre-eclampsia) and with available evidence to assess. We excluded topics with regional but limited universal applicability (eg, malaria).

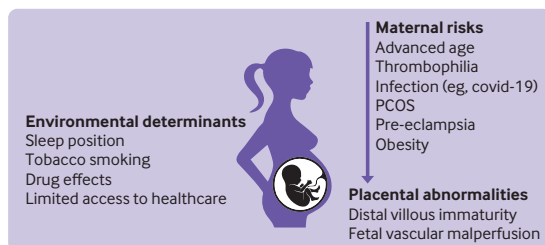


Figure 1 | Factors increasing the risk of stillbirth.
PCOS=polycystic ovary syndrome

Papers published between 1 January 1946 and 30 April 2023 were identified using Medline and PubMed, and by hand searching global and national guidelines (box 1). Searches were conducted for systematic reviews on stillbirth prevention in each of the topic areas chosen. All papers were assessed for reliability, bias, and generalisability. Preference was given to systematic reviews of randomised clinical trials, followed by systematic reviews of observational studies, or individual study findings, in accordance with the levels of evidence described by Sackett.⁵

We excluded studies that were not in English language, or did not have the full text available. Contemporary publications were preferred; date limitations were not otherwise enforced.

Findings are intended to be globally applicable, with contextual considerations described where relevant. The terms “woman”, “mother”, and “birthing person” are used throughout the review to denote the birthing individual rather than confer gender.

Prevention

Diabetes and dysmetabolism

Gestational diabetes mellitus is glucose intolerance diagnosed during pregnancy. This disorder is associated with adverse pregnancy outcomes; fetal macrosomia, shoulder dystocia, neonatal hypoglycaemia, congenital abnormalities, maternal hypertensive disease, future type two diabetes mellitus, and antepartum stillbirth.^{6,7}

The pathogenesis of stillbirth associated with gestational diabetes mellitus is unclear, however, glucose dysmetabolism critically impacts placental development and function. Macroscopically, placentas from mothers with gestational diabetes mellitus are enlarged and plethoric as compared with mothers who do not have this condition.⁸ Microscopically, glucose dysregulation promotes placental angiogenesis and vascularisation, thereby altering villous branching. A consequent histopathological feature is distal villous immaturity, which is a placental phenotype associated with elevated placental growth factor⁹ that causes a progressively hypoxic environment in utero.^{10,11} Stillbirths with

BOX 1 | KEY GUIDELINES

DIABETES AND DYSMETABOLISM

- ⇒ Screening for gestational diabetes: US Preventive Services Task Force recommendation statement¹⁴
- ⇒ Diabetes in pregnancy: National Institute for Health and Care Excellence (NICE)'s guideline of management from preconception to the postnatal period¹⁶
- ⇒ International Association of Diabetes and Pregnancy study groups recommendations on the diagnosis and classification of hyperglycaemia in pregnancy¹⁵

ASPIRIN USE IN PREGNANCY

- ⇒ The American College of Obstetricians and Gynaecologists: low dose aspirin use during pregnancy³³
- ⇒ NICE: hypertension in pregnancy: diagnosis and management³²

BEREAVEMENT CARE

- ⇒ Ireland: national stillbirth bereavement care pathway⁸⁸
- ⇒ UK: national standards for bereavement care following pregnancy loss and perinatal death⁸⁹
- ⇒ Australia: clinical practice guideline for care around stillbirth and neonatal death⁹⁰

distal villous immaturity affect well grown babies suddenly and unexpectedly.

Gestational diabetes mellitus affects between 2% and 11% of pregnancies,^{6,12} depending on the diagnostic and screening criteria used. Most international guidelines recommend screening by way of oral glucose tolerance test at 24-28 weeks' gestation, with variance in screening eligibility and intervention thresholds.¹³⁻¹⁵ Some guidelines advocate universal screening, whereas others recommend screening groups that are at risk (eg, people with a body mass of more than 30, who have individual or family history of gestational diabetes mellitus, or who have macrosomia).

