Continuing professional development

MBBS Recap: high-yield notes for revision

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Revision notes for the MD/MS entrance's CPD paper: medical ethics, rational use of drugs, infection prevention, BLS and ACLS, communication and patient safety. Resuscitation: the AHA 2020 figure is given as the exam answer where the 2025 AHA guidelines (October 2025, with ILCOR's evidence reviews) changed it, and the 2025 one as current practice; most core figures did not change.

Medical ethics and consent

Four principles (Beauchamp and Childress, principlism)

Principle	Meaning	Typical exam use
Autonomy	A competent, informed adult decides about his own body	Refusal of transfusion by a Jehovah's Witness; refusing treatment even if death follows; confidentiality
Beneficence	Act for the patient's good	Emergency treatment; may conflict with autonomy, and an informed competent choice prevails
Non-maleficence	Avoid harm; a risk is acceptable if the benefit outweighs it	Risk-benefit in surgery and research
Justice	Fair, equitable distribution of care and resources	Triage by urgency, not by who complains loudest

Paternalism (overriding the patient for his supposed good) is not a principle: it is what autonomy restrains. Veracity and confidentiality are usually seen as flowing from autonomy.

Ethical theories

- **Deontology**: right and wrong by duties and rules, whatever the consequences (a rule such as never lie).
- **Consequentialism**: by outcomes. **Utilitarianism** (greatest good for the greatest number) is its commonest form.
- **Virtue ethics**: by the moral character of the doer.
- **Doctrine of double effect**: an act with a good intended effect and a foreseen but unintended bad effect is defensible if the bad effect is not the means to the good and the good outweighs it. Example: **morphine titrated for pain in a dying patient**, accepting that it may hasten death. This differs from euthanasia, where death is the aim.

Consent

- **Valid consent** needs capacity, adequate information, understanding and voluntariness. Information includes the nature of the procedure, material risks, alternatives and the option of doing nothing.
- Types: **implied** (inferred from conduct, such as offering an arm for venepuncture), **express** (words or writing), **informed**, **substituted** (a surrogate for an incapable patient, using substituted judgement) and **presumed**.
- **Capacity is decision-specific and time-specific**: a man with moderate dementia may choose his meal yet be unable to weigh a hip operation. It is not all or none. Assess understanding, retention, weighing and communicating a choice.
- **Emergency**: an unconscious patient with life-threatening bleeding and no reachable relative is treated on clinical judgment without consent; document the reasoning, ideally with a second opinion. Relatives, police and courts do not need to be waited for.
- **Refusal**: a competent informed adult may refuse, including life-saving treatment. Explore the reasons first, then honour the decision and document it.
- **Illiterate participants**: give the information orally in their language, allow time for questions, ensure voluntariness and use an **impartial witness**; a village leader's signature does not replace personal consent. Thumbprints with a witness are the usual record.
- **Minors**: parents or guardians consent, but a mature adolescent should be heard; a doctor offers a 17-year-old a conversation alone and explains confidentiality before the result is shared. Nepal's own law on age and consent applies; do not apply another country's rules.
- AHA 2025 adds a narrative ethics chapter: default to start CPR unless there is serious risk to the rescuer, objective signs of irreversible death or a valid directive declining it; document an advance care plan; shared decision-making.

Confidentiality and privilege

- **Professional secrecy** is an implied term of the doctor-patient relationship and lasts after the patient's death. Even confirming that a person is in hospital without consent can breach it. Give information only to staff directly involved in care.
- **Privileged communication** (justified disclosure without consent): a **court order**, **notifiable infectious diseases** to public health authorities, serious risk to an identifiable third party (the Tarasoff principle: a duty to protect), suspected child abuse, certain occupational risks (epilepsy in a bus driver), and where the law requires a report. Insurers and employers are **not** entitled.
- **A competent patient with cancer who asks that the family not be told**: respect his confidentiality, explain this to the daughter, and encourage him to share it himself. The reverse case, a **family asking the doctor to hide the diagnosis from a competent patient**: first explore the family's fears and the patient's own wishes about how much he wants to know; withholding is justified only rarely (for instance, severe depression with suicide risk) and then temporarily.

Declarations and codes

Document	Gist
Nuremberg Code (1947)	**Voluntary consent of the subject is absolutely essential**; risk must not exceed humanitarian benefit
Declaration of Helsinki (WMA, 1964; ethics committee review added in the 1975 Tokyo revision; latest revision October 2024)	Ethics for **research on human participants**: consent, ethics committee review, protection of the vulnerable
Declaration of Geneva	A modern version of the Hippocratic oath
Declaration of Oslo	Therapeutic abortion
Declaration of Lisbon	Patient rights
Declaration of Tokyo / Istanbul Protocol	Torture and its documentation
Declaration of Sydney	Determining death for transplantation
Declaration of Malta	Hunger strikers
Declaration of Taipei	Health databases and biobanks
Belmont Report	Respect for persons, beneficence, justice in research (US)

An **institutional ethics committee** protects the **rights, safety and welfare of participants**; it reviews the protocol, consent process and risk-benefit before and during the study. Scientific merit is judged by the scientific review, and the committee does not guarantee positive results.

Negligence and misconduct

- **Negligence** is breach of the duty of care that causes harm. The four elements: **duty, breach (deviation from the standard), damage, direct causation**.
- **Bolam test**: not negligent if the doctor acted in line with a practice accepted by a **responsible body** of medical opinion, even if others would act differently (Bolam, 1957). **Bolitho** (1997) qualified it: the body of opinion must also stand up to logical analysis. For disclosure of risks, the later patient-centred (Montgomery) approach asks what a reasonable patient would want to know (Montgomery, UK Supreme Court, 2015).
- **Res ipsa loquitur**: "the thing speaks for itself"; harm that does not ordinarily occur without negligence (a swab left inside the abdomen) lets negligence be inferred, so the defendant must explain.
- **Vicarious liability**: an employer is liable for employees' negligence. **Novus actus interveniens**: a new intervening act breaks the chain of causation.
- **Defences**: no duty owed; **contributory negligence** by the patient (reduces or defeats a civil claim); a reasonable error of judgment; therapeutic or diagnostic misadventure; medical maloccurrence (unforeseeable event, such as hypersensitivity); res judicata. **Fatigue and overwork are not defences** and do not lower the standard.
- **Professional misconduct** (serious professional misconduct, "infamous conduct") is for the medical council: oversized or cure-claiming advertisements and signboards, fee-splitting (dichotomy), paying agents to bring patients, gifts or commissions for referral or prescribing, association with unqualified persons, sexual relationships with patients, criminal abortion and serious dishonesty. It differs from negligence, which concerns a breach of care towards a patient. A council can warn, suspend or remove registration. The exact rules of Nepal's own council apply to Nepali doctors.
- **Duty of care and abandonment**: a doctor may decline a non-emergency new patient, but once treatment has begun he must not stop without reasonable notice and arrangement of alternative care. In an emergency he must help within his competence.

Conscience, gifts and relationships

- **Conscientious objection**: a doctor may decline to perform a procedure, but must give neutral information, protect the patient's access to lawful care and **refer promptly to a willing colleague**. Nepal's law decides what is lawful.
- **Gifts**: decline gifts out of proportion to care (a large cheque) politely, explaining that the fee covers the service. A small token is a matter of judgment; test: would you be comfortable if colleagues knew?
- **Relationships**: a sexual or romantic relationship with a current patient is always unethical; with a former patient only if it was not the reason the care ended; with psychiatric patients, past or present, always unethical.
- **Informal care of friends and relatives** compromises objectivity and records; treat them only in emergencies.
- **Overutilisation**: patient-centred care does not mean agreeing to every request; decline unneeded tests politely and counsel.
- **Disability certificates**: assess fully before assuming malingering.

