OBSTETRICS & GYNAECOLOGY

A Comprehensive Guide for MRCOG

FOURTH EDITION

Edited by

Mark D Kilby and David M Luesley

Section Editors:

James Castleman
Arri Coomarasamy
Jessica Davison
James Owen Drife
Leo Gurney
Pierre Martin-Hirsch
Ash Monga
Jason Yap

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Obstetrics & Gynaecology

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Obstetrics & Gynaecology

A Comprehensive Guide for MRCOG

Fourth Edition

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PREFACE

Medical practice is changing and developing at pace. The introduction of new technologies, personalised medicine and advances in surgical specialties are occurring across the board, and the specialty of obstetrics and gynaecology is no exception. Furthermore, women's voices – their experiences of healthcare, views on the screening tests, lifestyle changes to prevent diseases and treatment choices for management – are increasingly important in the area of women's health.

It is always difficult to know when an update of an established textbook is required, but the use of online educational platforms, the increasingly popular use of systematic reviews of evidence and the constant revision of professional guidelines across the world make the need to refresh and update textbook content an increasing priority. This is the fourth edition of *Obstetrics and Gynaecology: A Comprehensive Guide for MRCOG*. Since the last edition was published in 2016, the rapid pace at which new knowledge and evidence have become available requires a revision to organise and present data in a format that fulfils the requirements of aspiring obstetricians and gynaecologists and continues to provide an easily accessible source of information for those practising as specialists. The popularity of the previous three editions signifies that we are achieving these objectives, and the tested template of aligning the text to the RCOG curriculum appears to meet the needs of the majority of readers. The basic core knowledge upon which our discipline is built does not evolve as rapidly as other aspects of our specialism, and an in-depth understanding of this core knowledge (as well as of new technologies and their applications in clinical practice) is an essential prerequisite to success in the MRCOG examination, and a solid basis on which to build a career as a practising specialist. The MRCOG's 'core curriculum' is constantly evolving, and the MRCOG examination format has itself been modified, with three parts to the formal assessment.

It is natural with the passage of time that contributors to our previous editions will have retired or moved on elsewhere, and it is right to bring in new contributors who have enthusiasm and often bring a fresh perspective and contemporary experience to their subject matter. We remain immensely grateful for the grounding provided by our previous contributors to all three editions. Their previous efforts, and the skilful updating, editing and rewriting of our new contributors, have maintained the high quality of the presented material, both text and figures.

We also wish to thank the section editors – James Castleman, Arri Coomarasamy, Jessica Davison, James Owen Drife, Leo Gurney, Pierre Martin-Hirsch, Ash Monga and Jason Yap – for their conscientiousness, skill and hard work in producing the finished chapters. Updating, adding and omitting provides a massive editorial challenge if the 'feel' of the text is to be preserved. We believe that we have done the best that we can and that this textbook will continue to be an invaluable companion to the higher training of obstetricians and gynaecologists, and a useful repository of knowledge and evidence for those in established practice.

Mark D Kilby and David M Luesley

And finally, I would like to both acknowledge and pay tribute to David M Luesley's long-standing hard work and support in producing all four editions to date. His vision and skill in producing a concise, up-to-date textbook with clear text and diagrams is an inspiration. I would like to mark my thanks, both personally and on behalf of previous contributors.

Mark D Kilby

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LIST OF ABBREVIATIONS

5-FU	5-fluorouracil
ABC	airway–breathing–circulation / Avoiding Brain injury in Childbirth
ABCDE	airway–breathing–circulation–disability–exposure
AC	abdominal circumference
ACE	angiotensin-converting enzyme
ACEI	angiotensin-converting enzyme inhibitor
aCL	anticardiolipin
ACOG	American College of Obstetricians and Gynecologists
ACR	albumin:creatinine ratio
ACS	acute coronary syndrome
ADPKD	autosomal dominant polycystic kidney disease
A&E	accident and emergency department
AED	anti-epileptic drug
AEP	atopic eruption of pregnancy
AF	amniotic fluid
AFI	amniotic fluid index
AFLP	acute fatty liver of pregnancy
AFP	alpha fetoprotein
AFV	amniotic fluid volume
Ag	antigen
AGC	atypical glandular cell
AIDS	acquired immunodeficiency syndrome
AIH	autoimmune hepatitis
AIS	androgen insensitivity syndrome
AKI	acute kidney injury
ALP	alkaline phosphatase
ALSO	Advanced Life Support in Obstetrics
ALT	alanine transaminase
AMH	anti-Müllerian hormone
AMHP	approved mental health professional
ANA	antinuclear antibody
aOR	adjusted odds ratio
APH	antepartum haemorrhage
aPL	antiphospholipid
APLS/APS	antiphospholipid syndrome
APTT	activated partial thromboplastin time
ARC	Antenatal Results and Choices
aRR	adjusted relative risk
ART	assisted reproductive technology
ASA	American Society of Anesthesiologists / antisperm antibodies
ASB	asymptomatic bacteriuria
ASCO	American Society of Clinical Oncology
ASD	atrial septal defect
ASRM	American Society for Reproductive Medicine
AST	aspartate aminotransferase (aspartate transaminase)
ATP	adenosine triphosphate
AUA	American Urological Association
AUB	abnormal uterine bleeding
AUM	ambulatory urodynamic monitoring
BAC	British Association for Cytopathology
BAPM	British Association of Perinatal Medicine
BASHH	British Association for Sexual Health and HIV
BCG	bacillus Calmette–Guérin
BCSH	British Committee for Standards in Haemotology
BD	twice daily
BEP	bleomycin, etoposide and cisplatin
BGCS	British Gynaecological Cancer Society
β-hCG	beta human chorionic gonadotrophin
BHIVA	British HIV Association
BMD	bone mineral density
BMI	body mass index
BP	blood pressure
BPD	biparietal diameter
bpm	beats per minute
BPP	biophysical profile
BPS	bladder pain syndrome
BSOTS	Birmingham Symptom-specific Obstetric Triage System
BV	bacterial vaginosis
CA	cancer antigen
CAH	congenital adrenal hyperplasia
CAIS	complete androgen insensitivity syndrome
cAMP	cyclic adenosine monophosphate
CBAVD	congenital bilateral absence of the vas deferens
CBD	cannabidiol
CBT	cognitive behavioural therapy
CC	clomifene citrate / cervical cancer
CCP	cyclic citrullinated peptide
cCTG	computerised cardiotocography
CDH	congenital diaphragmatic hernia
CDSR	Cochrane Database of Systematic Reviews
CEA	cancer embryonic antigen
CEE	conjugated equine oestrogen
CEFM	continuous electronic fetal monitoring
CEMACH	Confidential Enquiry into Maternal and Child Health
CEMD	Confidential Enquiry into Maternal Deaths
CESDI	Confidential Enquiry into Stillbirths and Deaths in Infancy
CF	cystic fibrosis
cffDNA	cell-free fetal DNA
CFTR	cystic fibrosis transmembrane conductance regulator
CFU	colony-forming units
CGIN	cervical glandular intraepithelial neoplasia
CGM	continuous glucose monitoring
CHC	combined hormonal contraception
CHD	congenital heart disease
CI	confidence interval
CIN	cervical intraepithelial neoplasia
CiP	Capability in Practice
CK	cytokeratin
CKD	chronic kidney disease
CLIA	chemiluminescent assay
CMACE	Centre for Maternal and Child Enquiries
CML	chronic myeloid leukaemia
CMV	cytomegalovirus
CMZ	carbimazole
CNS	central nervous system