A large cross sectional study of 90 000 women reported more pregnancy complications (eg, shoulder dystocia and neonatal intensive care unit admission) among those not meeting current gestational diabetes mellitus diagnostic criteria, but who met the more sensitive International Association of Diabetes and Pregnancy Study Groups criteria (versus women who met neither diagnostic criteria).¹⁶ Moreover, a study of placental distal villous immaturity recorded an 18% unexplained stillbirth rate, where the only identifiable risk factor in 70% of cases was one or more high glucose results in pregnancy with no gestational diabetes mellitus

diagnosis.¹¹ Although this suggests increased gestational diabetes mellitus diagnoses might prevent adverse outcomes, universal adoption of the International Association of Diabetes and Pregnancy Study Groups criteria would increase gestational diabetes mellitus prevalence an estimated 6–11-fold,⁶ potentially overwhelming stretched health services.

Some individuals exhibit postprandial reactive hypoglycaemia, a hypoglycaemic state induced by a change of insulin secretion after ingestion of refined carbohydrate diets.¹⁷ Reactive hypoglycaemia has different risk factors than gestational diabetes mellitus with the possible exception of the common risk factor of prepregnancy polycystic ovary syndrome.¹⁸ Reactive hypoglycaemia is most prevalent in younger, nulliparous women, irrespective of body mass index^{19–21}; women who were usually not screened for gestational diabetes mellitus.

Although older studies show mixed evidence, emerging evidence suggests that polycystic ovary syndrome alone is a risk factor for stillbirth. In a large population, individuals with polycystic ovary syndrome had a 50% increased risk of stillbirth compared with people who did not have the syndrome (adjusted odds ratio 1.50 (95% confidence interval 1.28 to 1.77)).²² One explanation could be that reactive hypoglycaemia is due to insulin resistance not severe enough to lead to overt polycystic ovary syndrome or gestational diabetes mellitus, but which might still increase stillbirth risk if left untreated.

Lifestyle modification (diet and exercise) might be sufficient to prevent adverse outcomes for most birthing people.²³ To monitor its success, and detect individuals who need medical treatment, advances in continuous glucose monitoring systems have facilitated glucose controlling therapy adjustment and efficacy in pregnancy.^{24 25}

Aspirin: to reduce pre-eclampsia risk

Crandon and Isherwood’s seminal 1979 paper documented the efficacy of prophylactic aspirin in reducing pre-eclampsia.²⁶ Subsequent systematic reviews have synthesised large randomised controlled trials, examining the benefits, optimal timing, and dosage of aspirin given antenatally, as well as in target populations for prophylaxis.

A 2013 systematic review of randomised controlled trials showed reduced pre-eclampsia, perinatal death, and fetal growth restriction among individuals at high risk commenced on aspirin before 16 weeks.²⁷ A subsequent 2017 systematic review of 45 randomised clinical trials identified increased benefits with more than 100mg aspirin daily, without increasing adverse effects.²⁸ A 2018 systematic review²⁹ that examined stillbirth prevention identified only one study of 24 patients who had had previous miscarriage,³⁰ comparing 75 mg aspirin with placebo. This study found no benefit, and the findings were severely limited by its small size and homogenous population.

Few studies examining aspirin use in pregnancy are powered to detect stillbirth risk reduction. The ASPRE trial³¹ randomly assigned 2971 participants at high risk of pre-eclampsia to 150mg aspirin or placebo; the results suggested a possible lower rate of stillbirth and neonatal death among those receiving aspirin versus placebo (8 (1.0%) of 798 v 14 (1.7%) of 822, odds ratio 0.59 (95% confidence interval 0.19 to 1.85)).

Risk stratification is undergoing debate, and international guidelines inconsistently describe target populations for prophylactic aspirin. A prospective, multicentre study compared a composite screen of maternal factors and objective investigations with current screening advised by National Institute for Health and Care Excellence (NICE)³² and American College of Obstetricians and Gynecologists (ACOG)³³ guidelines, for which the results are shown in table 1.^{34 34 3536} Both pre-eclampsia detection rates

Table 1 | Comparison of screening strategies for identifying women in early pregnancy who are at risk of developing pre-eclampsia

Guidelines	Risk factors	Detection of pre-eclampsia <37 weeks	Detection of pre-eclampsia ≥37 weeks	False positive rate, %
Fetal Medicine Foundation algorithm ³⁴	Maternal factors, mean arterial pressure, uterine pulsatility index, and serum placental growth factor	75 (62 to 85)	43 (35 to 50)	10
National Institute for Health and Care Excellence*, ³⁵	Maternal factors	39 (27 to 53)	34 (27 to 41)	10
American College of Obstetricians and Gynecologists ³⁶	Maternal factors	90 (79 to 96)	89 (84 to 94)	64

Data are percentage (confidence interval), unless otherwise specified. Adapted from O’Gorman and colleagues.³⁴

*This guidance from 2010 was revised in 2019 to include additional risk factors.

and false positive rates varied widely between guidelines. Given the relative safety of aspirin administration, an argument could be made for universal low dose aspirin in pregnancy.