Genetics and reproductive ethics

- Predictive testing of **children for adult-onset, untreatable conditions** (Huntington disease) is discouraged to preserve their future autonomy; adults have a **right not to know**.
- **BRCA1** results are actionable (enhanced screening, risk-reducing surgery), which tips towards beneficence.
- **Incidental findings** of exome or genome sequencing: report clinically actionable findings, ideally after prior consent.
- **Sex selection**: in Nepal, **identifying the sex of a foetus with the intention of aborting it, and aborting after such identification, are offences** under the **Muluki Criminal Code 2074, दफा 188(7)**. Punishment (दफा 188(8)): sex identification for abortion, **3 to 6 months' imprisonment**; abortion after sex identification, up to **1 more year** on top of the abortion penalty of दफा 188(3) (which rises with gestation: up to 1 year to 12 weeks, 3 years to 25 weeks, 5 years beyond). The offence is the purpose of abortion: telling the sex for a medical reason (a sex-linked disease) is not itself made an offence. Lawful abortion is in दफा 189 (on request to 12 weeks; to 18 weeks after rape or incest; with no week limit on a licensed doctor's opinion of risk to the woman's life or health or of foetal disability, and for a woman with HIV or a similar incurable disease), always with her consent and by a licensed provider; the later Right to Safe Motherhood and Reproductive Health Act 2075, s. 15, keeps 12 weeks on request and allows up to 28 weeks on the other grounds. Nepal's Code applies, not India's PCPNDT Act.
- **Enhancement** (selecting height or intelligence) goes beyond preventing disease and raises commodification concerns.

End of life, resources and the pharmaceutical industry (curriculum additions)

- **Advance directive (living will)**: a **competent person's statement, made in advance, of the treatments he would refuse if he later loses capacity**; it lets clinicians respect autonomy after capacity is gone. It differs from **presumed consent** (organ retrieval), **implied consent** (inferred from conduct) and a **best-interest decision** (made by others when no wishes are known). A **Do Not Attempt Resuscitation (DNAR) order** is a documented decision, made with the patient or his surrogate, not to start CPR; it covers CPR only, not other care.
- **Euthanasia**: **voluntary active** (a lethal drug given by the doctor at the competent patient's repeated request), **non-voluntary** (patient cannot consent, no expressed wish), **involuntary** (against the patient's wish) and **passive** (withholding or withdrawing life-sustaining treatment, as ethically accepted when treatment is futile or refused). **Physician-assisted suicide** is the patient himself taking a drug the doctor supplies. **Palliative sedation** and **double effect** aim at comfort, not death. A **good death** is pain-free, with dignity, in the place and company of choice. Euthanasia and assisted suicide are lawful only in a few countries, by statute. In Nepal the Muluki Criminal Code 2074 makes intentionally causing death homicide (s. 177, life imprisonment) and **abetting suicide** an offence (s. 185, up to 5 years and up to Rs 50,000), and neither section excepts a patient's request; so a request is answered with palliative care, never a lethal act.
- **Child refusal**: when parents refuse **life-saving transfusion** for a child on religious grounds, the doctor **acts in the child's best interest, transfuses, documents the reasons and informs senior colleagues or the hospital authorities**; a parent may refuse for himself but not for a child when the child's life is at risk. Use blood-sparing steps only if they do not delay life-saving care.
- **HIV testing** needs the **patient's informed consent**, with pre- and post-test counselling and confidentiality (WHO "five Cs": consent, confidentiality, counselling, correct results, connection to care); **secret testing breaches autonomy**. Staff are protected by **universal (standard) precautions applied to every patient**, not by knowing status. Refusal to treat, stigma and unfair allocation are unethical.
- **Justice in resource allocation**: scarce resources (the only ICU bed) go by **medical need and likelihood of benefit**, not wealth, status or influence; **micro-allocation** is by the clinician at the bedside, **macro-allocation** by policy makers; **equity** is fair, not necessarily equal, distribution. In triage, urgency decides.
- **Pharmaceutical industry**: expensive gifts, sponsored holidays and hospitality create a **conflict of interest** and may bias prescribing; modest educational items are generally permitted; declare any interest, and base prescribing on evidence, not on promotion. Promotion must be accurate and not misleading.
- **ICMJE authorship** requires **all four**: (1) substantial contribution to conception, design, data collection or analysis; (2) drafting or critically revising the work; (3) final approval; (4) **accountability for all aspects** of the work. **Obtaining funding, general supervision of the group** and writing or technical help do not by themselves earn authorship (they go under acknowledgements); acquiring data counts towards criterion 1 but, like any contribution, needs the other three too. Plagiarism, fabrication and falsification are misconduct; **ethics approval** is required for student research on people.
- **Hospice and palliative care**: a hospice looks after people near the end of life with advanced incurable illness: **comfort rather than cure**, relief of pain and other symptoms, psychological, social and spiritual support, and support for the family, including in bereavement. It neither hastens nor postpones death. Hospice care usually begins when life expectancy is about **6 months or less** (the US Medicare criterion); **palliative care** is wider and, as WHO advises, can start at diagnosis alongside treatment aimed at cure.
- **Research on prisoners and other vulnerable groups** (Helsinki, CIOMS): permitted only with **extra safeguards** because consent may not be truly voluntary (coercion, fear of losing privileges or of reprisal). Prisoners keep **the same rights as any other participant** (their own informed consent, refusal without penalty, confidentiality; no warden or official consents for them), **plus** added protection: independent ethics review, research that is relevant to prisoners' own conditions, and no undue inducements such as early release. Other vulnerable groups: children, the cognitively impaired, the poor and illiterate.

Rational use of drugs

WHO definition and essential medicines

- **Rational use** (WHO, 1985): patients receive medicines **appropriate to their clinical needs, in doses that meet their own requirements, for an adequate period, at the lowest cost to them and their community**.
- Irrational use: polypharmacy, antibiotics for viral illness, injections when oral drugs would do, non-adherence to guidelines, self-medication of prescription-only drugs.
- **WHO Model List of Essential Medicines**: first published in **1977** (about 200 medicines), updated **every two years**. Essential medicines satisfy the priority health needs of a population and should be available at all times in adequate amounts and affordable forms. Nepal publishes its own national list.
- **Orphan drugs** treat rare diseases and are unprofitable without state support.

WHO Guide to Good Prescribing: six steps

1. **Define the patient's problem** (diagnosis).
2. Specify the **therapeutic objective**.
3. Verify the suitability of your **P-drug** (personal drug) for this patient.
4. Start treatment (write the prescription).
5. Give **information, instructions and warnings**.
6. **Monitor** and stop treatment.

P-drugs are a prescriber's own drugs of first choice for common conditions, chosen once and reviewed when evidence changes, so that each consultation does not start afresh. Choice criteria in order: **efficacy** (the most important), **safety**, **suitability** (patient's comorbidity, contraindications) and **cost** (used only to separate otherwise equal options). The process: define the diagnosis, set the objective, list effective drug groups, choose a group, then choose the P-drug.

Practical rules of rational prescribing

- Right drug (narrowest effective spectrum), right dose (adjust for age, weight and **renal or hepatic function**), right route, right duration, right patient.
- Avoid abbreviations; write in plain, legible language; avoid trailing zeros (5 mg, not 5.0 mg); write the generic name.
- **Fixed-dose combinations** are justified only when proven to help, such as antitubercular or antimalarial combinations.
- **Self-limiting viral upper respiratory infection** in a well child: explain the course, give fluids and paracetamol, warn of danger signs; **no antibiotic**.
- **Drug information centre**: gives **unbiased, evidence-based information on drugs to prescribers and patients** (doses, interactions, adverse effects, availability); it neither dispenses nor licenses. Tools that promote rational use: **standard treatment guidelines**, the essential medicines list, a hospital formulary and a drug and therapeutics committee, with education and audit.