CoA	coarctation of the aorta
COC(P)	combined oral contraceptive (pill)
CODAC	Cause of Death and Associated Conditions
COS	controlled ovarian stimulation
COSRT	College of Sexual and Relationship Therapists
COVID-19	coronavirus disease 2019
COX-2	cyclooxygenase-2
CPM	confined placental mosaicism
CPR	cardiopulmonary resuscitation
CREST	Calcinosis, Raynaud's phenomenon, Esophageal involvement, Sclerodactyly and Telangiectasia
CRH	corticotropin-releasing hormone
CrI	credible interval
CRL	crown–rump length
CRP	C-reactive protein
CRPT	childbirth-related perineal trauma
CRS	congenital rubella syndrome
CS	caesarean section
CSA	child sexual abuse
CSEP	caesarean section ectopic pregnancy
CSEW	Crime Survey for England and Wales
CSF	cerebrospinal fluid
CSII	continuous subcutaneous insulin infusion
CSP	caesarean scar pregnancy
CT	computed tomography
CTG	cardiotocography
CTO	community treatment order
CTPA	computed tomography pulmonary angiogram
Cu-IUD	copper intrauterine device
CVA	cerebrovascular accident
CVD	cardiovascular disease
CVP	central venous pressure
CVS	chorionic villus sampling
CYP	cytochrome P450
DC	dichorionic
DCCV	direct current cardioversion
DCDA	dichorionic, diamniotic
DCM	dilated cardiomyopathy
dcSS	diffuse cutaneous systemic sclerosis
DES	diethylstilbestrol
DEXA	dual-energy X-ray absorptiometry (bone mineral density scan)
DFS	disease-free survival
DHEA	dehydroepiandrosterone
DHT	dihydrotestosterone
DIC	disseminated intravascular coagulation
DIE	deep infiltrating endometriosis
DKA	diabetic ketoacidosis
DMSO	dimethyl sulphoxide
DSD	disorders of sex development
dsDNA	double-stranded DNA
DSM-5	*Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition
DV	ductus venosus
dVIN	differentiated-type vulval intraepithelial neoplasia
DVP	deepest vertical pool/pocket
DVT	deep venous thrombosis / deep vein thrombosis
E3	oestriol
EAS	external anal sphincter
EASI	extra-amniotic saline infusion
EBM	evidence-based medicine
EBRT	external beam radiotherapy
EBV	Epstein–Barr virus
EC	endometrial cancer
ECG	electrocardiography
ECHR	European Convention on Human Rights
ECL	echogenic cystic lesion
ECV	external cephalic version
EDF	end-diastolic flow
EDTA	ethylenediaminetetraacetic acid
EEG	electroencephalography
EFI	endometriosis fertility index
EFW	estimated fetal weight
eGFR	estimated glomerular filtration rate
EIA	enzyme immunoassay
EMG	electromyography
EMQ	extended matching question
EPPROM	extremely preterm premature rupture of membranes
ER	extended release / oestrogen receptor
ERAS	Enhanced Recovery After Surgery
ERCS	elective repeat caesarean section
ESBL	extended-spectrum beta-lactamase
ESC	European Society of Cardiology
ESHRE	European Society of Human Reproduction and Embryology
ESMO	European Society of Medical Oncology
ESSIC	International Society for the Study of Bladder Pain Syndrome
ET	essential thrombocythaemia
ETT	endotracheal tube / epithelial trophoblastic tumour
FAI	free androgen index
FAS	fetal alcohol syndrome
FASD	fetal alcohol spectrum disorder
FASP	fetal anomaly screening programme
FATWO	female adnexal tumour of Wolffian origin
FBC	full blood count
FBS	fetal blood sampling
FDA	US Food and Drug Administration
FDV	first desire to void
FET	frozen embryo transfer
FETO	fetoscopic endoluminal tracheal occlusion
FEV1	forced expiratory volume in 1 second
FFLM	Faculty of Forensic and Legal Medicine
fFN	fetal fibronectin
FFP	fresh frozen plasma
FGM	female genital mutilation
FGMPO	female genital mutilation protection order
FGR	fetal growth restriction
FHR	fetal heart rate
FIGO	International Federation of Gynecology and Obstetrics
FISH	fluorescence in situ hybridisation
FLA	fetoscopic laser ablation
FM	fetal movement
FMH	fetomaternal haemorrhage
FNAIT	fetal/neonatal alloimmune thrombocytopenia
FPR	false-positive rate
FSD	female sexual dysfunction
FSE	fetal scalp electrodes
FSH	follicle-stimulating hormone