Recent evidence suggests that aspirin might be much more effective than previously thought, with high compliance preceding 16 weeks; note, the effectiveness of aspirin on pre-eclampsia greatly reduced with decreasing compliance.^{37 38}

Thrombophilias and clotting disorders

Antiphospholipid antibodies have been strongly linked with stillbirth and the more antiphospholipid antibodies are present, the higher the risk.³⁹ The role of other thrombophilias has been debated. In a systematic review of randomised clinical trials and observational trials, stillbirth after 24 weeks was most strongly associated with protein S deficiency.⁴⁰ Individuals with anticardiolipin antibodies, lupus anticoagulant, factor V Leiden, or heterozygous prothrombin were also at a significantly higher risk of stillbirth after 24 weeks' gestation, in addition to earlier pregnancy loss, with the exception of lupus anticoagulant. The remaining thrombophilias did not have significant associations with stillbirth.

Some thrombophilias such as factor V Leiden mutation are common, yet, stillbirth is uncommon. A possible explanation and mechanism is that inherited common thrombophilias combine with other conditions, such as glucose dysmetabolism and cord variations, causing stasis, hypercoagulability, and vessel damage (Virchow's triad), increasing thrombosis in the fetal part of the placental circulation (fetal vascular malperfusion) and causing chronic or acute fetal hypoxia and death.^{41 42}

Thrombophilias, antiphospholipid syndrome, and rhesus incompatibility are potential contributors to stillbirth in low resource settings, however, scarce evidence is available to assess their prevalence.

Sleep positioning

Lying supine in the third trimester of pregnancy can cause compromised maternal haemodynamics. Aortocaval compression from the gravid uterus impairs venous blood return to the heart, reducing maternal cardiac output, uterine perfusion, and ultimately oxygenation of the fetus and placenta. The adverse impact on fetal wellbeing is frequently shown in labour as abnormalities in electronic fetal monitoring.⁴³

The association between sleep position and stillbirth has been highlighted, although evidence is largely from case-control questionnaire studies, which are subject to recall bias.⁴⁴⁻⁴⁶ Individuals who reported supine positioning when falling asleep had double the stillbirth risk of those who fell asleep in a left lateral position (adjusted odds ratio 2.31 (95% confidence interval 1.04 to 5.11)).⁴⁴ By full term, this risk increased to 10-fold (10.26 (3.00 to 35.04)).⁴⁵

The risk of stillbirth with supine sleep position is further increased for growth restricted fetuses with pre-existent compromised placental perfusion (5.5 (1.36 to 22.5)).⁴⁶

Nonetheless, up to 80% of pregnant people spend some time sleeping on their back.⁴⁷ The largest prospective study of more than 8000 pregnancies undergoing objective sleep assessments from 13 to 30 weeks gestation found a protective effect of non-supine sleeping for stillbirth when measured at 30 weeks (adjusted odds ratio 0.27 (95% confidence interval 0.09 to 0.75)).⁴⁸ However, mothers who assumed a supine sleep position for more than 50% of their asleep time seemed to be no more likely to have a composite adverse outcome (ie, stillbirth, small for gestational age, or gestational hypertension) than those who were positioned supine for less than 50% of the time (odds ratio 1.24 (0.98 to 1.57)). Therefore, current public health messaging on healthy sleep positions is highly justified.⁴⁹

Fetal movement monitoring

In a case-control study comparing 153 individuals who had experienced stillbirth with 480 people with an ongoing pregnancy or live delivery, those who had a stillbirth were much more likely to have had reduced fetal movements in the preceding two weeks (adjusted odds ratio 14.1 (95% confidence interval 7.27 to 27.45)).⁵⁰ The problem is that a reduction in fetal movement is common; and no evidence-based method exists for monitoring and intervention.