Polypharmacy and deprescribing

- **Polypharmacy**: usually **five or more medicines** concurrently (WHO 2019 medication safety report; definitions vary). It can be appropriate, but it raises interaction, fall and delirium risk.
- In an older patient with new confusion or falls, **review all drugs**; stop the recent culprit (anticholinergics are classic) and non-essential drugs. Tools: Beers criteria, STOPP/START.

Antimicrobial stewardship and AWaRe

- **Stewardship** aims to **optimise antimicrobial use for the best clinical outcome while limiting toxicity and resistance** (right drug, dose, duration, route). Cost saving is a by-product. Core actions: guideline-based empirical therapy, **time-out at 48 to 72 hours** (de-escalate, switch to oral, stop), restriction and prior authorisation, audit with feedback.
- **WHO AWaRe classification** (introduced with the Essential Medicines List 2017, updated with each list since: 2019, 2021, 2023, 2025; the WHO AWaRe antibiotic book, 2022, gives first and second choices for common infections): **Access** (first or second choice for common infections, such as amoxicillin), **Watch** (higher resistance potential, such as ciprofloxacin and ceftriaxone) and **Reserve** (last resort for confirmed or suspected multidrug-resistant infections, such as colistin, linezolid and cefiderocol). Target: at least **70% of human antibiotic use from the Access group** (by 2030 in the UN General Assembly's political declaration on AMR, 2024; WHO's earlier 13th General Programme of Work target was 60% by 2023).

Pharmacovigilance

- Pre-marketing trials include a few thousand carefully selected patients followed briefly, so **rare reactions (about 1 in several thousand), delayed effects and effects in children, elderly or pregnant** are found only after marketing.
- **Spontaneous reporting** is the main post-marketing tool. Nepal's national pharmacovigilance centre sits with the Department of Drug Administration, reporting to the WHO Uppsala Monitoring Centre.
- Phase IV is post-marketing surveillance. Other tools: cohort and case-control studies, the yellow-card scheme (UK).
- Classification of reactions: type A (augmented, dose-related, predictable) and type B (bizarre, idiosyncratic or immunological).

Modern points

- Deprescribing and medication reconciliation at every transition of care are now standard.
- Electronic prescribing with decision support reduces errors from illegible writing and dosing.
- Choosing Wisely and low-value-care campaigns promote avoiding unnecessary tests and drugs.

Infection prevention

Standard precautions

Apply to **all patients**: hand hygiene, PPE by risk, respiratory hygiene, safe injection and **sharps** practice, safe handling of linen and waste, environmental cleaning, patient placement.

Hand hygiene (WHO)

- **WHO Five Moments**: before touching a patient, before a clean or aseptic procedure, after body-fluid exposure risk, after touching a patient, after touching patient surroundings.
- **Alcohol-based hand rub** (60 to 80% alcohol) is preferred when hands are not visibly soiled: it takes **20 to 30 seconds**, kills more microbes than soap and water, is available at the point of care and is gentler on skin.
- **Soap and water** (**40 to 60 seconds**) when hands are visibly soiled, after using the toilet, and for *Clostridioides difficile* and norovirus (spores and non-enveloped viruses are not reliably killed by alcohol).
- Remove rings and watches; keep nails short.
- **Alcohol rub does not replace soap and water** when hands are **visibly soiled** (organic matter reduces its action), after the toilet, or when spore-formers (*C. difficile*) or non-enveloped viruses are suspected.

Transmission-based precautions

Type	Examples	Measures
Contact	MRSA, VRE, *C. difficile*, scabies	Gown and gloves; single room; dedicated equipment
Droplet (particles over 5 µm, travel about 1 m)	Influenza, pertussis, meningococcus, mumps, rubella	**Surgical mask**; single room or 1 m separation
Airborne (droplet nuclei under 5 µm, remain suspended)	**Pulmonary TB**, measles, varicella, SARS-CoV-2 in aerosol-generating procedures	**Fitted N95 or FFP2 respirator**, negative-pressure or well-ventilated single room; patient wears surgical mask during transport

A **fitted N95** filters at least 95% of 0.3 µm particles and seals to the face; a surgical mask does not. For suspected pulmonary TB (three weeks of cough, night sweats, weight loss) use **airborne isolation**, ventilation and cough etiquette. In Nepal's TB programme, ventilation, sunlight and triage of coughers complement respirators.

PPE order

- **Donning**: gown, mask or respirator, eye protection, gloves.
- **Doffing** (gloves, the most contaminated, first): gloves, gown, hand hygiene, eye protection, then the **mask or respirator last**, removed by its straps outside the room, then hand

hygiene. (Variants exist; the principle is the most contaminated item first and the respirator last.)

Sterilisation and disinfection

- **Spaulding classification**: **critical** items enter sterile tissue or the vascular system (surgical instruments, implants) need **sterilisation**; **semicritical** items contact mucous membranes or non-intact skin (flexible endoscopes, laryngoscope blades, respiratory equipment) need at least **high-level disinfection**; **non-critical** items touch intact skin (stethoscope, BP cuff) need low-level disinfection.
- **Autoclave** (moist heat): **121 °C at 15 psi for 15 to 20 minutes** (gravity displacement); **134 °C at 30 psi for 3 to 4 minutes** in a pre-vacuum cycle. Moist heat kills spores by protein denaturation. Boiling at 100 °C does not kill spores. Test with *Geobacillus stearothermophilus* spores; chemical indicators show exposure only.
- Others: dry heat (hot-air oven 160 °C for 2 hours; for glassware, powders and oils), ethylene oxide and hydrogen peroxide plasma (heat-labile items), glutaraldehyde, ortho-phthalaldehyde and peracetic acid (high-level disinfectants), gamma radiation (disposables).

Sharps and exposure

- **Never re-cap a used needle by hand**: two-handed recapping is a leading cause of needle-stick injury (hepatitis B, hepatitis C, HIV). Use a puncture-proof container at the point of use; single-handed scoop only if recapping is essential.
- Risk after needle-stick: **hepatitis B about 30% (6 to 30%), hepatitis C about 1.8%, HIV about 0.3%**.
- **First aid**: wash with soap and water, do not squeeze or scrub, no bleach. Report, assess the source and exposed person.
- **HIV post-exposure prophylaxis** (WHO): start as soon as possible, ideally within hours and no later than 72 hours, for **28 days**. Preferred regimen: **tenofovir plus lamivudine (or emtricitabine) plus dolutegravir**. Do not delay for tests. Hepatitis B: vaccinate, with HBIG for a non-immune person exposed to HBsAg-positive blood.

Biomedical waste (WHO colour code)

Colour	Content
Yellow	**Infectious** waste (dressings, swabs) and pathological waste; sharps in puncture-proof yellow-marked containers
Brown	Chemical and pharmaceutical waste
Black	General non-hazardous waste

Radioactive waste carries the radiation symbol. National schemes differ (the red bag for recyclable plastics is India's scheme, not WHO's); in Nepal the National Health Care Waste Management Standards and Operating Procedures (2020) set them: **green** non-risk biodegradable, **blue** non-risk recyclable, **red** all risk waste (infectious, pathological, sharps, pharmaceutical, cytotoxic), **yellow** chemical, **black** radioactive (see the Community Medicine notes); segregation at the point of generation is the principle everywhere. Treatment: WHO favours non-burn methods (autoclave or microwave, then shredding) over small, poorly run incinerators, which release dioxins (WHO 2014, Safe management of wastes from health-care activities).

Healthcare-associated infection

- **Nosocomial infection**: appears 48 hours or more after admission (or within 30 days of surgery, 90 for implants). **Iatrogenic infection** arises directly from a treatment.
- Common types: catheter-associated UTI, central-line bloodstream infection, ventilator-associated pneumonia, surgical site infection. Prevention **bundles**: line insertion checklist with chlorhexidine skin prep, early catheter removal, head-of-bed elevation and sedation holidays, surgical antibiotic prophylaxis **within 60 minutes before incision** (120 minutes for vancomycin and fluoroquinolones, which run as long infusions; WHO 2016 SSI guidelines), and not continued after the operation (WHO 2016); hair removed by clipping, not shaving.