FSRH	Faculty of Sexual and Reproductive Healthcare
FVC	forced vital capacity
FVIII	factor VIII
FVL	factor V Leiden
FVS	fetal varicella syndrome
GAS	group A haemolytic streptococcus
GBH	grievous bodily harm
GBS	group B streptococcus
GCIG	Gynecologic Cancer Intergroup
GDM	gestational diabetes mellitus
GDPR	General Data Protection Regulation
GH	gestational hypertension
GMC	General Medical Council
GnRH	gonadotrophin-releasing hormone
GORD	gastro-oesophageal reflux disease
GP	general practitioner
G+S	group and save
GST	granulosa cell tumour
GTD	gestational trophoblastic disease
GTN	gestational trophoblastic neoplasia
GTT	glucose tolerance test
HAART	highly active antiretroviral therapy
HAV	hepatitis A virus
Hb	haemoglobin
HbA1C	glycated haemoglobin
HbSS	sickle cell anaemia
HBV	hepatitis B virus
HC	head circumference; hybrid capture
hCG	human chorionic gonadotrophin
HCM	hypertrophic cardiomyopathy
HCT	haematocrit
HDFN	haemolytic disease of the fetus and newborn
HDV	hepatitis D virus
HELLP	haemolysis, elevated liver enzymes and low platelet count
HEV	hepatitis E virus
HFEA	Human Fertilisation and Embryology Authority
HG	hyperemesis gravidarum
HGSOC	high-grade serous ovarian carcinoma
HIC	high-income country
HIE	hypoxic–ischaemic encephalopathy
HIV	human immunodeficiency virus
HLA	human leucocyte antigen
HMB	heavy menstrual bleeding
HNPCC	hereditary non-polyposis colorectal cancer
HP	heterotopic pregnancy
HPG	hypothalamic–pituitary–gonadal
hPL	human placental lactogen
HPV	human papillomavirus
HQIP	Healthcare Quality Improvement Partnership
HR	hazard ratio / high risk
HRQoL	health-related quality of life
HRT	hormone replacement therapy
HSB	harmful sexual behaviour
HSCIC	Health and Social Care Information Centre
HSG	hysterosalpingography
HSIB	Healthcare Safety Investigation Branch
HSIL	high-grade squamous intraepithelial lesions
HSV	herpes simplex virus
HTA	Human Tissue Authority
HUS	haemolytic uraemic syndrome
HyCoSy	hysterosalpingo-contrast sonography
IAS	internal anal sphincter
IBD	inflammatory bowel disease
IBS	irritable bowel syndrome
IBT	intrauterine balloon tamponade
ICD	implantable cardiac defibrillator / International Classification of Diseases
ICD-PM	International Classification of Diseases – Perinatal Mortality
ICH	intracranial haemorrhage
ICI	International Consultation on Incontinence
ICP	intracranial pressure / intrahepatic cholestasis of pregnancy
ICS	International Continence Society
ICSI	intracytoplasmic sperm injection
ICU	intensive care unit
IE	infective endocarditis
IFH	impacted fetal head
IFN	interferon
Ig	immunoglobulin
IGF-1/2	insulin-like growth factor 1/2
IGFBP	insulin-like growth factor binding protein
IGT	impaired glucose tolerance
IIH	idiopathic intracranial hypertension
IL	interleukin
ILCOR	International Liaison Committee on Resuscitation
ILD	interstitial lung disease
IM	intramuscular
IMB	intermenstrual bleeding
IMRT	intensity-modulated radiotherapy
INR	international normalised ratio
IOL	induction of labour
IOM	Institute of Medicine
IPAA	ileal pouch–anal anastomosis
IPD	individual participant data
IPM	Institute of Psychosexual Medicine
IQR	interquartile range
ISA	International Stillbirth Alliance
ISSVD	International Society for the Study of Vulvovaginal Disease
ITP	immune thrombocytopenia / immune thrombocytopenic purpura / idiopathic thrombocytopenic purpura
IUFD	intrauterine fetal death
IUGA	International Urogynaecological Association
IUI	intrauterine insemination
IUS	intrauterine system
IUT	intrauterine transfusion
IV	intravenous
IVD	instrumental vaginal delivery
IVF	in vitro fertilisation
IVIg	intravenous immunoglobulin
IVM	in vitro maturation
IVU	intravenous urogram
JCVI	Joint Committee on Vaccination and Immunisation
KNDy	kisspeptin, neurokinin B and dynorphin
LAC	lupus anticoagulant

