Job Readiness Workshop for 6th Year Medical Students

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Dealing with obstetric emergencies (PPH, Obstetric Shock, Eclampsia)

Objectives

- To develop hands-on skills for managing obstetric emergencies in various clinical settings.
- To enhance decision-making and teamwork in emergency situations involving PPH.

Immediate Resuscitation Measures

- **Call for help:** Mobilize the obstetric and anesthetic team and prepare for possible transfer to the operating room.
- **Airway and Breathing:** Ensure airway patency and adequate oxygenation. Administer high-flow oxygen (via non-rebreather mask or nasal cannula).
- **Circulation:** Start aggressive fluid resuscitation:

➢ **IV Access:** Establish two large-bore (16- or 18-gauge) IV lines.

➢ **Fluid Replacement:** Begin rapid infusion of crystalloid solutions (e.g., normal saline or lactated Ringer's) to restore intravascular volume.

➢ **Blood Products**: If ongoing bleeding or hemodynamic instability persists, administer blood products (packed red blood cells, fresh frozen plasma, and platelets) in a 1:1:1 ratio to replace blood loss and correct coagulopathy.

➢ **Medications**: Administer uterotonic agents such as oxytocin, misoprostol, ergometrine, or carboprost to enhance uterine contraction and control bleeding.

Maternal Early Warning Scores (MEWS)

MEWS calculated from 5 physiological variables:

- Mental response
- Pulse rate
- Systolic BP
- Respiratory rate
- Temperature

Maternal Early Warning Scores (MEWS)

Physiological parameters	Normal values	Yellow alert	Red Alert
Respirator rate	10-20 breaths per minute	21-30 breaths per minute	< 10 or >30 breaths per minute
Oxygen saturation	96-100%		< 95 %
Temperature	36.0-37.4°C	35-36 or 37.5- 38°C	< 35 or > 38°C
Systolic blood pressure	100-139 mmHg	150 – 180 or 90 – 100 mmHg	>180 or < 90 mmHg
Diastolic blood pressure	50-89 mmHg	90–100 mmHg	>100 mmHg
Heart rate	50-99 beats per minute	100- 120 or 40 -50 beats per minute	>120 or < 40 beats per minute
Neurological response	Alert	Voice	Unresponsive, pain

RESUSCITATION

- In 2010, the AHA changed the sequence of BLS steps from *airway-breathing-circulation* (A-B-C) to *circulation-airway-breathing* (C-A-B).

- In pregnancy, the sequence should be: chest compressions/current airway- breathing- uterine displacement (C-A-B-U).

Advanced life support in Obstetrics 2020

Identify and Manage the Cause (e.g. Hemorrhage)

- **Uterine Atony (most common cause):** Perform uterine massage to stimulate contraction. If unsuccessful, use pharmacologic uterotonics.
- **Retained Placental Tissue:** Manually explore the uterus for retained placental tissue or clots, which can contribute to ongoing bleeding.
- **Genital Tract Trauma:** Inspect for and repair any perineal, vaginal, or cervical lacerations.
- **Coagulopathy:** Correct any underlying clotting disorders, often necessitating the administration of blood products or medications like tranexamic acid.

Advanced Interventions

- **If bleeding is refractory to initial measures, consider more advanced procedures such as:**
- Bimanual compression of the uterus
- Uterine balloon tamponade (e.g., Bakri balloon)
- Surgical interventions like uterine artery ligation or hysterectomy in cases of life-threatening bleeding.

Monitoring and Support

- Continuously monitor vital signs, urine output, and blood loss.
- Consider inserting a Foley catheter to monitor urine output as a marker of perfusion.
- Maintain ongoing laboratory assessment (e.g., hemoglobin, coagulation profile, and arterial blood gases).