BLS and ACLS

Figures are **AHA 2020**; where the **AHA/ILCOR 2025** guidelines (published October 2025) changed or restated them, this is stated. The 2025 update kept the core adult technique and ACLS framework and refined details.

Adult BLS

- **Recognise**: unresponsive and not breathing, or only gasping; check the pulse for no more than 10 seconds (health professionals). Shout for help, call the emergency number, fetch an AED, and **start chest compressions at once**. The sequence is **C-A-B** (compressions first); rescue breaths first (A-B-C) delays compressions. Opening the airway: head tilt and chin lift; **jaw thrust only** if cervical spine injury is suspected (2025: if jaw thrust and an airway adjunct fail to open the airway, a trained rescuer uses head tilt and chin lift).
- **Rate 100 to 120 per minute; depth at least 5 cm but not more than 6 cm; full chest recoil; minimise interruptions** (compression fraction above 60%, ideally above 80%; pauses under 10 seconds). All unchanged in 2025.
- **Ratio 30:2** for one or two rescuers without an advanced airway (2025 restates it). With an **advanced airway**, give **one breath every 6 seconds** (10 per minute) without pausing compressions.
- Why recoil and no interruptions: complete recoil creates the negative intrathoracic pressure that refills the heart; coronary perfusion pressure falls within seconds of stopping compressions and takes many compressions to rebuild.
- Breaths: enough volume for **visible chest rise**, each over about 1 second; avoid hyperventilation.
- **Compressions alone (Hands-Only CPR)** are advised for untrained lay rescuers on adults; 2025 tells telecommunicators to instruct Hands-Only CPR for adults and **conventional CPR with breaths for children**.
- Hard flat surface; hand on the **lower half of the sternum**. CPR gives only a quarter to a third of normal cardiac output. Commonest fractures: ribs 4 to 6; commonest organ injured: liver.
- **2025 additions**: standard technique also for adults with obesity; adjust, rather than remove, a bra when placing pads; routine mechanical CPR devices not recommended, but may be used where manual compressions are difficult or dangerous; **head-up CPR** not recommended outside trials; a **single Chain of Survival** for adults, children, in and out of hospital (prevention, recognition, high-quality CPR, defibrillation, advanced resuscitation, post-arrest care, recovery).
- **Opioid overdose**: naloxone helps, but 2025 stresses **not delaying CPR** for a patient in arrest; it also recommends policies allowing lay rescuers to carry and use naloxone.

- **Exhaled air** carries about **16% oxygen** (inspired 21%), enough for rescue breaths. **BLS** is compressions, airway opening, breaths (mouth, mask or bag-mask) and an AED, deliverable without advanced equipment; **intubation, IV or IO drugs and advanced airway adjuncts belong to ALS**.
- **Signs of return of spontaneous circulation**: a palpable pulse or measurable blood pressure, an abrupt sustained rise in end-tidal CO2 (to 35 to 40 mm Hg), and purposeful movement, coughing or normal breathing. Agonal gasps and a seizure do not prove effective circulation; fixed dilated pupils point to severe brain injury.
- **Failing airway protection** (for example respiratory rate 6, GCS 4 after trauma): secure the airway by intubation first; GCS 8 or below is the usual threshold.

Choking (foreign-body airway obstruction)

- **Conscious adult or child, cannot speak (severe obstruction)**: exam answer (AHA 2020): **abdominal thrusts (Heimlich)**; current practice (**AHA 2025**, adults and children): **repeated cycles of 5 back blows alternating with 5 abdominal thrusts** until the object is expelled or the person becomes unresponsive (the order Europe's ERC has long taught). Partial obstruction (can cough or speak): encourage coughing, do not thrust.
- **Infant**: **5 back blows alternating with 5 chest thrusts** (AHA 2025: chest thrusts with the heel of one hand); never abdominal thrusts. Chest thrusts also for the very obese and in late pregnancy. Blind finger sweeps only if the object is visible.
- **Unresponsive**: lay down and start CPR, looking in the mouth for the object before each set of breaths.
- Definitive tool for a lodged object in the airway: rigid bronchoscopy.

Paediatric and neonatal points

- Compression depth at least **one third of the chest's front-to-back depth**: about **5 cm in a child and 4 cm in an infant**; adult depth from puberty; rate 100 to 120. Infant technique: exam answer (AHA 2020): two fingers for one rescuer, two thumbs encircling the chest for two; current practice (**AHA/AAP 2025**): **the two-finger technique is dropped** (it rarely reaches the depth): use **two thumbs encircling the chest or the heel of one hand**. Pulse check in an infant: **brachial**; in a child, carotid or femoral.
- **Ratio**: **30:2 with one rescuer; 15:2 with two rescuers** for infants and children (unchanged in 2025). With an advanced airway in a child, **one breath every 2 to 3 seconds** (20 to 30 a minute) with continuous compressions (AHA 2020, kept). In paediatric arrest the cause is usually **hypoxic (asphyxial)**, so breaths matter; the rescuer gives 2 minutes of CPR before leaving to call help if alone.
- **Neonatal resuscitation** (NRP; AHA/AAP 2025): dry, warm, stimulate; ventilation is the priority; start compressions if the heart rate stays **below 60 per minute after 30 seconds of effective ventilation**; compression to ventilation ratio **3:1** (90 compressions and 30 breaths a minute), over the lower third of the sternum; raise oxygen to 100% once compressions start; start ventilation with **21% oxygen at 35 weeks or more** and 21 to 30% below 35 weeks, guided by pre-ductal (right hand) oximetry. Epinephrine **IV or umbilical venous 0.01 to 0.03 mg/kg** (the preferred route), endotracheal 0.05 to 0.1 mg/kg while access is obtained. 2025 changes: **deferred cord clamping for at least 60 seconds** for most term and preterm infants (2020: at least 30 seconds); ventilation rate **30 to 60 inflations a minute** (2020: 40 to 60); initial inflation pressures 20 to 30 cm H2O; the two-finger compression technique dropped, two thumbs encircling. Heart rate is the most sensitive sign of successful resuscitation.
- Child doses: epinephrine **0.01 mg/kg** (0.1 mL/kg of 1:10,000) every 3 to 5 minutes, amiodarone 5 mg/kg, defibrillation 2 then 4 J/kg; 2025 says give the first epinephrine dose as early as possible for non-shockable rhythms.
- **Why breaths come early in children**: paediatric arrest is usually **hypoxic (asphyxial or from respiratory failure or shock)**, unlike the sudden primary cardiac arrest of adults, so oxygenation must be restored with the compressions. Europe's guidelines (ERC 2021, kept 2025) therefore **start with 5 rescue breaths** before compressions in children; the AHA (2020, 2025) keeps compressions first (C-A-B) at all ages but with breaths at 15:2. An exam asking why breaths come first in children wants the hypoxic cause. A pulseless child with an **organised rhythm** has **PEA: no shock, CPR and adrenaline 0.01 mg/kg** and a search for the cause (after drowning, hypoxia: early breaths). Atropine and pacing have no place in PEA or asystole.