LAM	lactational amenorrhoea method
LARC	long-acting reversible contraceptive
lcSS	limited cutaneous systemic sclerosis
LDH	lactate dehydrogenase
LEEP	loop electrosurgical excision procedure
LFT	liver function test
LGA	large for gestational age
LGBT	lesbian, gay, bisexual and transgender
LGSOC	low-grade serous ovarian carcinoma
LH	luteinising hormone
LHR	lung area to head circumference ratio
LLETZ	large loop excision of the transformation zone
LMA	laryngeal mask airway
LMIC	low- or middle-income country
LMP	last menstrual period
LMWH	low-molecular-weight heparin
LNG	levonorgestrel
LNG-IUS	levonorgestrel-releasing intrauterine system
LOFTI	listening, observing, feelings, thinking and interpreting
LP	lichen planus
LS	lichen sclerosus
LSIL	low-grade squamous intraepithelial lesion
LUTS	lower urinary tract symptom
LVSI	lymphovascular space invasion
MAIS	mild androgen insensitivity syndrome
MAP	mean arterial pressure
MAS	McCune–Albright syndrome
MBRRACE-UK	Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK
MC	monochorionic
MCA	Mental Capacity Act; middle cerebral artery
MCA-PSV	middle cerebral artery peak systolic velocity
MCDA	monochorionic, diamniotic
MCMA	monochorionic, monoamniotic
MCoC	midwifery continuity of carer
MCP-1	monocyte chemotactic peptide-1
MCQ	multiple choice question
MDI	multiple daily injection
MDT	multidisciplinary team
MEA	microwave endometrial ablation
MEOWS	Modified Early Obstetric Warning Score
MEWS	Modified Early Warning Score
MG	myasthenia gravis
MHRA	Medicines and Healthcare products Regulatory Agency
MHV	mechanical heart valve
MI	myocardial infarction
MMF	mycophenolate mofetil
mMOET	Managing Medical and Obstetric Emergencies and Trauma
MNI-CORP	Maternal, Newborn and Infant Clinical Outcome Review Programme
MoM	multiple of the median
MPD	maximum pocket depth
MPS	massive parallel sequencing
MR	magnetic resonance
MRI	magnetic resonance imaging
MRKH	Mayer–Rokitansky–Küster–Hauser (syndrome)
MRSA	methicillin-resistant *Staphylococcus aureus*
MS	multiple sclerosis
MSU	midstream urine
MTCT	mother-to-child transmission
MUS	mid-urethral sling
MUSA	Morphological Uterus Sonographic Assessment
MVP	maximum vertical pocket
NAAT	nucleic acid amplification tests
NACT	neo-adjuvant chemotherapy
NAIT	neonatal alloimmune thrombocytopenia
NANC	non-adrenergic, non-cholinergic
NAPS	National Association for Premenstrual Syndromes
NAS	neonatal abstinence syndrome
NCARDRS	National Congenital Anomaly and Rare Disease Registration Service
NCCN	National Comprehensive Cancer Network
NCEPOD	National Confidential Enquiry into Patient Outcome and Death
NETZ	needle excision of the transformation zone
NHS	National Health Service
NHSCSP	National Health Service Cervical Screening Programme
NHSR	NHS Resolution
NICE	National Institute for Health and Care Excellence
NICU	neonatal intensive care unit
NIPD	non-invasive prenatal diagnosis
NIPT	non-invasive prenatal testing
NNT	number needed to treat
NOTSS	non-technical skills for surgeons
NPEU	National Perinatal Epidemiology Unit
NSAID	non-steroidal anti-inflammatory drug
NSC	National Screening Committee
NSPCC	National Society for the Prevention of Cruelty to Children
NST	non-stress test
NT	nuchal translucency
NTD	neural tube defect
NYHA	New York Heart Association
OA	occiput anterior
OAB	overactive bladder
OASI	obstetric anal sphincter injury
OCD	obsessive–compulsive disorder
OCP	oral contraceptive pill
OD	every day
OEP	ovarian ectopic pregnancy
O&G	obstetrics and gynaecology
OGD	oesophago-gastroduodenoscopy
OGTT	oral glucose tolerance test
OH	over hypothyroidism
OHSS	ovarian hyperstimulation syndrome
ONS	Office for National Statistics
OP	occiput posterior
OPH	outpatient hysteroscopy
OR	odds ratio
OS	overall survival
OSCE	objective structured clinical examination
OSE	ovarian surface epithelium
OSI	obstetric shock index
OS/IUI	intrauterine insemination with ovarian stimulation

OT	occiput transverse
OTC	ovarian tissue cryopreservation
PAE	prenatal alcohol exposure
PAIS	partial androgen insensitivity syndrome
PAMG-1	placental alpha microglobulin-1
PAPP-A	pregnancy-associated plasma protein-A
PARP	poly ADP ribose polymerase
PAS	placenta accreta spectrum
PAST	posterior axillary sling traction
PCB	post-coital bleeding
PCOS	polycystic ovary syndrome
PCR	polymerase chain reaction
PDA	patent ductus arteriosus
PDS	polydioxanone
PDSA	plan–do–study–act
PE	pulmonary embolism
PECOMA	perivascular epithelioid cell tumour
PEFR	peak expiratory flow rate
PEP	polymorphic eruption of pregnancy / post-exposure prophylaxis
PEPSE	post-exposure prophylaxis following sexual exposure
PESA	percutaneous epididymal sperm aspiration
PET	positron emission tomography / pre-eclampsia toxaemia
PFMT	pelvic floor muscle training
PG	prostaglandin
PGAD	persistent genital arousal disorder
PGT	pre-implantation genetic testing
PH	pulmonary hypertension
PICO	population, intervention, comparison, outcome
PID	pelvic inflammatory disease
PlGF	placental growth factor
PLND	pelvic lymph node dissection
PLR	positive likelihood ratio
PM	post-mortem
PMD	premenstrual disorder
PMDD	premenstrual dysphoric disorder
PMRT	Perinatal Mortality Review Tool
PMS	premenstrual syndrome
PNS	pudendal nerve stimulation
POI	premature ovarian insufficiency
POP	progestogen-only pill
POP-Q	Pelvic Organ Prolapse Quantification
PPCM	peripartum cardiomyopathy
PPH	postpartum haemorrhage
PPHN	persistent pulmonary hypertension of the newborn
PPI	patient and public involvement / proton-pump inhibitor
PPROM	preterm prelabour rupture of membranes
PPS	pentosan polysulphate
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PROM	prelabour rupture of membranes
PROMPT	PRactical Obstetric Multi-Professional Training
PSANZ-PDC	Perinatal Society of Australia and New Zealand – Perinatal Death Classification
PSC	primary sclerosing cholangitis
PSE	perinatal sentinel event
PSN	presacral neurectomy
PSTT	placental site trophoblastic tumour
PSV	peak systolic velocity
PT	prothrombin time
PTB	preterm birth
PTNS	posterior tibial nerve stimulation
PTSD	post-traumatic stress disorder
PTU	propylthiouracil
PUD	peptic ulcer disease
PUL	pregnancy of unknown location
QF-PCR	quantitative fluorescent polymerase chain reaction
QI	quality improvement
QoL	quality of life
QUiPP	QUantitative innovation in Predicting Preterm birth
RA	rheumatoid arthritis
RAADP	routine antenatal anti-D prophylaxis
RADICAL	Raise awareness, Apply quality improvement methods, Design for safety, Involve service users, Collect and Analyse safety data and Learn from safety incidents
RAI	radioactive iodine
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
rASRM	revised American Society for Reproductive Medicine
RCA	root cause analysis
RCo	ristocetin cofactor
RCOG	Royal College of Obstetricians and Gynaecologists
RCPCH	Royal College of Paediatrics and Child Health
RCT	randomised controlled trial
RCVS	reversible cerebral vasoconstriction syndrome
ReCoDe	Relevant Condition at Death
RFEA	radiofrequency endometrial ablation
RFM	reduced fetal movement
Rh	rhesus
RITA	radiofrequency interstitial thermal ablation
RMI	risk of malignancy index
ROBuST	RCOG operative birth simulation training
ROM	rupture of membranes
ROS	reactive oxygen species
RPR	rapid plasma reagin
RR	relative risk
SAH	subarachnoid haemorrhage
SAQ	short answer question
SARC	sexual assault referral centre
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
SBA	single best answer
SBAR	situation, background, assessment, recommendation
SBLCB	Saving Babies' Lives Care Bundle
SCC	squamous cell carcinoma
SCD	sickle cell disease
SCH	subclinical hypothyroidism
SD	standard deviation
SDI	socio-demographic index
SDP	single deepest pocket
SDV	strong desire to void