A systematic review addressing management of reduced fetal movement identified no randomised trials or meaningful conclusions.⁵¹ Three subsequent large studies have been conducted into fetal movement monitoring: the AFFIRM trial,⁵² the Mindfetalness trial,⁵³ and My Baby's Movements trial.⁵⁴ None resulted in a conclusive stillbirth reduction. AFFIRM⁵² included 409 175 pregnancies in a stepped-wedge design (adjusted odds ratio 0.90 (95% confidence interval 0.75 to 1.07)); the Mindfetalness trial⁵³ included 39 865 pregnancies in a cluster randomised trial (stillbirth rate 0.2% intervention group v 0.14% control group); and the My Baby's Movements⁵⁴ included 290 105 births in a stepped-wedge trial (stillbirth rate 2.2 v 2.4 per 1000 births; adjusted odds ratio 1.18 (95% confidence interval 0.93 to 1.50)).

Assessing whether fetal movement monitoring prevents stillbirth is challenging. Stillbirth is fortunately rare in high income countries, which means that trials need extremely large sample sizes. Public knowledge of fetal movement monitoring is widespread, including among control groups. When individuals with reduced fetal movement are identified, clinician action might be too slow to prevent stillbirth, as was found in some retrospective audits.⁵⁵

Calls have been made to reduce the emphasis on fetal movement monitoring to avoid unnecessary

anxiety.⁵⁶ However, a 2022 study of Australian mothers found that advice to monitor fetal movements did not increase anxiety.⁵⁷

Overall, evidence is insufficient to show stillbirth prevention through fetal movement monitoring in high income countries. In low and middle income countries, where delays in care may be different, evidence is scarce.

Conception health before or between births, and care in pregnancies after stillbirth

In a survey of 1288 pregnant people in London, of 73% who had planned conception, half had sought pre-conception advice.⁵⁸ This low proportion was mirrored by a systematic review of 14 mixed methods studies in high income countries that found pre-conception care engagement was between 18% and 45%.⁵⁹ Evidence regarding pre-conception care access in low and middle income countries is scarce. However, given that only 56% of women in low income countries who have a need for modern family planning methods receive this intervention, compared with 79% in high income countries,⁶⁰ access to preconception care is likely minimal.

Health professionals describe confusion about whose responsibility pre-conception care is, and how to identify women requiring this help.⁵⁸ Across contexts, individuals of childbearing age might have limited contact with health systems before conceiving.

Potential modifiable risk factors for stillbirth include short birth interval, obesity, tobacco smoking, illicit drug use, advanced maternal age, and non-attendance at antenatal care.⁶¹ Interventions to address modifiable risk factors are complex and require health system approaches. For example, the global prevalence of obesity is increasing dramatically.⁶² Despite this challenge, findings from a systematic review identified no randomised clinical trials that have assessed preconception interventions for improving pregnancy outcomes among people who are overweight or obese.⁶³ Generic obesity reduction strategies might be ineffective or inappropriate before conception. For example, surgical weight loss interventions have been shown to be more effective than non-surgical interventions,⁶⁴ but might increase caesarean section risks.

Tobacco smoking has a well researched, dose dependent association with stillbirth, summarised in a systematic review of 34 observational studies (increased stillbirth risk by 9% when smoking one to nine cigarettes per day, 52% when smoking 10 or more cigarettes per day).⁶⁵ Smoking reduction is among health promoting behaviours amenable to intervention during pregnancy, including diet and exercise improvements, although evidence for smoking and alcohol cessation interventions is weaker.⁶⁶

Sensitively addressing risk factors for parents who have previously experienced stillbirth is particularly challenging. Interventions may increase self-blame for the previous stillbirth, and parents may have different motivations to healthcare professionals. For example, although a birth interval of less than a year after a stillbirth has been linked in some studies with adverse pregnancy outcomes, most individuals who have a subsequent pregnancy after stillbirth conceive within a year.^{67–69} Parents' desire for a live child as soon as possible may outweigh any potential disadvantages, while health professionals may be unaware or unwilling to discuss this potential outcome.

When discussing future stillbirth risk, healthcare providers must be sensitive to parents' ideas, priorities, and needs to ensure that parents are adequately equipped for future pregnancy without compounding trauma and distress.