Defibrillation and the adult arrest algorithm

- **Shockable**: **ventricular fibrillation and pulseless ventricular tachycardia**. **Non-shockable**: **asystole and pulseless electrical activity (PEA)**. Defibrillation is unsynchronised.
- Energy: biphasic as the manufacturer states (usually 120 to 200 J; 200 J if unknown), monophasic 360 J. Resume CPR immediately after each shock for 2 minutes. Pad positions: anterolateral or anteroposterior. A single shock then immediate CPR, not stacked shocks; escalating energy for later shocks may be considered. 2025 names VF or pulseless VT after three or more shocks **"persisting VF/pVT"** (the older term "refractory"); for it, **vector change or double sequential defibrillation** may be considered, but its usefulness is **not established** (COR 2b; ILCOR 2023 a weak recommendation).
- **Drugs**:

Drug	Dose	Notes
Adrenaline (epinephrine)	**1 mg IV or IO every 3 to 5 minutes** (1:10,000)	Early in non-shockable rhythms; in shockable rhythms after initial shocks have failed (2020: after the second shock; 2025: after initial defibrillation has failed)
Amiodarone	**300 mg IV bolus** for refractory VF or pulseless VT (after the third shock in the AHA 2020 algorithm), then **150 mg**	Lidocaine 1 to 1.5 mg/kg (then 0.5 to 0.75 mg/kg) is an equal alternative; 2025: either "may be considered" (COR 2b)
Vasopressin	Removed from the algorithm (2015)	2025: no benefit alone or added to adrenaline; high-dose adrenaline also of no benefit
Atropine	No longer used in arrest	Used in bradycardia (1 mg every 3 to 5 minutes, maximum 3 mg)

Drug	Dose	Notes
Sodium bicarbonate, calcium, magnesium	Not routine (2025: COR 3, no benefit)	Calcium for hyperkalaemia and calcium-channel overdose; bicarbonate for hyperkalaemia and tricyclic overdose; magnesium for torsades de pointes

- **Access**: IV first; **IO** if IV is unsuccessful or not feasible (2025 restated this priority). Adrenaline for anaphylaxis is 1:1,000 intramuscularly, not IV.
- **Airway in arrest** (2025): delay an advanced airway that interrupts compressions until initial CPR and shocks have failed or ROSC; a supraglottic airway or tracheal tube are both acceptable, by the team's skill; **continuous waveform capnography confirms and monitors tube position** (COR 1); the highest feasible inspired oxygen during CPR.
- **Capnography**: aim for ETCO2 of at least 10 mm Hg, ideally 20 or more, as a sign of good compressions; ETCO2 at or below 10 mm Hg after 20 minutes in an intubated adult predicts poor outcome and may be one part of a decision to stop (never alone); an abrupt rise to 35 to 40 mm Hg suggests ROSC. 2025: no single ETCO2 value alone ends resuscitation in children.
- **Termination in out-of-hospital arrest** (2025): the **BLS termination rule** where advanced care is unavailable or much delayed (COR 1), the ALS rule, or the **universal rule** in tiered systems (arrest not witnessed by EMS, no shock given, no ROSC before transport).

Reversible causes: 5 Hs and 5 Ts

Hypovolaemia, hypoxia, hydrogen ion (acidosis), hypo- or hyperkalaemia, hypothermia; tension pneumothorax, tamponade, toxins, thrombosis (pulmonary or coronary). A trauma patient in PEA with **absent breath sounds on one side, a deviated trachea and distended neck veins** has **tension pneumothorax**: immediate decompression. Hypovolaemia gives flat neck veins; tamponade gives muffled heart sounds and distended veins with equal breath sounds. Special situations: pregnancy (high-quality CPR with **manual left uterine displacement**, IV access above the diaphragm, early airway; for a uterus at or above the umbilicus with no ROSC, prepare at once and perform **resuscitative delivery** (the current name for perimortem caesarean) with the **goal of delivery within 5 minutes** of arrest, the classic "4-minute rule" for starting it; AHA 2025 algorithm); drowning (give rescue breaths early); severe hypothermia (continue to rewarm; "not dead until warm and dead").

- **Anaphylaxis**: the first drug is **intramuscular adrenaline 1:1,000, 0.01 mg/kg into the anterolateral thigh (at most 0.5 mg in an adult or child over 12; 0.3 mg at 6 to 12 years, 0.15 mg under 6, by Resuscitation Council UK age bands)**, repeated after 5 minutes if needed; lie the patient flat with legs raised (sitting up if breathing is hard), then high-flow oxygen and IV fluids for shock. Antihistamines, steroids and nebulised salbutamol are adjuncts and never delay adrenaline. Current practice (**Resuscitation Council UK 2021**): **refractory anaphylaxis** (no improvement after two IM doses) is treated with an **adrenaline infusion** under expert guidance; non-sedating oral antihistamines only for skin symptoms after the patient is stable, and **steroids are no longer routine**.

Peri-arrest rhythms

- **Pulseless tachyarrhythmia**: defibrillate. **Unstable tachycardia with a pulse** (hypotension, altered consciousness, chest pain, failure): **synchronised cardioversion** (2025: also for stable wide-complex tachycardia when vagal manoeuvres and drugs fail). Energies: exam answer (the AHA 2010 and 2015 algorithm card) narrow regular 50 to 100 J, narrow irregular (AF) 120 to 200 J biphasic, wide regular 100 J, wide irregular at defibrillation energy (unsynchronised); current practice (**AHA 2025**): **AF at least 200 J** biphasic, then escalate; atrial flutter 200 J may be reasonable. Stable narrow regular tachycardia: vagal manoeuvres (the modified Valsalva, strain then lie flat with legs raised, about three times as effective as the standard one: REVERT trial, Lancet 2015), then **adenosine 6 mg rapid IV, then 12 mg**; IV diltiazem or verapamil are alternatives. Stable regular monomorphic wide-complex tachycardia: adenosine may be considered, or amiodarone, procainamide or sotalol; **verapamil or diltiazem in wide-complex tachycardia is harmful**, and adenosine harmful in an irregular or polymorphic one (pre-excited AF). In pre-excited AF avoid AV-nodal blockers (digoxin, verapamil, diltiazem, beta-blockers, IV amiodarone).
- **Bradycardia with a pulse, unstable**: atropine 1 mg, then dopamine or adrenaline infusion or pacing; 2025 adds transvenous pacing for refractory instability.

Post-cardiac arrest care (2025)

- **Avoid hypotension**: MAP at least **65 mm Hg**; oxygen saturation 92 to 98%, avoid hyperoxia; PaCO2 35 to 45 mm Hg.
- **Targeted temperature control** for patients not following commands after ROSC: **at least 36 hours** (2025); target 32 to 37.5 °C, avoiding fever. **Coronary angiography** before discharge when a cardiac cause is suspected (and emergency angiography for ST elevation).
- 2025 suggests head-to-pelvis CT and echocardiography after ROSC to find the cause. **Prognosis is multimodal and delayed, at least 72 hours after ROSC or after normothermia**; do not treat myoclonus without an EEG correlate. Survivors need structured screening for emotional distress, cognition and rehabilitation. 5% dextrose worsens outcome; use isotonic fluids. Consider organ donation.

Airway and emergency care

- **Unanticipated difficult airway (Difficult Airway Society)**: Plan A tracheal intubation (maximum three attempts), Plan B second-generation supraglottic device, Plan C face-mask ventilation, **Plan D front-of-neck access** (scalpel cricothyroidotomy) in cannot-intubate-cannot-oxygenate.
- **Coma cocktail** for undiagnosed coma: dextrose, oxygen (with ventilation if opioid toxicity), naloxone, thiamine. **Adrenaline is not part of it.**
- **Primary survey (ATLS)**: exam answer ABCDE (ATLS 10th edition, 2018); current practice **xABCDE** (**ATLS 11th edition, 2025**, which added the x): exsanguinating external haemorrhage first (direct pressure, tourniquet, haemostatic dressing), then airway with cervical spine protection, breathing, circulation with haemorrhage control, disability, exposure. Signs of airway compromise: unable to speak, GCS 8 or below, severe maxillofacial injury, stridor and drooling.
- **Triage** by colour: **Red (immediate)** airway obstruction, severe breathing difficulty, shock, uncontrolled bleeding, tension

pneumothorax; **Yellow (urgent)**; **Green (delayed)** walking wounded, minor injuries; **Black (expectant or dead)**. Priority is by threat to life, not by pain or distress; a patient with stridor and drooling is seen before one with renal colic. Systems with five levels: Emergency Severity Index, Australasian Triage Scale, Manchester. **Reverse triage** frees hospital beds for a mass casualty. In the field, START uses respiration, perfusion and mental status.