sEMG	surface electromyography
sFGR	selective fetal growth restriction
SFH	symphysis–fundal height
sFlt-1	soluble fms-like tyrosine kinase-1
SGA	small for gestational age
SHBG	sex hormone-binding globulin
SIGN	Scottish Intercollegiate Guidelines Network
SIP	Scientific Impact Paper
SLE	systemic lupus erythematosus
SLN	sentinel lymph node
SLNB	sentinel lymph node biopsy
SMA	small for gestational age
SMBG	self-monitored blood glucose
SMD	standardised mean difference
SMDT	specialist multidisciplinary team
SNRI	serotonin–norepinephrine reuptake inhibitor
SOA	Sexual Offences Act
SROM	spontaneous rupture of membranes
SRY	sex-determining region of the Y chromosome
SSRI	selective serotonin reuptake inhibitor
STAT	immediately
STD	sexually transmitted disease
STI	sexually transmitted infection
STUMP	smooth muscle tumour of unknown malignant potential
STV	short-term variability
SUDEP	sudden unexpected death in epilepsy
SVT	supraventricular tachycardia
T3	triiodothyronine
T4	thyroxine
T21	trisomy 21
TAPS	twin anaemia–polycythaemia sequence
TB	tuberculosis
TBA	thermal balloon ablation
TBG	thyroid-binding globulin
TENS	transcutaneous electrical nerve stimulation
TESA	testicular sperm aspiration
THC	tetrahydrocannabinol
TIA	transient ischaemic attack
TKI	tyrosine kinase inhibitor
TNF	tumour necrosis factor
TNMG	transient neonatal myasthenia gravis
TPMR	termination of pregnancy for medical reasons
TPO	thyroid peroxidase
TRAb	thyroid-stimulating hormone receptor antibodies
TRAP	twin reversed arterial perfusion
TRH	thyrotrophin-releasing hormone
TSH	thyroid-stimulating hormone
TTP	thrombotic thrombocytopenic purpura
TTTS	twin–twin transfusion syndrome
TVT	tension-free vaginal tape
TVUS	transvaginal ultrasound
TXA	tranexamic acid
UAD	uterine artery Doppler
UAE	uterine artery embolisation
UC	ulcerative colitis
UD	urethral diverticula
UDCA	ursodeoxycholic acid
uE3	unconjugated oestriol
UFH	unfractionated heparin
UGT	uridine 5'-diphosphate glucuronosyltransferase
UKMEC	UK Medical Eligibility Criteria for Contraceptive Use
UKOSS	UK Obstetric Surveillance System
UKTIS	UK Teratology Information Service
UPP	urethral pressure profilometry
UPSI	unprotected sexual intercourse
US(S)	ultrasound (scan)
UTI	urinary tract infection
UTROSCT	uterine tumour resembling an ovarian sex-cord tumour
uVIN	usual-type vulval intraepithelial neoplasia
VAS	vibro-acoustic stimulation
VBAC	vaginal birth after caesarean section
VBT	vaginal brachytherapy
VCU	videocystourethrogram
VDRL	Venereal Disease Research Laboratory
VEGF	vascular endothelial growth factor
VHSIL	vulval high-grade squamous intraepithelial neoplasia
VIN	vulval intraepithelial neoplasia
VLP	virus-like particle
V/Q	ventilation/perfusion
VSCC	vulval squamous cell carcinoma
VSD	ventricular septal defect
VTE	venous thromboembolism
vWD	von Willebrand's disease
VWF	von Willebrand factor
VWM	vaginal wall mesh
VZIG	varicella-zoster immunoglobulin
VZV	varicella-zoster virus
WBC	white blood cell
WHI	Women's Health Initiative
WHO	World Health Organization
WMA	World Medical Association

Note on terminology

Throughout this book we have used the term 'women' and the pronouns 'she'/'her' for ease of reading, but would encourage a more inclusive approach such as 'women and birthing people' so that all individuals using obstetric and gynaecology services are referred to by their preferred names and pronouns.

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1.1 EVIDENCE-BASED MEDICINE AND MEDICAL INFORMATICS

Andrew Sharp and Angharad Care

MRCOG STANDARDS

- Demonstrate the skills needed to critically appraise scientific trials and literature
- Principles of screening, clinical trial design and statistical methods used in clinical research
- Levels of evidence, quantification of risk, power of study, level of significance, informed consent, and ethics and regulatory approvals in research
- Understand the principles and legal issues surrounding research and teaching
- Understand the difference between audit and research

Introduction

This chapter outlines the key principles of evidence-based medicine. They will help you to appraise clinical research throughout your medical career and encourage you to think critically, as well as providing the knowledge requirements for the research components of the MRCOG Core Curriculum.

The phrase 'evidence-based medicine' (EBM) was coined at McMaster University Medical School (now known as the Michael G. DeGroote School of Medicine) in Canada in 1990 by Professor Gordon Guyatt.[1] EBM has been defined as 'the conscientious explicit and judicious use of current best evidence in helping individual patients make decisions about their care in the light of their personal values and beliefs'.[2]

EBM describes the learning process of turning a clinical problem into a dichotomous question – i.e. a question with only two possible answers, such as yes or no. To answer the question, you must systematically find and appraise evidence to justify a clinical decision. This methodology was developed from a frustration that clinical medicine was often practised largely by expert opinion, with the potential for two 'experts' to take completely different courses of action given the same clinical scenario. Before EBM, clinical decisions could be derived from outdated medical school teaching, or from experiential bias based on single clinical cases, or from a particular enthusiasm to use a new clinical technique before it was proven to show benefit in a given population.