Covid-19 and stillbirth

An increased rate of stillbirth among mothers who are not vaccinated and acquire a covid-19 infection during pregnancy has been described across different countries.^{70–73} Higher rates of stillbirth were observed with the delta variant of covid-19,^{71 74} while subsequent variants, such as omicron, appear to have a lower associated stillbirth risk.⁷⁵

The pathophysiology of stillbirth with covid-19 infection has been investigated in numerous case reports, although larger studies are currently absent. Placental histology indicates malperfusion, which, when severe, may permit in utero vertical covid-19 acquisition.^{76–78} Mothers who had a stillbirth often had mild clinical symptoms of covid-19 despite severe viraemia.⁷⁹

Vaccination may reduce stillbirth risk; a meta-analysis of 23 observational studies showed marginally lower stillbirth risk among individuals vaccinated against covid-19 (pooled odds ratio 0.85 (95% confidence interval 0.73 to 0.99)).⁸⁰

Beyond directly increasing stillbirth risk, the covid-19 pandemic impacted provision and access to maternity care and parents' experience of bereavement care when stillbirth occurred. A rapid review and meta-analysis of 15 countries found an increased risk of stillbirth during lockdown measures (risk ratio 1.33 (95% confidence interval 1.04 to 1.69)).⁸¹

Parents have described how the shock and confusion of the pandemic compounded their bereavement, as well as isolating them from support networks because of social distancing and travel restrictions.⁸² Lessons learnt from the covid-19 pandemic are applicable to future pandemics and current bereavement care provision in the context of contagious diseases.

Care after stillbirth

Evidence

The psychosocial impact of stillbirth is important, highlighted by a systematic review and meta-analysis

of 144 qualitative studies.⁸³ Following stillbirth, parents often experience negative psychological symptoms, including in subsequent pregnancies. Wide ranging consequences include anxiety over siblings of the stillborn baby, employment and financial difficulties, increased substance misuse, body image issues, and poorer quality of life, alongside physical effects such as chronic pain, sleep difficulties, and fatigue. Parents may experience prolonged grief disorder and post-traumatic stress, particularly when they feel isolated and unsupported. High quality care for bereavement may mitigate some negative short and long term psychosocial consequences.

Two major systematic reviews exist of parents and healthcare professionals' experiences of care after stillbirth; the first addresses primarily research from high income countries⁸⁴ and the second low and middle income countries.⁸⁵ The first systematic review created a metasummary of 52 qualitative studies published between 1996 and 2013 of which all but one were from high income countries. The most common themes for parents included the memorable impact of staff behaviours; the importance of clear, timely information; the offer of spending time and making memories with their baby; and the need for health system readiness to provide support after birth and discharge. Staff identified a critical need for bereavement care training.

The subsequent systematic review of studies based in low and middle income countries used the same method, however, conclusions were limited by the inclusion of predominantly small qualitative studies from few geographical regions. Community support was the most identified theme. No themes were related to spending time with their baby or making memories, however, subsequent research has challenged the concept that this opportunity is unwanted by parents in low and middle income countries.⁸⁶

Principles and guidelines

Consensus has not been agreed internationally on what care should be provided to parents suffering a perinatal loss, and few guidelines are available at even on a national level. The 2020 RESPECT study⁸⁷ used a post-Delphi method to produce eight consensus bereavement care principles. This study included 23 experts alongside 236 participants from 26 high income countries or low and middle income countries. The eight principles were reducing stigma, providing respectful care, shared decision making, investigating and identifying causes of stillbirth, acknowledging and normalising varied grief responses, providing holistic postnatal care, providing information on future reproductive health, and facilitating these through training of healthcare professionals. Although these principles can steer bereavement care guideline development, the study

Table 2 | Comparison of the Sands Australia stillbirth bereavement care principles and SANDS UK bereavement care standards^{89 91}

Australia (principles of bereavement care)	UK (bereavement care standards)
Shared principles	
Bereavement care is individualised	Individualised, parent led bereavement care plan
Shared decision making	Parents are supported to make informed choices
Ongoing emotional and practical support	Parents are aware of and can access emotional and mental health support
Health professionals trained in bereavement care	Bereavement care training is provided to all staff
Health professionals can access self-care	Healthcare staff can access support and resources
Distinct principles*	
Recognition of parenthood	A healthcare professional is responsible for bereavement care in every setting where a stillbirth may occur
Acknowledgement of partner's and family's grief	Bereavement rooms (dedicated delivery rooms for families who have a pregnancy loss) available in all hospitals
Acknowledgement of individual grief responses	Memory making opportunities are available
Awareness of burial, cremation and funerals	Clear communication between staff that the parent has experienced a bereavement
Communication is clear and honest	—

*Columns for distinct principles do not relate to each other.

had important limitations. Participants from low and middle income countries represented only 23% of respondents, while 84% of stillbirths occur in low and middle income countries.² Additionally, no parents were included in this research.