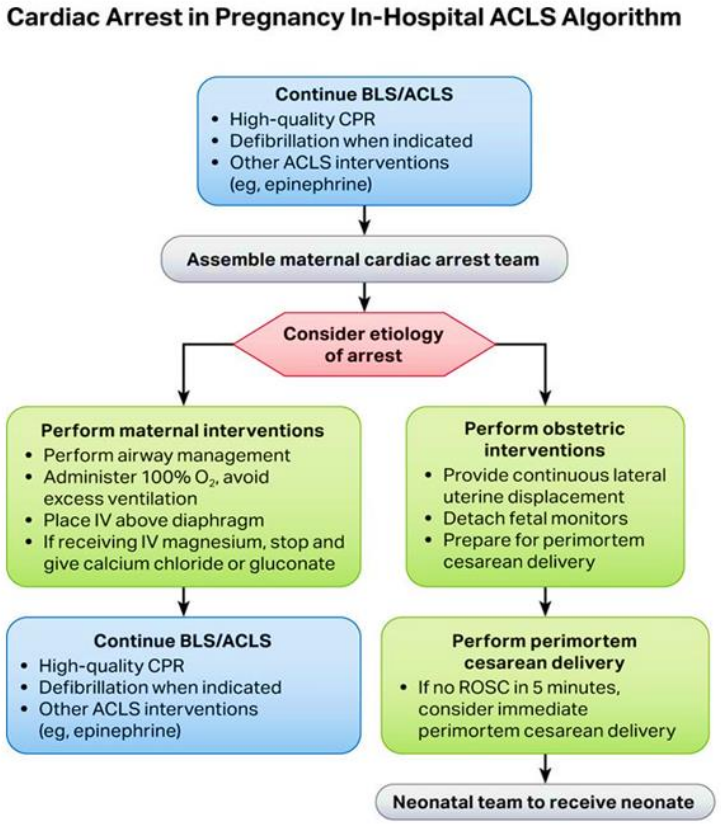
Post-Resuscitation Care

- Once bleeding is controlled and the patient is stabilized, continue monitoring for any signs of re-bleeding or delayed complications like disseminated intravascular coagulation (DIC).

- After the restoration of spontaneous circulation SpO2 (92%–98%), partial pressure of carbon dioxide (PaCO2:35–45 mm hg), systolic blood pressure (> 90 mm), and blood sugar (150–180 mg %) should be maintained.

- Transfer to an intensive care unit (ICU) may be necessary for further Care.

Maternal Cardiac Arrest



Maternal Cardiac Arrest

- Team planning should be done in collaboration with the obstetric, neonatal, emergency, anesthesiology, intensive care, and cardiac arrest services.
- Priorities for pregnant women in cardiac arrest should include provision of high-quality CPR and relief of aortocaval compression with lateral uterine displacement.
- The goal of perimortem cesarean delivery is to improve maternal and fetal outcomes.
- Ideally, perform perimortem cesarean delivery in 5 minutes, depending on provider resources and skill sets.

Perimortem Cesarean Delivery

Perimortem Cesarean Delivery

Perimortem Cesarean Delivery (PMCD)

- Performed when the mother has not responded to CPR after 4 min
- Recommended for fetuses at least 20 wk gestation
- Decision made on a case-by-case basis, considering the fetus' gestational age, the mother's medical condition, and availability of resources and skills
- Should be performed as quickly as possible
- Maternal and fetal survival rates following PMCD vary greatly based on multiple factors

ACLS algorithm for IHCA in pregnancy

- The ACLS algorithm for IHCA in pregnancy includes the following steps:
- Perform BLS and ACLS as would occur in any adult patient.
- Chest compression and ventilation recommendations for the pregnant patient are the same as nonpregnant patients.
- The mother should be placed supine for chest compressions.
- Manual left uterine displacement (LUD) should be used to relieve aortocaval compression during resuscitation.
- The energy required for defibrillation during cardiac arrest in pregnancy would be the same as for the nonpregnant patient.
- If magnesium is being administered, stop it, and provide calcium gluconate or calcium chloride.
- Fetal assessment should not be performed during resuscitation.
- Fetal monitors should be removed or detached as soon as possible to facilitate perimortem Cesarean delivery (PMCD) without delay or hindrance.
- If ROSC (return of spontaneous circulation) occurs, move to post-cardiac arrest care.
- Pregnant women who remain comatose after resuscitation from cardiac arrest should receive targeted temperature management and fetal heart rate monitoring with OB/GYN support.
- If ROSC does not occur within 5 minutes, consider perimortem Cesarean delivery.
- The neonate should be evaluated for neonatal resuscitation.