On the other hand, research alone is insufficient to answer clinical questions as it cannot contextualise data for a good health decision about a single individual. Clinicians are required to assess the quality of the evidence, interpret the findings and apply them to the specific health and social circumstances of their patients.

Therefore, EBM was designed to bridge this gap, allowing clinicians make informed decisions whilst personalising care.

The five-step EBM model

The practice of EBM involves five essential steps:[3]

1. Formulating the clinical question
2. Finding the evidence
3. Critically appraising the evidence
4. Applying the evidence
5. Evaluating performance

Step 1: Formulating the clinical question

Very rarely does patient pathology present like textbook examples. We often generate multiple questions about management that can feel unstructured or ill-defined. One of the skills of EBM is converting those thoughts into a well-formulated clinical question. The PICO (**P**opulation, **I**ntervention, **C**omparator and **O**utcome) model captures the key elements of a good clinical question in four simple components:[4]

P – Population – Characteristics of the relevant patients
Example: In postmenopausal women with vasomotor symptoms

I – Intervention – What intervention is being considered?
Example: A non-hormonal botanical extract

C – Comparator – The main comparator to the intervention
Example: Placebo

O – Outcome – What are the consequences for the patient or what is the main measurable outcome of interest?
Example: Change in frequency of vasomotor symptoms

A credible question is much more likely to generate a credible answer, and the converse is also true. A poorly formed or vague question will lead to uncertainties in the types of research data that should be included or discarded as part of your search for evidence. The population and outcome should be specific, but not so specific that it becomes too difficult to find relevant studies to generate a reliable answer.

Step 2: Finding the evidence

The traditional approach to finding evidence has been to undertake a search in large medical databases, such as MEDLINE, EMBASE or PubMed Central (PMC). A search strategy is designed and run, including prespecifying the criteria for study inclusion and exclusion. Depending upon the research question, different types of studies would need to be considered (Table 1.1.1). The articles discovered by the search would be checked for duplicates and appraised by title and abstract for suitability, and then the full articles would be read to appraise their quality to answer the clinical question.

However, over 240 different databases exist,[5] and so an individual clinician will find it impractical to search them all.

Alternative strategies[6] for accessing the best evidence include the following:

Read an 'evidence-based' guideline

Evidence-based guidelines (or clinical practice guidelines) are rigorously developed and consist of statements that include recommendations to help physicians, patients, carers or policymakers to make healthcare decisions in a specific healthcare setting with the aim of optimising patient care. These guidelines, rather than being based on consensus or expert opinion alone, are often underpinned by systematic literature reviews. The evidence is then summarised, graded (an indication of strength

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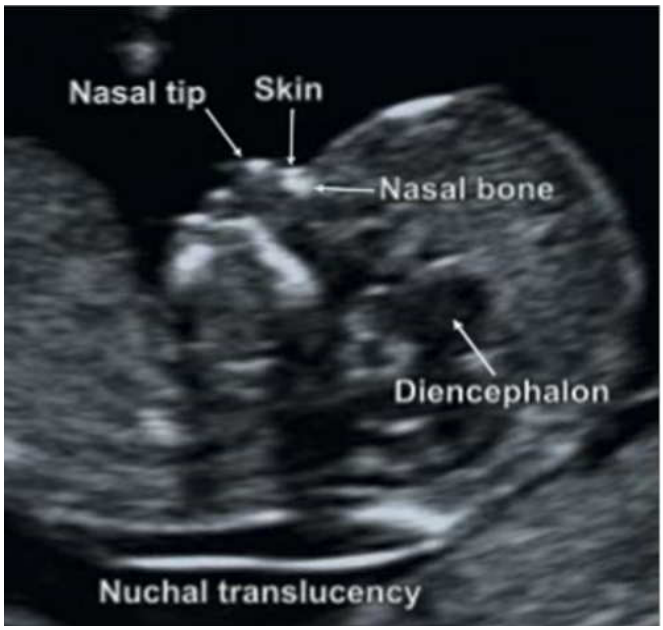

FIGURE 3.1.1 Fetal features needed for accurate NT measurement. (From: Miller.[4] Contains public sector information licensed under the Open Government Licence v3.0.) ⏎

Women should be aware that a negative screening result does not guarantee that their baby does not have the screened anomaly or another abnormality. When parents have no intention of pursuing more invasive diagnostic tests, it's important to consider whether screening is appropriate. In such cases, screening may offer limited benefits whilst potentially causing significant anxiety for the parents.

Cell-free fetal DNA and non-invasive prenatal testing

New non-invasive testing, based on measuring cell-free fetal DNA in maternal blood, shows promise to replace many of the current screening tests, and possibly invasive procedures. Cell-free DNA, found in blood plasma, consists of DNA fragments released by cells that have undergone apoptosis. Whilst the majority of DNA in maternal circulation is of maternal origin, a small proportion originates from the fetus. The cell-free fetal DNA (cffDNA) is from cells undergoing apoptosis in the placenta.

The cffDNA can be utilised for various purposes, such as determining the gender and rhesus phenotyping of the fetus, as well as detecting trisomy 13, 18 and 21. This non-invasive prenatal testing (NIPT) is possible because, in cases of trisomy, there will be an increased amount of cffDNA from the affected chromosome in the mother's circulation, compared to other fetal-derived chromosomes. Studies report a sensitivity of >99% for T21, 100% for trisomy 18 and 91.7% for trisomy 13. False-positive results can occur due to placental mosaicism. False-negative results are possible but less common. Therefore, currently, confirmation by invasive testing is still recommended.

Advancements in next-generation sequencing technologies now allow the sequencing of cffDNA, enabling the accurate detection of any chromosomal aneuploidies. In time, it is likely that similar technology will facilitate the non-invasive detection of subchromosomal deletions, duplications and sequence variations with a high degree of accuracy, meaning non-invasive prenatal diagnosis (NIPD) will be possible.

Currently, within the NHS, NIPT is offered only after a high-chance first-trimester screening result. However, in other countries, such as Australia, women are given the option of the combined test, NIPT for trisomies 13, 18 and 21 or NIPT for any chromosomal aneuploidy. NIPT as a first-line test such as this is often offered in combination with a dating and NT measurement due to the stand-alone benefits of NT described above.