In the past few years the UK, Ireland, and Australia have all developed national bereavement care guidelines^{88–90} while ACOG refer to the Australian Sands principles in their clinical guidelines on management of stillbirth. Of note, the Australian Sands principles are aligned with, but distinct from, the national guidelines.⁹¹

The UK Bereavement Care Pathway and Australian Sands principles have substantial overlap (table 2) and both were led by the national Sands charities with input from key stakeholders. However, while the UK pathway is predominantly perinatal and hospital focused, the Australian principles encompass wider aspects of bereavement care, such as funeral provision. The Irish pathway is organised around four domains (bereavement care, the hospital, the baby and parents, and the staff) and implementation is hospital oriented through their stillbirth care pathway checklist.⁸⁸

Despite these notable examples, national and international guidelines are sparse, particularly in low and middle income countries where most

stillbirths occur and where parents report lower satisfaction with bereavement care. An analysis of 3769 parents' experiences of stillbirth gathered through a 2015 survey found that parents in middle income countries were less likely to report respectful care after their baby was stillborn compared with parents in high income countries (351/619 (57%) v 2462/3150 (78%); odds ratio 0.37 (95% confidence interval 0.30 to 0.44)).⁸⁶ Parents in middle income countries also felt less involved in decision making, a principle common to all three existing national bereavement care guidelines. As such, urgent attention is needed to develop, implement, and evaluate bereavement care guidelines.

Training to improve bereavement care

Perinatal bereavement care has unique considerations: parental support, communication, clinical decisions, and impact on staff. *The Lancet* 2016 stillbirth series called for improved bereavement care training,⁹² echoed by all three national bereavement care guidelines.^{88–90} Across studies providers frequently reported a paucity of training as a barrier to provision of high quality bereavement care.^{84 85 92–94}

In some countries, numerous local perinatal bereavement care training courses are available;^{95 96} although, to the authors' knowledge, none are nationally endorsed. While low and middle income countries bear the highest burden of stillbirth, training may not be available within a whole country, and some healthcare providers report feeling unprepared to provide perinatal bereavement care.⁹⁷

The Kirkpatrick model describes evaluation of healthcare training initiatives on four levels, where level 4 is ideal: patient experience of care (level 4), behaviour change (level 3), learning (level 2), and reaction (level 1). Where training courses exist, their impact on results for parents' experiences of care (Kirkpatrick level 4) has not been evaluated.⁹⁸ One training module, which focused on post-mortem consent after stillbirth, reported a successful impact after the course on behavioural change (level 3) as assessed by participants' supervisors.⁹⁹

The SUPPORT course⁹⁵ is UK based, providing training for healthcare professionals in caring for parents suffering any perinatal bereavement from early pregnancy to neonatal death. Evidence of its impact at level 1 and 2 (reaction and learning) has also shown beneficial results for improving bereavement care.¹⁰⁰

Robust implementation and evaluation of bereavement care training is clearly needed in both high and low income countries.

Mode of birth

Following diagnosis of antepartum stillbirth, parents should be counselled on options for delivery, taking into account their unique medical context. Key considerations are timing and mode of delivery,

pain management, delivery setting, and preferences (eg, the presence of a companion). In the absence of features necessitating immediate delivery (eg, sepsis, antepartum haemorrhage, or pre-eclampsia), the timing of delivery should incorporate the parents' preferences.

Although some people diagnosed with antepartum stillbirth will labour spontaneously¹⁰¹ or require medically indicated caesarean delivery, for others a joint parent-provider decision regarding the delivery method will need to be made. Vaginal delivery is typically provider recommended because of the lower maternal risks reported in observational studies,¹⁰² although, supporting robust interventional data are scarce.¹⁰³ Evidence from multiple countries suggests that stillborn babies are less likely to be delivered by caesarean than liveborn babies.^{101 104–106}

However, parent and provider perspectives may be at odds; providers focus on reducing maternal morbidity and future pregnancy risk, while parents often have their own priorities with their baby. In the INSIGHT study,⁹³ reasons for requesting caesarean delivery from parents who have had a stillbirth included desire for a sense of control, feeling unprepared for an unpredictably long process of vaginal birth, hope that a quick caesarean followed by resuscitation could save their baby, and concern about vaginal delivery causing pain and trauma to the baby that has died. Discussions around mode of delivery must take account of parents' perspectives, fears, hopes, and wishes.