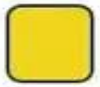
Take Home Message

- In conclusion, in-hospital cardiac arrest in pregnancy requires a specialized approach to resuscitation.
- The primary focus is on resuscitating the mother, and fetal monitoring should not be used during the resuscitation.
- Oxygenation and airway management is crucial in the resuscitation of a pregnant woman.
- Amiodarone should be avoided due to the risk of fetal thyroid and neurodevelopmental complications.
- Perimortem Cesarean delivery should be considered if ROSC does not occur within 5 minutes.

IV cannula sizes and their identification by colors

Fb.com/medicalonline1 IV Cannula				
Gauge	Color code	External Diameter	Length	Flow Rate
14G	Orange	2.1 mm	45 mm	240 ml/min
16G	Grey	1.8 mm	45 mm	180 ml/min
18G	Green	1.3 mm	32/45 mm	90 ml/min
20G	Pink	1.1 mm	32 mm	60 ml/min
22G	Blue	0.9 mm	25 mm	36 ml/min
24G	Yellow	0.7 mm	19 mm	20 ml/min
26G	Violet	0.6 mm	19 mm	13 ml/min

Blood Collection Tubes

											
Color	Red (plain)	Red (speckled)	Gold	Light blue	Green (dark)	Green (light)	Lavender	Pink	Gray	Royal blue	Royal blue
Additive	None	Clot activator (silica particles)	Clot activator (silica particles) & Gel separator	Sodium citrate 3.2%	Sodium heparin	Lithium heparin (with or without gel)	Potassium EDTA (K2EDTA)	Potassium EDTA (K2EDTA)	Sodium Fluoride & Potassium Oxalate / Sodium Oxalate	None	Potassium EDTA (K2EDTA)
Uses	Chemistry panels (after serum separation)	Chemistry panels (after serum separation)	Chemistry panels (after serum separation)	Coagulation studies (PT, PTT, INR)	Chemistry panels (especially "stat" tests), Blood gas analysis	Chemistry panels (especially "stat" tests), Blood gas analysis	CBC, Blood bank testing	CBC, Blood bank testing	Blood glucose	Trace element and heavy metal testing (less common)	Trace element and heavy metal testing (more common)

Blood Collection Tubes

ORDER OF DRAW	Cap Color		Use	Additive	Special Directions
First		Special	Blood culture	Culture media	Must draw first; Use sterile technique
		Clear (Discard tube)	Fill before filling blue-top tube when using butterfly set	None	Discard tube
		Light blue	Coagulation studies	Sodium citrate	Invert 3-4 times
		Red	Chemistry	No anticoagulant (glass), Silicon coating (plastic)	Do not invert (glass) Invert 5 times (plastic)
		Red/gray	Chemistry	Clot activator, gel separator	Invert 5 times
		Gold (SST)	Chemistry	Gel separator, clot activator	Invert 5 times
		Green	Chemistry	Heparin	Invert 8 times
		Lavender	Hematology, hemoglobin A1c	EDTA	Invert 8 times
Last		Gray	Blood alcohol	Potassium oxalate, Sodium fluoride	Do not cleanse site with alcohol, Invert 8-10 times
		Gray	Glucose	Potassium oxalate, Sodium fluoride	Invert 8-10 times

Blood Collection Tubes

- **Blood group, cross match, CBC**: Lavender (purple) (pink) (EDTA) tube
- **Chemistry**: Yellow tube
- **PT, PTT, INR, Fibrinogen**: Light Blue tube

Lavender (Purple) Top Tube

- **Additive:** EDTA (ethylenediaminetetraacetic acid), an anticoagulant.
- **Purpose:** Binds calcium ions to prevent clotting.
- **Common Uses:** Hematology tests such as Complete Blood Count (CBC), blood typing, and hemoglobin A1c.
- **Notes:** Prevents platelet clumping and preserves cell morphology for detailed blood analysis.