- **IV cannula colours** (gauge, colour, flow): 14 G orange 240 mL/min; 16 G grey 180; 18 G green 90; 20 G pink 60; **22 G blue 36**; 24 G yellow 20.

Communication skills

Structure of the consultation

- **Open the consultation with open-ended questions** ("Tell me more about how the pain began"). They let the patient set out his concerns in his own words, bring out worries the doctor did not expect, and usually do not lengthen the visit. **Closed questions** (answered yes, no or one word) come later to clarify detail. **Leading questions** suggest the answer and bias the history.
- Calgary-Cambridge guide: initiate, gather information, physical examination, explain and plan, close; relationship-building runs through all of it.
- **Active listening**: verbal cues (open questions, repeating, paraphrasing, encouraging sounds, summarising) versus **non-verbal cues** (**eye contact**, facial expression, posture, tone, gestures).
- **Empathy** is recognising the patient's feelings and showing you understand them; it differs from sympathy (feeling sorry for) and from taking on the feeling. **Premature reassurance** shuts down concerns. The NURSE responses: name, understand, respect, support, explore.
- **Plain language instead of jargon** improves understanding and adherence and prevents errors. **Teach-back** (asking the patient to say the instructions in his own words) tests the clinician's explanation, not the patient's memory.
- Interpreters: a **trained professional interpreter** translates faithfully and keeps confidence; **family members** filter, add or omit, and inhibit sensitive disclosure. Speak to the patient, not the interpreter, in short sentences; a child should never interpret for a parent.
- **Let the patient finish the opening statement**: doctors interrupt after a median of about **11 seconds** (Singh Ospina, 2019; Beckman and Frankel's classic figure was 18 seconds, 1984), yet an uninterrupted opening rarely runs past 1 to 2 minutes. Then ask "anything else?" before narrowing (agenda setting).
- **ICE**: elicit the patient's **ideas, concerns and expectations**; unspoken concerns are the commonest reason a consultation fails.
- **Chunk and check**: give information in small pieces and check understanding after each; signpost ("I'd like to talk about the treatment now").
- Consultation models: Pendleton (1984; seven tasks), Neighbour's inner consultation (connecting, summarising, handing over, safety-netting, housekeeping), Calgary-Cambridge (the most used in teaching). **Safety-netting**: tell the patient what to watch for, what to do and when to return.

Shared decision-making and communicating risk

- **Shared decision-making**: the clinician brings the evidence, the patient brings his values and preferences, and they choose together; it sits between paternalism and simply handing over a menu. Steps (the SHARE approach, AHRQ): seek participation, help explore options, assess values, reach a decision, evaluate it. **Patient decision aids** improve knowledge and lower decisional conflict (Cochrane review, 2017).
- **Risk**: give **absolute risks, in natural frequencies** ("3 in 100 people", with the same denominator), over relative risks, which inflate small effects (a fall from 2 in 100 to 1 in 100 is a "50% relative reduction" but a 1% absolute one, NNT 100). Frame both ways (chance of benefit and of harm); pictographs help.
- **Health literacy**: assume it is limited ("universal precautions"): plain words, teach-back, pictures, a written summary.

Feedback and empathy

- **Good feedback**: **specific, timely, based on observed behaviour, private and aimed at improvement**; not vague, delayed, public or about the person's character.
- **Empathic reply** to a bereaved parent: names and accepts the feeling ("this must be the hardest thing you have faced; I am here"). Platitudes ("it is God's will", "be strong"), false reassurance and "I know exactly how you feel" or talking of one's own loss close the conversation. Sympathy is pity for, empathy is understanding of, the other's feeling.
- **Opening a consultation**: greet the patient and introduce yourself, then an open invitation to tell the problem **in his or her own words, listening without interrupting** (most patients finish their opening account within two minutes), before closed questions, examination or tests. The exception is the acutely ill: with **acute chest pain**, guidelines want an **ECG within 10 minutes** of arrival (ESC 2023), so history and ECG go together, and the unstable patient is resuscitated first.

Communicating with colleagues

- **SBAR** (situation, background, assessment, recommendation) for a referral or a call for help; **I-PASS** (illness severity, patient summary, action list, situation awareness, synthesis by the receiver) for handover, which cut preventable adverse events by about 30% (Starmer, NEJM 2014).
- **Graded assertiveness** for a junior to stop an unsafe act: **CUS** ("I am Concerned, I am Uncomfortable, this is a Safety issue") and the **two-challenge rule** (voice the concern twice; if ignored, go up the chain). **Closed-loop** communication in resuscitation (see Patient safety).

Breaking bad news: SPIKES (Baile)

Setting up (privacy, sit down, no interruptions, bring support), **P**erception (what does the patient already know?), **I**nvitation (how much does he want to know?), **K**nowledge (give information in small chunks, with a warning shot), **E**motions (respond with empathy), **S**trategy and summary. The first step is setting up, not giving the diagnosis. Devised by **Baile and Buckman** for cancer patients (Oncologist, 2000). Alternatives: the ABCDE approach (Rabow and McPhee) and BREAKS.

- Use the words "cancer" or "died", not euphemisms; then **silence**: let the patient react before more information.
- **Collusion** (a family asking that the patient not be told): explore their fears, then the patient's wishes; see Ethics.

Therapeutic privilege (withholding because telling would itself cause serious harm) is narrow and temporary.

- Bad news by telephone only when unavoidable; check who is listening and that the person is not alone or driving.
- Rapport survives bad news when it is honest, unhurried and ends with a plan and the next contact.

Barriers to communication

Barrier	Examples
Environmental	Noise, poor lighting, lack of privacy, interruptions
Physiological	Hearing or speech difficulty
Psychological	Anxiety, depression, anger, denial
Semantic or language	Jargon, different language, words of different meaning
Cultural	Illiteracy, belief, custom, religion, attitude

When a waiting room is noisy, ask for quiet truthfully, explaining that noise interferes with the examination.

Motivational interviewing (MI)

Developed by **Miller and Rollnick** (Miller 1983; the book 1991). A **collaborative, goal-oriented style that strengthens the person's own motivation for change**, since people are moved more by their own reasons than by being told. Spirit: **Partnership, Acceptance, Compassion, Evocation (PACE)**. Core skills **OARS**: Open questions, Affirmations, Reflective listening, Summarising. Four processes: **engaging, focusing, evoking, planning**. Principles: resist the righting reflex, understand the patient's motivation, listen with empathy, empower the patient. A question such as "What worries you about your sight and what might you change?" draws out the patient's own reasons. The aim is to draw out **change talk** (the patient's own desire, ability, reasons and need: DARN) and to roll with **sustain talk** rather than argue; arguing for change makes the patient argue against it. Stages of change (**Prochaska and DiClemente**, transtheoretical model): precontemplation, contemplation, preparation, action, maintenance, relapse; MI suits the ambivalent patient in contemplation. Brief intervention for alcohol or tobacco: the **5 As** (ask, advise, assess, assist, arrange) and, for the unwilling smoker, the **5 Rs** (relevance, risks, rewards, roadblocks, repetition).

Difficult encounters

- **Angry patient**: do not retaliate or take it personally; acknowledge the issue, validate the emotion, use open and empathic communication, and invite questions.
- **Psychosis**: asked "do you believe the voices are real?", **acknowledge the distress without confirming the delusion or hallucination and without blunt contradiction**; build rapport first. Agreeing reinforces the false belief.
- **Refusal of treatment**: explore the reasons fully before honouring autonomy.
- **Disclosure of an error**: tell the patient promptly, **apologise, explain what happened, say what is being done to put it right and to prevent recurrence**, and report it. Concealment breaches the duty of candour. Expect anger, and continue care.
- **Adolescents**: give time alone (sexual activity, alcohol, drugs, tobacco), explain the limits of confidentiality, and share results only as the patient wishes, within the law.
- **Telemedicine and social media**: keep the same confidentiality and professional boundaries; a doctor's online conduct is judged by the medical council.

