New-Onset Fever

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A 70-year-old male patient was admitted to the ICU with hemorrhagic stroke. On the fifth day of admission, he spiked a fever of 100 °F orally. He was not intubated and had an indwelling urinary catheter, peripheral intravenous cannula, and a nasogastric tube. His sensorium remained unchanged, and he was hemodynamically stable.

New onset of fever is an everyday problem encountered in the ICU. The reason could be manifold such as noninfectious cause, mild infection, or an initial presentation of severe infection. This should trigger a careful clinical assessment and a systematic approach to differentiate these possibilities.

Step 1: Record Temperature

- All patients in the ICU should have, as a minimum, hourly temperature recorded and charted in the nursing record as per the ICU protocol.
- The site of recorded temperature should be marked in the nursing chart (O = oral, R = rectal, A = axillary, T = tympanic).
- All ICUs should have access to a core temperature measurement device (tympanic, rectal), properly calibrated and sterilized.
- Temperature may be recorded as centigrade or Fahrenheit.
- The same method and site of measurement should be used repeatedly to facilitate the trending of serial measurements.

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- In immunocompetent patients who are stable, core temperature below 101 °F (equivalent to oral temperature of 100 F) in which clinical examination does not reveal any definite source of fever may be observed for a few hours before initiating investigation.
- As a general rule, core temperature of more than 38.3 °C (101 °F) warrants special attention in all patients.
- In immunocompromised patients, temperature of any degree should be investigated.

Step 2: Take a Detailed History

- Take proper history from the bedside nurse and do a thorough chart review.
- Enquire about medications, blood transfusion, diarrhea, rash, new procedure, dressing changes, and catheters and line manipulation (both insertion and removal),dialysis
- Duration of indwelling urinary catheter and central and arterial line placement.

Step 3: Perform Focused Clinical Examination

- Examine for any source of infection or noninfectious causes of fever (Tables 54.1 and 54.2).
- Perform systematic head-to-toe examination:
  - Purulent nasal discharge, sinus tenderness.
  - Parotid swelling, oral hygiene.
  - Chest auscultation (including bases).
  - New murmur.

Table 54.1 Noninfectious causes of fever in the ICU

Drug fever
β-Lactam, antiepileptics, sulfonamides
Antipsychotics (neuroleptic malignant syndrome, serotonin syndrome)
Blood products, IV contrast, immunoglobulins, albumin
CNS causes: Blood in cerebrospinal fluid, pontine bleed
Pulmonary/cardiac causes: Acute respiratory distress syndrome, pulmonary emboli, fat emboli, pericarditis
Abdominal causes: Ischemic gut, pancreatitis, acalculous cholecystitis
Metabolic: Adrenal insufficiency, thyroid storm, gout
Postoperative fever (48 h), postprocedure (bronchoscopy)
Thrombophlebitis, decubitus ulcer, hematoma, deep venous thrombosis (DVT)

Table 54.2 Infectious causes of new-onset fever in the ICU

Ventilator-associated pneumonia
Sinusitis
Catheter-related sepsis
Urinary tract infection
Clostridium difficile diarrhea
Complicated wound infections

- Abdominal examination, suprapubic tenderness.
- Vascular device sites for purulence and erythema, note insertion date.
- Urinary catheter site.
- Surgical wounds, drain sites (take off dressings).
- Skin rash.
- Gynecological examination.
- Painful leg swelling.
- Decubitus ulcer.

Step 4: Send Investigations

- If clinical examination does not strongly suggest a noninfectious source, two sets of blood cultures should be sent in the following:
  - In patients with temperature above 101 °F.
  - In patients who are hemodynamically unstable or develop new organ dysfunction or immunosuppressed, with new onset of fever of any degree.
- All ICUs should have a blood culture drawing protocol in consultation with microbiology department:
  - Skin disinfection: 2% chlorhexidine or 2% iodine, give 30 s for drying.
  - Site: two peripheral venipunctures, or one from distal lumen of the central line and another from periphery, If a blood sample cannot be drawn from a peripheral vein, then blood can be drawn from different lumens of multilumen catheter.
  - Minimum two sets (each set containing two bottles, one aerobic another anaerobic)—at least 10 mL in each bottle —to be inoculated directly into the culture bottle.
  - Labeling should be done carefully for site, date, and time.
- If infection is suspected clinically and there is a focus on infection, the following investigations should be sent:
  - Total and differential white blood cell count, C-reactive protein (CRP), procalcitonin when presence of infection is in doubt.
  - Focused imaging such as chest X-ray, abdominal ultrasonography, CT scan of the abdomen/chest.
  - If there is a history of diarrhea, send stool for occult blood, pus cells, *Clostridium difficile* toxin and GDH.
  - Urinalysis and culture sensitivity.
  - Transthoracic/transesophageal echocardiogram—look for vegetation.
  - Sputum, endotracheal suction, Non bronchoscopy or bronchoscopy with bronchoalveolar lavage sent for Gram stain, AFB stain, Fungal stain and quantitative bacterial culture and sensitivity.
  - Avoid sending cultures of urinary catheter tips, superficial wound swabs and drains which have been in situ for >48 h.
- Trend of white blood cell count or CRP is valuable to ascertain any new infection.