Pink Top Tube

- **Additive:** EDTA (similar to lavender tubes).
- **Purpose**: Prevents clotting by binding calcium.
- **Common Uses:** Blood banking, cross-matching, and blood typing.
- **Notes:** Similar to lavender tubes but specifically used in blood transfusion preparation

Gold or Tiger Top Tube (SST - Serum Separator Tube)

- **Additive:** Clot activator and gel for serum separation.
- **Purpose**: The clot activator helps the blood to clot, and the gel separates serum from the cells after centrifugation.
- **Common Uses:** Chemistry panels, thyroid function tests, lipid profiles.
- **Notes:** Provides a clear serum sample for laboratory testing

Light Blue Top Tube

- **Additive:** Sodium citrate (anticoagulant).
- **Purpose:** Binds calcium to prevent blood clotting. The ratio of blood to anticoagulant is critical (9:1).
- **Common Uses:** Coagulation studies (e.g., PT, aPTT, INR, fibrinogen levels).
- **Note:** Tube must be filled completely for accurate results.

Crystalloids

- Crystalloids are intravenous (IV) solutions composed of water and electrolytes, used to restore fluid balance in the body.
- They are classified based on their tonicity relative to plasma and the composition of solutes.

Common types of crystalloids

- **Isotonic Crystalloids:**
- These solutions have an osmolarity similar to that of plasma and do not cause significant shifts between the intracellular and extracellular compartments.
- **Hypotonic Crystalloids:**
- These solutions have a lower osmolarity than plasma, causing fluid to move from the extracellular space into the cell.
- **Hypertonic Crystalloids:**
- These solutions have a higher osmolarity than plasma, causing fluid to move from the intracellular space into the extracellular space.

Isotonic Crystalloids

- **Normal Saline (0.9% NaCl):**
- Contains sodium and chloride in equal amounts. It is commonly used for fluid resuscitation, correcting extracellular fluid deficits, and for diluting medications.
- Overuse can lead to hyperchloremic metabolic acidosis.
- **Lactated Ringer's (LR):**
- Contains sodium, potassium, calcium, chloride, and lactate (which the liver metabolizes into bicarbonate).
- It’s commonly used for fluid resuscitation in surgical patients, trauma, or burns.
- It is contraindicated in patients with liver dysfunction or lactic acidosis.
- **Ringer’s Solution:**
- Similar to Lactated Ringer’s but without lactate.
- It is less commonly used but can serve as a substitute in specific clinical scenarios

Hypotonic Crystalloids

- **Half Normal Saline (0.45% NaCl):**
- Used for patients with hypernatremia or dehydration with high serum sodium levels.
- Overuse can lead to cellular edema.
- **Dextrose 5% in Water (D5W):**
- Isotonic in the bag, but once infused, the dextrose is metabolized, leaving free water that acts as a hypotonic solution.
- It’s used to provide free water to correct hypernatremia or in patients with low glucose levels.
- It is not ideal for resuscitation because it can lead to fluid shifts into cells.

Hypertonic Crystalloids

- **Hypertonic Saline (3% NaCl, 5% NaCl):**
- Used in specific situations such as severe hyponatremia or increased intracranial pressure.
- It must be administered with caution to avoid rapid shifts in fluid balance and the risk of cellular dehydration.

Colloids

- Colloids are intravenous solutions that contain large molecules, such as proteins or starches, which stay in the bloodstream longer and increase the oncotic pressure, drawing fluid into the vascular compartment.
- This makes them useful for increasing blood volume in certain medical situations.
- Unlike crystalloids, which distribute more evenly between the vascular and interstitial spaces, colloids are more effective at expanding plasma volume.

Types of Colloids

- Albumin (5%) (25 %)
- Dextran 40 & 70
- Gelatins
- Hydroxyethyl Starch (HES)

Types of Urinary Catheters

- Intermittent urinary catheters
- Indwelling urinary catheters
- Suprapubic catheters

Types of urinary catheters

- **The catheters can vary with the composition and coating material.**
- Composition: Silicone, latex, and PVC.
- Coating: Teflon, hydrogel, and antimicrobial or latex with a silicone elastomer coat.