Seeing and holding the baby

Time spent seeing, holding, and saying goodbye to a stillborn baby after birth is cherished by many parents and is well documented in high income countries.^{107 108} Bereavement care guidelines^{89 90 109} advocate for parents to be offered and supported in this choice, as well as emphasising the importance and significance to parents of physical reminders of the baby such as photography, hand and footprints, and keepsakes. While there is less evidence from low and middle income countries regarding the wishes of parents and cultural acceptability of specific bereavement care practices, emerging evidence suggests low uptake more attributable due to lack of provision or perceived acceptability rather than due to parent choice.^{86 110}

The long term psychological impact of time spent with the baby is challenging to assess because this intervention is not distinct ut rather co-related to many other aspects of supportive care.

A systematic review of retrospective observational studies reported mixed effects of parental contact with their stillborn baby on mental health outcomes such as depression, anxiety, and post-traumatic stress.¹⁰⁸ However, across studies mothers were consistently satisfied with choosing to have had contact with their baby. A systematic review that

included qualitative evidence found positive psychological effects of seeing and holding the baby in 21 of 23 studies.¹⁰⁷

Where this option is possible, parents report appreciation for the ability to revisit and revise decisions, such as hospitals storing photography and keepsakes for collection at a later date. It is all about choice.

Investigation of stillbirth causation

Identification of stillbirth causation is important. Parents want to understand why their baby died and how to prevent future stillbirth.¹¹¹ On a population level, stillbirth causation data can target prevention strategies, inform public health messaging, and guide health service improvements. All parents should be offered thorough and appropriate investigations after stillbirth.

Unfortunately, global reporting of stillbirth causation is inconsistent and most commonly reported as unexplained, according to a 2017 synthesis of data from 50 countries.¹¹² Numerous classification systems are used. In high and middle income countries, the most commonly identified causes were antepartum haemorrhage, placental conditions, congenital anomalies, and specific fetal or pregnancy pathologies. These causes contrast with antepartum haemorrhage, infection, and hypoxic peripartum death in low income countries, which reflect the higher rates of preventable, intrapartum stillbirths.²

A recent systematic review¹¹³ of interventions for investigating and identifying the causes of stillbirth found no randomised clinical trials comparing stillbirth investigation strategies. Appropriate selection of investigations to maximise information (including negative findings to exclude recurrent pathological indications) while minimising distress and financial burden (to individuals or the health system) is essential. This research is challenging with sparse evidence, particularly in low income countries where the financial burden is more substantial.

A 2022 descriptive review of stillbirth investigation guidelines in four high income countries found unanimous recommendation of the medical history evaluation, post mortem examination (including minimally invasive techniques), placental pathological examination, genetic analysis, microbiology of fetal and placental tissues, and a Kleihauer test.¹¹⁴

Availability of investigations is inconsistent and their diagnostic yield depends on stillbirth cause within each context. Although, worldwide, medical history evaluation is likely to have a high diagnostic yield due to the high incidence of intrapartum hypoxia, in high income countries, placental histology may be more useful. A retrospective review of 120 stillborn babies in Israel identified a direct or major contributor to death in 88% of cases with solely placental pathology.¹¹⁵ A prospective, cohort

study of 1025 stillborn babies in the Netherlands also identified placental examination as the highest yield investigation (95.7% (95% confidence interval 94.2 to 96.8)), followed by post mortem ((72.6% (69.2 to 75.9)).¹¹⁶ Accordingly Korteweg and colleagues¹¹⁶ proposed a flowchart to guide investigations of stillbirth; commencing with low cost, simple investigations (eg, expert external examination of the baby), and selection of subsequent investigations based on both initial findings and the wishes of the parents.