Step 5: Remove Lines if There is a Suspicion of Line Sepsis

- All patients with a central vascular access of some duration and persistent fever without any other obvious source of infection should have the line removed at the earliest if any of the following criteria are met:
  - Inflammation or purulence present at the insertion site or along the tunnel.
  - No other identifiable source of infection.
  - An abrupt onset, associated with fulminant shock.
  - Nonfunctioning lumen.
  - Fever on starting infusion/dialysis.
  - Persistent bacteremia or fungemia.
- The intracutaneous and tip of the central line should be sent for semiquantitative culture.
- Central line infection is considered significant for the following situations:
  - Culture of the same organism from both the catheter tips and at least one percutaneous blood culture.
  - Multiple blood cultures containing organisms such as *Staphylococci* (especially coagulase-negative *Staphylococci*) and *Candida.*
  - Positive semiquantitative culture of the catheter tip (>15 cfu).
  - Differential time to positivity—growth detected from the catheter sample at least 2 h before growth detected from the peripheral vein sample (Fig. 54.1).

Step 6: Make a Diagnosis

- In patients on the ventilator, pneumonia should be considered by clinical examination, purulence of endotracheal secretions, raised white blood cell count, and new or worsening lung infiltrate on chest skiagram.
- Consider urosepsis in patients with an indwelling bladder catheter and increased pus cells in urine.
- Consider sinusitis in patients with the nasogastric tube and purulent nasal discharge.
- Consider inflammatory diarrhea (stool positive for occult blood) with abdominal distension, and in patients on antibiotics, investigate for *C. difficile* colitis.
- Consider gynecological infection if vaginal discharge is present.

Step 7: Start Treatment

- If infectious cause for fever is suspected, empirical antibiotic therapy should be started.
- The choice of antibiotics should be guided by the hospital antibiotic policy and suspected source of infection.

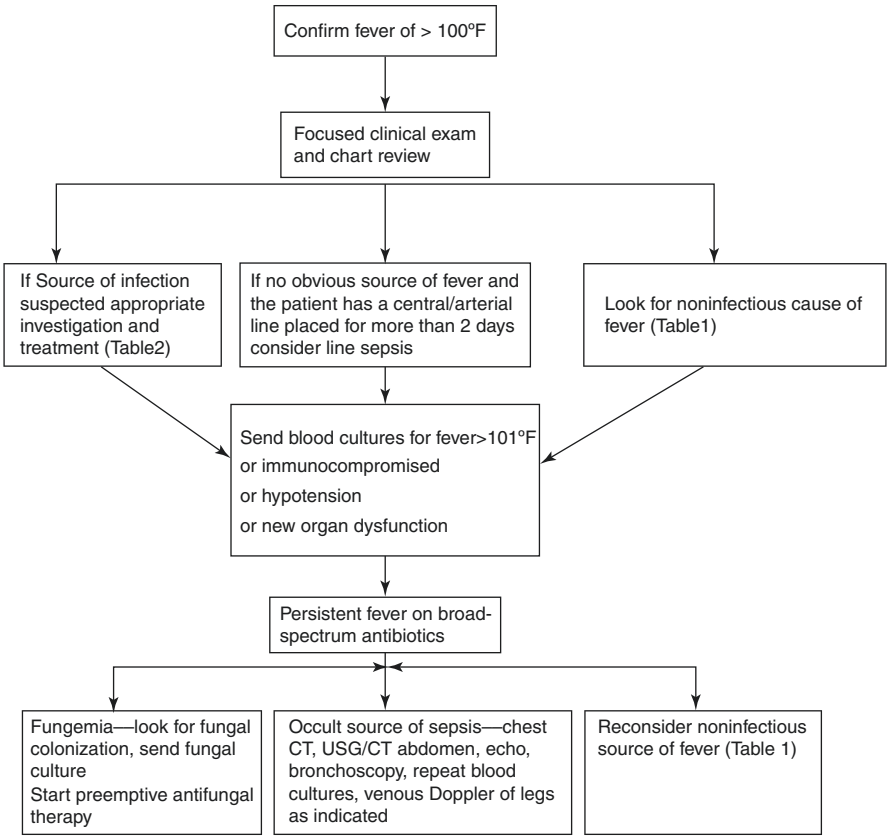

Fig. 54.1 An approach to new onset of fever in the ICU

- In patients with persistent fever despite broad-spectrum antibiotics, look for occult source of sepsis.
- Consider fungemia in patients colonized by fungus.
- Never forget noninfectious causes of fever.

Suggested Reading

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