Key consideration in Urethral Catheterization

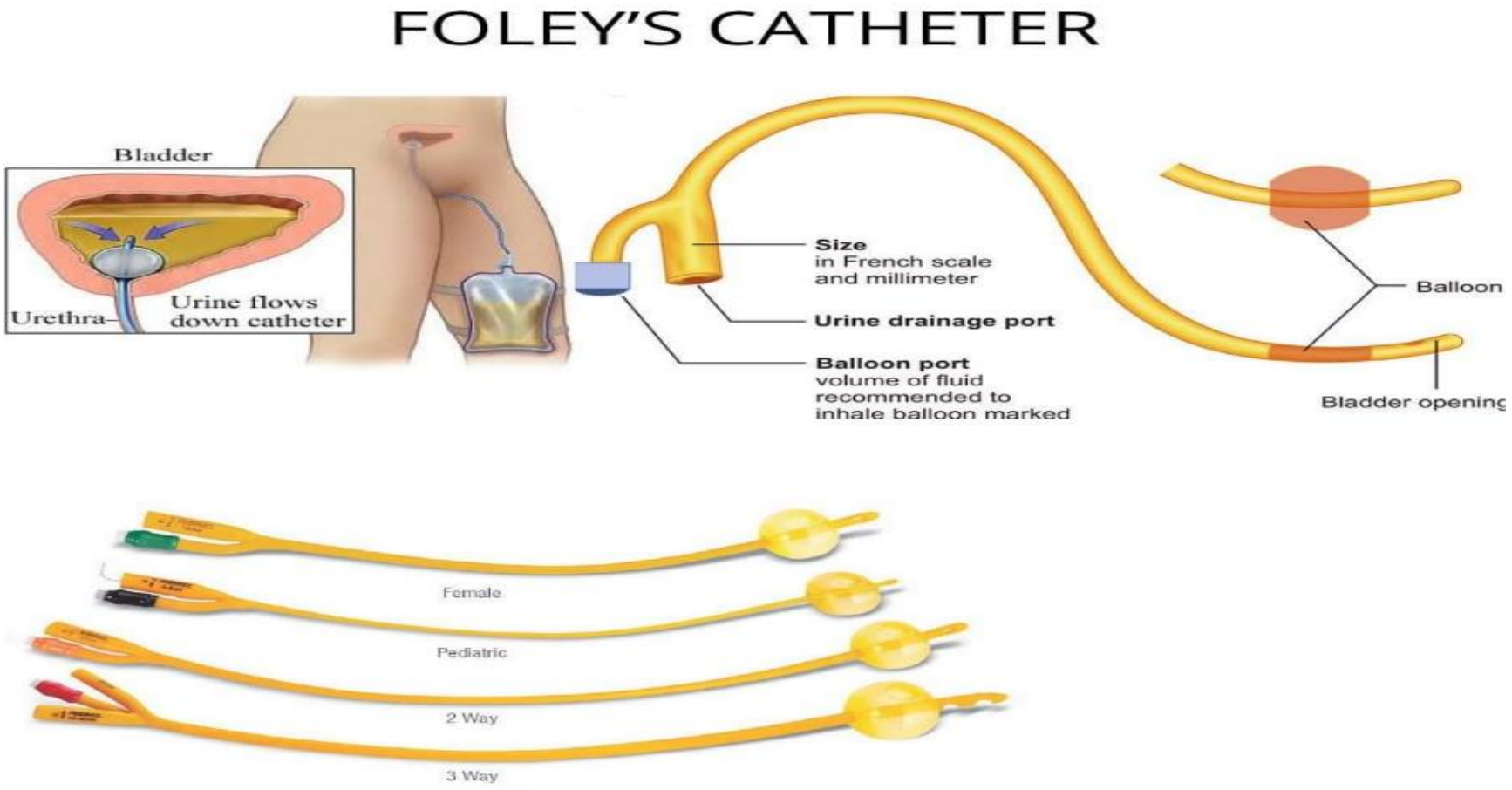
- **Sterile Technique:** Proper insertion and maintenance using sterile techniques help reduce the risk of infection.
- **Minimizing Use:** Catheters should only be used when absolutely necessary and removed as soon as they are no longer required to reduce the risk of complications.
- **Patient Comfort:** Proper sizing, material selection, and insertion techniques help minimize discomfort and prevent trauma.