Recent innovations in the use of fetal MRI (magnetic resonance imaging), CT (computed tomography), ultrasound, and microCT offer additional options when a traditional postmortem is unacceptable to parents.¹¹⁷ Micro CT, for example, involves high definition diagnostic imaging and radio-pathological interpretation.¹¹⁸ Images can be stored, facilitating re-examination and further specialist opinion, unlike histological evaluations. Initial analyses of post-mortem ultrasound have found acceptable diagnostic accuracy for brain and abdominal organs, with lower accuracy for thoracic, mainly cardiac, structures (overall 74.7% sensitivity and 83.3% specificity).¹¹⁹

Minimally invasive techniques also facilitate remote image interpretation, collaboration, and knowledge sharing between institutions and countries, without the need for geographical proximity.

Parents must be counselled by appropriately knowledgeable and trained health professionals to make the right decision for them. Unfortunately, this training is often scarce, or incomplete, leaving providers not confident and ill equipped.^{120–123}

Involving parents in perinatal mortality review

A recent large portfolio of studies (PARENTS)¹²⁴ found that parental engagement in perinatal mortality reviews is achievable and useful for parents and professionals alike. By exploring issues uncaptured by medical notes, reviews can improve safety and future care for mothers and babies.

Involvement of parents is highly desirable but barriers may differ from setting to setting, such as geographically disparate hospital populations or language difficulties.¹²⁵ These barriers disproportionately affect those most at risk of stillbirth. Facilitators include a well structured perinatal mortality review meeting (the UK has established a dedicated national tool and process); coordination and streamlining of care; advocacy for parents; and training and support for staff to enable parental engagement.¹²⁶

A case study in a tertiary maternity unit in the UK (M Baron and E Tyrell, personal communication 2022) found that adaptations such as use of phone or email facilitated parental involvement even during the covid-19 pandemic, and continued to be applicable to the large geography served. With effort, many barriers could and should be overcome.

Management in subsequent pregnancies

If pregnancy following a stillbirth occurs, parents are often anxious, but also very engaged in their care.⁶⁹ Increased surveillance is required, as is support and counselling where needed.^{1 83}

The recurrence rate of stillbirth is estimated to be 2.5-2.9% in high income countries.^{67 127} A recent retrospective study of 101 pregnancies after stillbirth reported that four in five parents took home a healthy, live, term baby,¹²⁸ but ongoing adverse psychological consequences may occur, including attachment challenges.⁸³

Guidelines often focus on prevention of stillbirth in subsequent pregnancies while neglecting the psychological impact.¹²⁹ An international survey of 2716 parents from high and middle income countries suggested that although additional antenatal care was available for most parents (eg, additional ultrasound scans), attention to psychosocial needs was inconsistent. Only 10% of parents accessed a bereavement counsellor,⁶⁷ even though parents often experience depression, anxiety, post-traumatic stress, and relationship difficulties, which are exacerbated in the subsequent pregnancy.^{69 130 131}

For better outcomes in subsequent pregnancies, adaptations to care are required that include both parents and address prevention and psychosocial care.

Conclusion

Several evidence based interventions could and should be implemented to reduce stillbirth incidence now. Two examples that we highlight are improving identification and management diabetes in pregnancy and prophylactic aspirin administration. We have detailed that a strong argument can be made for discussing lifestyle changes with every pregnant person and for giving low dose aspirin to everyone except those with contraindications. Such a strategy could be effective until sophisticated approaches to identifying those at risk are widely implemented.

With evolving evidence regarding care after stillbirth, particularly in low healthcare resource settings, this review emphasises the importance of parents and providers as partners: parents' choices being heard and recognised while staff provide compassionate care. Supported and trained staff will in turn be better equipped to provide effective support.

QUESTIONS FOR FUTURE RESEARCH

- ⇒ What is the optimal definition and management of reactive hypoglycaemia and would its diagnosis be effective at preventing stillbirth?
- ⇒ What is the role of dysmetabolism and thrombophilia in fetal vascular malperfusion?
- ⇒ Can training in bereavement care improve parents' experiences of perinatal bereavement and long term psychosocial outcomes, and improve staff processing of perinatal death?

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Patient and public involvement statement BA was secretary and DS was co-chair of the Bereavement Working Group of the International Stillbirth Alliance during the writing of this review. This working group is a collaboration of parents, clinicians, and researchers, and many discussions with parents helped to inform the authors' inclusion of topics in this review. Before publication, the manuscript was reviewed by two parents from different countries to the authors who experienced stillbirth bereavement; Sofia Saterskog (Sweden) and Grace Mwashigadi (Kenya).

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