Special circumstances (curriculum additions)

- **Children**: speak to the child at his level, use play and drawing, involve the parent, explain before touching, and gain assent. **Sexual history**: ask permission, explain why, use open, non-judgemental language, ensure privacy and confidentiality. **Aggressive patients**: keep distance and an exit, stay calm and low-voiced, do not argue, listen, acknowledge the feeling, call for help early. **Impaired patients** (hearing, speech, intellect): face them, use plain language, allow time, check understanding, use an interpreter or carer if needed. **During procedures**: explain, ask permission, narrate, check comfort.
- **Written communication**: clinical notes are **dated, timed, signed, legible and factual**; a **referral letter** states the question, history, findings, investigations, treatment so far and urgency; **presentations** are structured and brief. **Safety-netting** closes the consultation: what to expect, which danger signs mean return, where to go.

Patient safety

Terms

- **Near miss**: an error or hazard **caught before it reaches the patient**, so no harm. **Adverse event**: harm from care rather than the disease. **Sentinel event**: unexpected death or permanent or severe harm. **Never event**: serious, largely preventable, such as wrong-site surgery or a retained foreign body.
- **Active error**: by front-line staff with immediate effect. **Latent error**: a system fault (staffing, design, policy) waiting to cause harm. Reason's **Swiss cheese model**: harm happens when holes in several layers of defence line up. Reporting near misses lets the system learn at no cost to a patient; a **no-blame, just culture** encourages reporting.
- Contributors to prescribing errors: tiredness, workload, distraction, inattention, inadequate competence; to dispensing errors: illegible writing, look-alike and sound-alike drugs.
- **Kinds of unsafe act** (Reason): **slips** (an action not as planned: the wrong syringe picked up) and **lapses** (a memory failure: a dose forgotten) are skill-based; **mistakes** are errors of planning, rule-based (a good rule misapplied) or knowledge-based; **violations** are deliberate departures from a rule. Slips and lapses are reduced by design, mistakes by training and decision support, violations by culture.
- **Medication error** is the commonest preventable harm in health care; the **prescribing** stage produces the most errors, administration the next. **Adverse drug event**: harm from a drug, preventable (an error) or not (an adverse drug reaction at a correct dose).

Landmarks and WHO programmes

Year	Landmark
1999	**To Err Is Human** (US Institute of Medicine): **44,000 to 98,000** deaths a year in US hospitals from medical error; errors come mainly from faulty systems, not bad people
2004	WHO World Alliance for Patient Safety
2005	First Global Patient Safety Challenge: **Clean Care is Safer Care** (hand hygiene)

Year	Landmark
2008	Second: **Safe Surgery Saves Lives**: the **Surgical Safety Checklist** (19 items); in eight cities it cut deaths from **1.5% to 0.8%** and complications from **11% to 7%** (Haynes, NEJM 2009)
2017	Third: **Medication Without Harm**: halve severe avoidable medication harm in five years
2019	World Health Assembly makes **17 September World Patient Safety Day**
2021	**Global Patient Safety Action Plan 2021 to 2030** ("eliminate avoidable harm in health care"; seven strategic objectives)

About 1 in 10 hospital patients suffers an adverse event, about half of them preventable (WHO). Joint Commission International's **six International Patient Safety Goals**: identify patients correctly, improve effective communication, improve the safety of high-alert medicines, ensure safe surgery, reduce the risk of health-care-associated infection, reduce harm from falls.

Learning from incidents

- **Root cause analysis**: a retrospective, team review of a serious event asking what happened, why, and what system change will stop it; tools are the fishbone (Ishikawa) diagram and the "five whys". **Failure mode and effects analysis (FMEA)** is **prospective**: it looks for how a process could fail before harm occurs.
- **Just culture**: console human error, coach at-risk behaviour, sanction only reckless behaviour (Marx). Blame drives errors underground.
- **Hierarchy of interventions**, strongest first: **forcing functions** (a connector that cannot fit the wrong port; concentrated potassium removed from wards), automation and computerised order entry, simplification and standardisation, checklists and double-checks, and weakest, rules and education.
- Quality improvement: the **PDSA cycle** (plan, do, study, act: Deming); **Donabedian's** structure, process and outcome for judging quality. **Human factors**: fatigue, hierarchy and poor design make errors predictable; design for the human rather than expect perfection.

Safeguards

- **WHO Surgical Safety Checklist**: **sign in** (before induction), **time out** (before incision: the whole team confirms patient identity, procedure, **site marking**, antibiotic prophylaxis and anticipated events) and **sign out** (before leaving the theatre: counts, specimen labelling, recovery plan). A **team check before incision** is the core defence against **wrong-site, wrong-patient or wrong-procedure surgery**, which is more likely in emergencies, with fatigue and with hierarchy. A signed consent alone does not prevent it. Two staff verifying independently, not together, avoids replicated errors.
- **Closed-loop communication**: the sender gives the message, the receiver **repeats it back**, the sender confirms. It catches **misheard drug names and doses**, especially in verbal emergency orders, which are documented afterwards.
- Other measures: two patient identifiers, barcode checks, **high-alert medicines** (insulin, heparin, concentrated potassium) with independent double-checks, look-alike sound-alike labelling, avoiding abbreviations and trailing zeros, handover tools (**SBAR**: situation, background, assessment, recommendation), early warning scores (NEWS2) and rapid response teams, medication reconciliation, and a falls and pressure-injury bundle.
- **Retained items**: counts of swabs, needles and instruments at the start, before closure of a cavity and at the end; a count discrepancy needs a search and an X-ray before the patient leaves.
- **Patient identification**: at least **two identifiers** (name and date of birth or hospital number), never the bed number; checked before every drug, transfusion, sample and procedure.
- **Transfusion**: bedside check of patient and unit by two people; most ABO-incompatible transfusions come from identification errors, at sample collection (wrong blood in tube) or the bedside check, not from the laboratory (UK SHOT reports).
- **Falls**: risk assessment on admission, review of sedatives, footwear and lighting; **pressure injuries**: risk score (Braden), turning, pressure-relieving mattresses, nutrition. **Venous thromboembolism**: risk assessment and prophylaxis for every admission.
- **Patient involvement**: patients and families who are encouraged to speak up ("Ask me if I washed my hands") catch errors.
- Disclosure and apology after an error are expected (**duty of candour**, open disclosure); see Communication skills. **Second victim**: the clinician involved in an error also needs support.

Basic clinical skills

Examination skills

- **Rectal examination**: explain and get consent with a chaperone; **left lateral (Sims) position**, inspect the anus, lubricated gloved finger, assess tone, the anal canal and rectum, the **prostate** in a man (normal: smooth, firm and rubbery, about the size of a walnut, roughly 3–4 cm across, with a **palpable median sulcus** between the two lobes; **hard, craggy and asymmetrical** suggests carcinoma, **boggy and tender** prostatitis), the cervix in a woman, and look at the glove for blood or melaena.
- **Ear drum**: in an **adult pull the pinna up and back**, in a **child down and back**, to straighten the canal; hold the otoscope like a pen with the little finger on the face. Normal drum: **pearly grey, translucent, a cone of light in the anteroinferior quadrant, the handle of the malleus visible**; red and bulging in acute otitis media, retracted and dull in effusion.
- **Breast examination**: inspect with arms by the sides, raised and hands on hips (dimpling, nipple retraction); palpate each quadrant, the tail of Spence and behind the nipple with the flat of the fingers; then the **axillary and supraclavicular nodes**. A lump is assessed by **triple assessment** (clinical, imaging, needle biopsy).
- **Heart sounds**: **S1** is closure of the mitral and tricuspid valves, **S2** of the aortic and pulmonary valves (physiologically split in inspiration), **S3** in rapid filling (children, young, heart failure), **S4** atrial contraction against a stiff ventricle. Murmur grading is **Levine 1 to 6** (a **thrill** from grade 4). **Breath sounds**: **vesicular** (normal, inspiration longer than expiration), **bronchial** (consolidation: loud, expiration as long as inspiration, a gap between), **crackles** (fluid or opening airways), **wheeze** (narrowed airways, mainly expiratory), **stridor** (upper airway obstruction, inspiratory) and **pleural rub**.
- **Palpating the uterus**: bimanual in the non-pregnant woman (anteverted, anteflexed normally); in pregnancy the fundus is

just palpable above the symphysis at 12 weeks, at the umbilicus at about 20 to 22 weeks and at the xiphisternum at 36 weeks.