Materials of Catheters

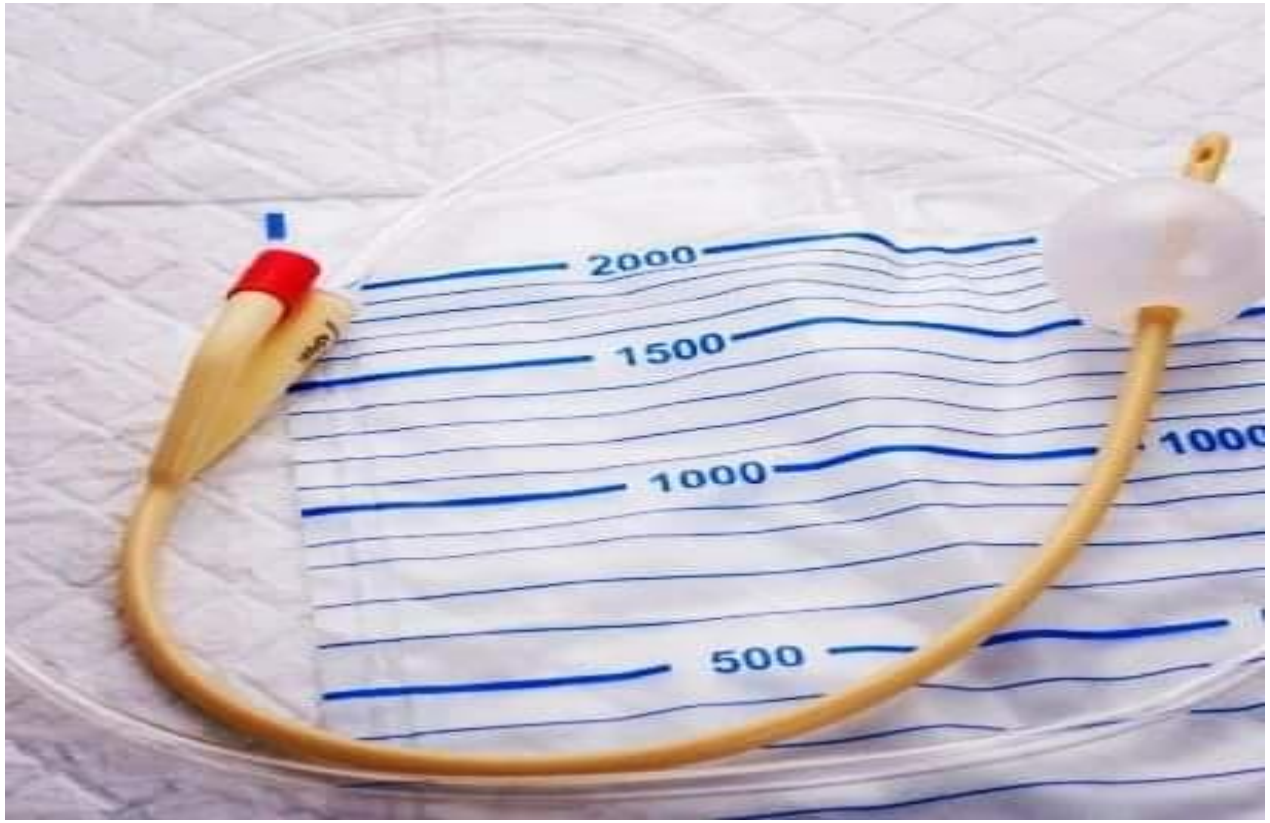
- **Latex Catheters:** Flexible and cost-effective but can cause allergic reactions in some patients.
- **Silicone Catheters:** Non-allergenic, ideal for patients with latex allergies. They are also more resistant to encrustation and can remain in place longer than latex catheters.
- **Hydrophilic Catheters:** Coated with a water-based lubricant, reducing friction during insertion and removal. These are often used for intermittent catheterization.

18 F for male
16 F for female
8-10 F and less for pediatrics

Transurethral indwelling catheterization



Foley Catheter



One, Two & Three ways catheters

References

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  Green–top guideline No. 56

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