Parental carrier testing

Although not currently offered routinely in the UK, parental carrier testing for autosomal recessive conditions is being offer in some countries, such as Australia. This is because 1 in 20 people is a carrier for at least one condition. This means 1 in 240 couples have an increased chance of having a child with the condition. This results in 1 in 1000 pregnancies being affected by an autosomal recessive condition. Of these couples, 90% will have no family history. The most common examples include cystic fibrosis, with a carrier frequency of 1 in 25; spinal muscular atrophy, with a carrier frequency of 1 in 40; and fragile X syndrome, with a carrier frequency of 1 in 250. Women can choose to have this testing

TABLE 3.1.2 NT measurements with associated fetal outcomes ⏎

NT	Chromosomal defects	Fetal death	Major fetal abnormality	Alive and well
3.5–4.4 mm	21.1%	2.7%	10%	70%
4.5–5.4 mm	33.3%	3.4%	18.5%	50%
5.5–6.4 mm	50%	10.1%	24.2%	30%
>6.5 mm	64.5%	19%	46%	15%

TABLE 3.1.3 Screening tests for T21 and their detection rate ⏎

Timing and test		T21 detection rate
11–13^{+6} weeks		
NT		70–75%
Combined test	NT + hCG (↑) + PAPP-A (↓)	90% for 5% false-positive rate
15–19^{+6} weeks		
Double test	hCG + uE3	60%
Triple test	hCG + uE3 + AFP	70%
Quadruple test	hCG (↑) + uE3 (↓) + AFP (↓) + inhibin A (↑)	81%

Note: SURUSS[5] and FASTER[6] trials.

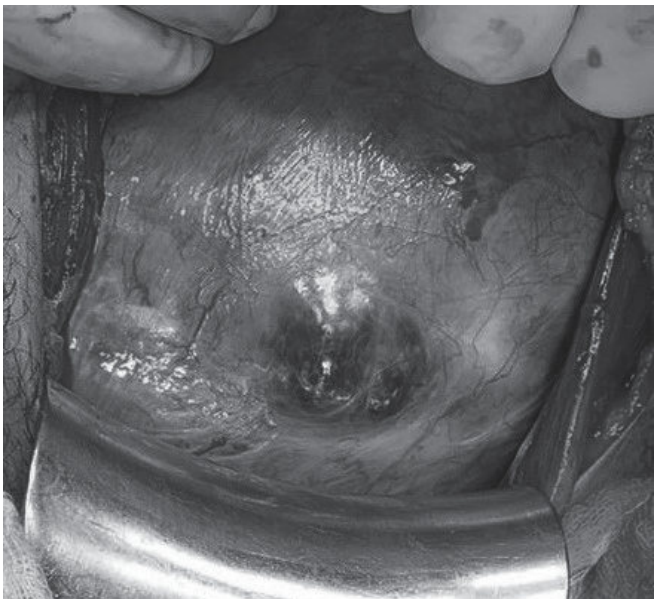

FIGURE 3.20.1 Placental bulge through 'uterine window' noted at CS. (Courtesy of Dr Lin Foo.) ⏎

Whilst each case should be considered on an individual basis, based on the expertise and resources available within a unit, RCOG recommends that all PAS cases are delivered in a recognised regional specialist centre that plans and coordinates the multidisciplinary care of the patient.

PAS cases cared for by a specialist MDT have less operative morbidity.[12] A PAS team should consist of senior obstetric and gynaecological surgeons; a specialist midwife to coordinate care and provide continuity, particularly in the postnatal period; anaesthetists; urologists or urogynaecologists; and interventional radiologists. Commonly, such a team is led by the obstetrician with a specialist interest in PAS and who has been involved in the diagnosis and classification of the PAS.

In cases predicted to be FIGO Grade 1 (accreta), especially where the area of abnormal attachment is predicted to be 'focal' (i.e. <5 cm in length),[22] it is reasonable to plan for uterine-conserving surgery without the need for more extensive resources such as ureteric stenting or interventional radiology. However, it is essential that the surgical team has expertise in managing such cases, particularly familiarity with techniques such as lower uterine segment compression sutures.

There should be plans for availability of blood products, as well as additional support from relevant personnel if a hysterectomy or more extensive surgical dissection is expected.

For increta and percreta cases, additional interventions, such as endoluminal balloon occlusion and ureteric stenting, should be considered prior to abdominal incision. Additional team members should include a gynaecological surgeon who has experience in PAS hysterectomies and dissections.

Anaesthetic considerations include a combination of regional anaesthesia for the pre-laparotomy steps, and if suitable for the patient, until delivery of the baby, after which a general anaesthetic may be preferred for the rest of the surgery. Utilising a regional anaesthetic block for the initial steps minimises the exposure of the baby to general anaesthesia. Neonatology involvement in planning is also important, as most cases are electively delivered prior to full term.

MDT discussion and surgical planning should include contingency plans in the event of the need for emergency delivery because of significant antepartum haemorrhage and/or preterm labour prior to planned delivery date.

Preoperative optimisation is vital. Haematinic investigations should be carried out if haemoglobin is <110 g/L so that replacement therapies, e.g. iron supplementation, can be arranged in a timely manner.[32]

EXAM KEY POINTS

MRCOG Part 2

- Diagnosis: Ultrasound diagnosis of PAS is highly accurate when performed by an expert sonographer (Evidence level 2++)
- Diagnosis: Ultrasound features of PAS are listed in Table 3.20.1
- MRI is a useful adjunct to ultrasound in assessment of PAS (Evidence level 2++)

MRCOG Part 3

- Safety: Women with a history of previous uterine surgery with an anterior low-lying placenta or placenta praevia should be referred for PAS screening

Timing of admission and delivery

Decisions about timing of delivery and administration of antenatal corticosteroids need to balance the likelihood of neonatal sequalae from iatrogenic preterm caesarean delivery, and maternal–fetal morbidity from an emergency delivery where access to specialist expertise may be limited. There are no RCTs to aid decision of optimal gestation for delivery, but a decision tree analysis recommends delivery at 34 weeks for PAS cases in which significant blood loss and caesarean hysterectomy is anticipated.[33] Cohort study data suggest that, in cases predicted to be FIGO Grade 1 in the absence of other complications, planned delivery at 36–37 weeks is a reasonable option.[34,35]

The need for elective inpatient admission prior to delivery depends primarily on the occurrence and significance of bleeding and/or pain, but other factors, such as shortened cervical length, distance from specialised centre, expertise available at local unit and patient anxiety, affect decision-making. The risk of significant antepartum haemorrhage increases as gestation advances; therefore, there is a rationale to offer admission to PAS patients from 34 weeks.