- **Hip in a newborn** (developmental dysplasia): **Ortolani** (a dislocated hip is reduced with a clunk on abduction) and **Barlow** (a dislocatable hip is pushed out on adduction); done gently in the first weeks, with ultrasound if doubtful.

Procedural skills

- **CPR**: see BLS and ACLS (30:2, 100 to 120 compressions a minute at 5 to 6 cm in adults; children and infants 15:2 with two rescuers).
- **Adult intubation**: preoxygenate, **sniff position**, laryngoscope in the right of the mouth with the tongue swept left, tip of a **Macintosh blade in the vallecula**, **lift along the handle's axis and do not lever on the teeth**, tube through the cords. **Confirm by waveform capnography** (the gold standard), then chest rise, bilateral breath sounds and misting; the depth is about **21 cm in women and 23 cm in men at the teeth**; unrecognised oesophageal intubation is the deadly error. **Children**: the tube internal diameter is **age/4 + 4 mm (cuffed 3.5 + age/4)** and the depth at the teeth about **three times the tube size**; infants have a large occiput, a floppy epiglottis (straight blade may help) and the **narrowest point at the cricoid ring** (the exam answer; some CT and MRI studies place it just below the cricoid or at the glottis, a debated finding). **Current practice**: cuffed tubes are reasonable in infants and children (AHA 2020).
- **Venous access**: choose a visible straight vein, apply a tourniquet, clean, cannula bevel up at about 15 to 30 degrees and advance slightly once flash appears; **colour codes of cannulae: grey 16 G, green 18 G, pink 20 G, blue 22 G, yellow 24 G** (flow falls with the gauge and rises with the shorter length). In resuscitation when veins fail use **intraosseous access** (proximal tibia, humeral head).
- **Umbilical catheterisation**: the cord has **two thick-walled arteries and one thin-walled vein**; the vein (at about 12 o'clock) is used in emergencies for fluids and drugs, **inserted only until blood flows back** (a few centimetres) in resuscitation.
- **Radial artery puncture** (for blood gases): do an **Allen test** first (compress both arteries, the hand blanches, release the ulnar artery, colour should return in under 5 to 10 seconds, showing the ulnar artery can supply the hand), puncture at about **30 to 45 degrees** over the pulse, and **press firmly for at least 5 minutes, longer on anticoagulants or with clotting disorders**; a tourniquet and massage cause bleeding. Complications: haematoma, thrombosis, ischaemia of the hand.
- **Pleural aspiration**: the needle goes **just above the upper border of the lower rib** of the chosen space, because the **intercostal vein, artery and nerve run in the groove under the lower border** of each rib. The BTS pleural disease guideline (2023) advises **thoracic ultrasound guidance** for all pleural procedures.
- **Chest drain**: insert in the **triangle of safety** (**BTS**): bounded by the **lateral border of pectoralis major** in front, the **anterior border of latissimus dorsi** behind, a line at the **level of the nipple (the 5th intercostal space)** below and the apex below the axilla. Use **blunt dissection** and over the upper border of the rib, never a trocar. Insert above the triangle and the axillary structures are at risk; below it the diaphragm, liver and spleen. The drain is attached to an **underwater seal**, which **swings with respiration and bubbles with an air leak**; **never clamp a bubbling drain**. Small-bore (12 to 14 Fr) Seldinger drains are enough for most pneumothoraces and effusions (BTS 2023).
- **Central venous line**: ultrasound-guided **right internal jugular** vein by the Seldinger technique, Trendelenburg position; confirm the tip at the **SVC and right atrial junction** on a chest X-ray (and exclude pneumothorax). **Subclavian** has the highest risk of pneumothorax, **femoral** of infection and thrombosis, and the internal jugular of carotid puncture; **air embolism** is prevented by head-down position and occluding the hub.
- **Wound closure**: irrigate, remove foreign material, give tetanus prophylaxis, **lignocaine up to 3 mg/kg (7 mg/kg with adrenaline)**; **exam answer: no adrenaline in end-arteries** (fingers, toes, penis, nose, ears); **current practice**: dilute lignocaine with adrenaline (1:100,000–200,000) is used by many hand surgeons for digital blocks in healthy fingers, since the old reports of gangrene were rarely due to adrenaline itself; the Cochrane review (2015) found the evidence too weak to recommend or refute it (no trial reported ischaemia), and phentolamine reverses a persisting white finger. Do not close bites, heavily contaminated or old wounds primarily. **Skin sutures are removed at about 5 days on the face, 7 to 10 on the trunk and scalp, 10 to 14 on limbs and 14 over joints**; tissue adhesive suits small clean wounds.
- **ECG interpretation**: rate (300 / number of large squares), rhythm, axis, P wave, PR interval (0.12 to 0.20 s), QRS (under 0.12 s), ST segment, T wave and QT; read systematically each time.

Sources

Harrison's Principles of Internal Medicine (ethics, communication and resuscitation chapters); Park's Textbook of Preventive and Social Medicine; KD Tripathi's Essentials of Medical Pharmacology; Katzung's Basic and Clinical Pharmacology; Bailey and Love; Beauchamp and Childress, Principles of Biomedical Ethics; WHO Guide to Good Prescribing (1994), WHO Model List of Essential Medicines (first 1977) and AWaRe classification; WHO Guidelines on Hand Hygiene in Health Care (2009) and WHO Guidelines on HIV post-exposure prophylaxis (2024 update); WHO Surgical Safety Checklist; AHA 2020 Guidelines for CPR and ECC; AHA 2025 Guidelines for CPR and ECC (Circulation, October 2025: Parts 7 Adult BLS, 9 Adult ALS, 11 Post-Cardiac Arrest Care, and the AHA/AAP paediatric and neonatal parts) and the ILCOR Consensus on Science (2023–2025); Neonatal Resuscitation Program (AHA/AAP 2025); ATLS 10th (2018) and 11th (2025) editions; Difficult Airway Society 2015 guidelines; WHO guidelines for the prevention of surgical site infection (2016); WHO, Safe management of wastes from health-care activities (2014); WHO Global Patient Safety Action Plan 2021 to 2030; Institute of Medicine, To Err Is Human (1999); Haynes and colleagues, NEJM 2009 (Surgical Safety Checklist); Starmer and colleagues, NEJM 2014 (I-PASS); Reason, Human Error (1990); Muluki Criminal Code 2074, दफा 188–189, and the Right to Safe Motherhood and Reproductive Health Act 2075; Baile and colleagues, SPIKES (Oncologist 2000); Miller and Rollnick, Motivational Interviewing.

- Basic clinical skills: British Thoracic Society pleural disease guideline (2023) and the earlier BTS chest drain guidance (2010); Resuscitation Council UK and AHA 2025 (airway and ECG); Hutchison's and Macleod's clinical examination; Bailey

and Love’s practical procedures; Cochrane review of adrenaline in digital nerve blocks (2015); Nepal Muluki Criminal Code 2074 (ss. 177, 185) for euthanasia.