BOX 3.20.1 CARE BUNDLE FOR PAS CASES ⏎

- Consultant obstetrician planning/directly supervising delivery
- Consultant anaesthetist planning/directly supervising anaesthesia
- Consultant gynaecologist with experience in intrapartum hysterectomy
- Consultant interventional radiologist/urologists if MDT discussion of case recommends involvement
- Availability of blood products
- Preoperative MDT planning
- Consent for possible interventions, e.g. ureteric stenting, insertion of arterial balloons
- Availability of level 2 critical care bed

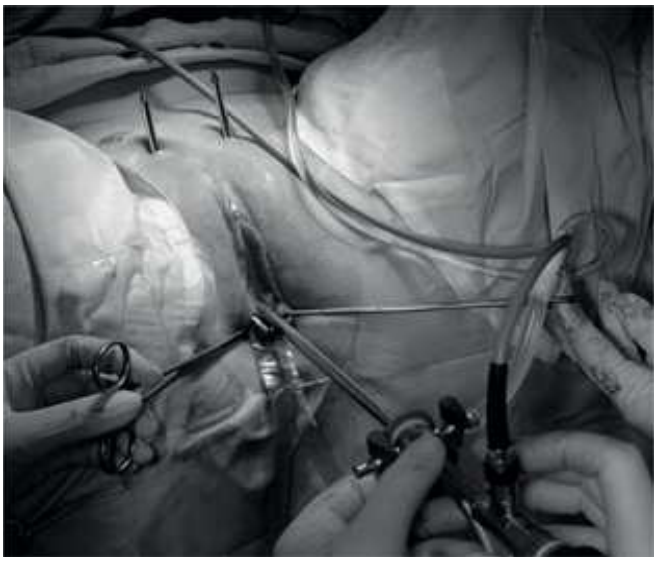

FIGURE 7.2.4 TVT trochars inserted and cystoscopy checked to exclude bladder perforation. ⏎

In those centres that continue to use the cough stress test, the bladder is then refilled with 300 mL normal saline and the patient asked to cough vigorously. The tape may then be adjusted to a point where there is only a drop of leakage from the urethral meatus. After this final adjustment, the tape is held in position beneath the urethra using a pair of McIndoe scissors while the plastic sheaths are removed on each side (Figure 7.2.5).

In those centres where a cough stress test is no longer used, the tape is positioned loosely below the mid-urethra without tension. Finally, the vaginal incision is closed using an absorbable suture and the suprapubic incisions are closed with Steri-Strips. While an indwelling catheter is not required in all cases, a urethral catheter should be left on free drainage for 48 hours following a bladder injury.

FIGURE 7.2.5 TVT: Adjusting the tension of the tape. ⏎

Outcome

The initial multicentre study carried out in six centres in Sweden reported a 90% cure rate at 1 year in women undergoing their first operation for urodynamic stress incontinence, without any major complications.[54] Long-term results would confirm the durability of the technique, with success rates of 86% at 3 years,[55] 84.7% at 5 years,[56] 81.3% at 7 years,[57] 90% at 11 years[58] and 90% at 17 years.[59]

TVT has also been compared with open colposuspension in a multicentre prospective randomised trial of 344 women with urodynamic stress incontinence.[60] Overall, there was no significant difference in terms of objective cure: 66% in the TVT group and 57% in the colposuspension group. However, operation time, postoperative stay and return to normal activity were all longer in the colposuspension arm. Analysis of the long-term results at 24 months using a pad test, quality-of-life assessment and symptom questionnaires showed objective cure rates of 63% in the TVT arm and of 51% in the colposuspension arm.[61] At 5 years, there were no differences in subjective cure (63% in the TVT group and 70% in the colposuspension group), patient satisfaction or quality-of-life assessment. However, while there was a significant reduction in cystocele in both groups, there was a higher incidence of enterocele, rectocele and apical prolapse in the colposuspension group.[62] Furthermore, cost-utility analysis has also shown that, at 6-month follow-up, TVT resulted in a mean cost savings of £243 when compared with colposuspension.

A smaller randomised study has also compared TVT with laparoscopic colposuspension in 72 women with urodynamic stress incontinence. At a mean follow-up of 20 months, objective cure rates were higher in the TVT group than in the laparoscopic colposuspension group: 96.8% versus 71.2%, respectively.[63]

Postoperative complications

Following the procedure, most women can go home the same day, although some do require catheterisation for short-term voiding difficulties (2.5–19.7%). Other complications include bladder perforation (2.7–5.8%), *de novo* urgency (0.2–15%) and bleeding (0.9–2.3%).[65]

Currently, all mid-urethral tape procedures are paused in the UK and Ireland following the Cumberlege review and enquiry.[35]

Transobturator sling procedures

The transobturator route for the placement of synthetic mid-urethral slings was first described in 2001.[66] As with the retropubic sling procedures, transobturator tapes may be performed under local, regional or general anaesthetic and have the theoretical advantage of eliminating some of the complications associated with the retropubic route, such as bladder and urethral perforation.

The transobturator approach may be used as an 'inside-out' (TVT-O, Gynaecare) or alternatively an 'outside-in' (Monarc, American Medical Systems) technique. To date, there have been several studies documenting the short-term efficacy of transobturator procedures.

Technique

Transobturator 'inside-out'

The TVT-O device consists of an 11 mm wide by 40 cm long tape of polypropylene mesh, both ends of which are attached to a plastic sheath that threads over the helical needle introducer. A winged needle guide is also provided to facilitate passage of the needle through the obturator membrane (Figure 7.2.6).

The procedure may be performed under local or general anaesthesia. The patient is placed in the dorsal lithotomy position in

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