

Post Op Pyrexia

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Introduction

Postoperative fever is defined as a temperature higher than 38 C (or greater than 100.4 F) on two consecutive postoperative days or higher than 39 C (or greater than 102.2 F) on any postoperative day. Knowledge of differential diagnosis, as well as a systematic approach, proves useful in narrowing down the differential diagnosis and instituting proper management.[\[1\]](#)[\[2\]](#)

Fever, as a manifestation of sepsis, should be promptly identified and managed appropriately to lower mortality rates in such cases.



Etiology



- Underlying conditions (e.g., **immunosuppressed** patients) may have a reduced inflammatory response or reduced fever while at the same time having a serious infection.
- Differential diagnosis includes infectious (e.g., nosocomial or surgical site infections) and non-infectious (e.g., deep vein thrombosis, pulmonary embolus, myocardial infarction, drug-related, transfusion-related, endocrine-related for example adrenal insufficiency or thyroid storm) causes.
- Fever is more likely to be due to **infection** as the time interval following surgery increases.
- Fever in patients may have more than one cause at the same time, and **infectious** and **non-infectious** causes may **coexist**.

Epidemiology

Postoperative fever is very common. The exact incidence of postoperative fever is not known, but the numbers are high. Estimates from different surgical procedures reveal that fever occurs early in the postoperative period anywhere from **20% to 90%** of patients. In the majority of these cases, the fever usually occurs on the **first or second day** after surgery and has been linked to benign causes. Postoperative fever is known to occur after all types of surgical procedures, irrespective of the type of anesthesia. The fever also occurs in children and both genders.

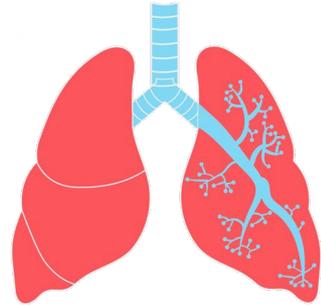
Postoperative fever can occur after minor surgical procedures but is rare and depends on the type of procedure. Overall, both **abdominal and chest** procedures result in the highest incidence of postoperative fever.[\[3\]](#)[\[4\]](#)

Pathophysiology

Systemic Inflammatory Response Syndrome (SIRS):

Four criteria include:

- Temperature higher than 38 C
- Heart rate higher than 90 beats per minute
- Respiratory rate greater than 20 per minute
- White blood cell count greater than $12 \times 10^9/L$ or less than $4 \times 10^9/L$

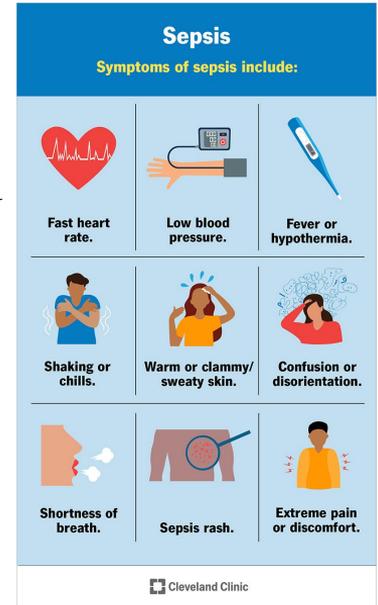


Pathophysiology

Two of the 4 criteria are needed to identify a patient with SIRS.

Two of the SIRS criteria plus a suspected source of sepsis are required to diagnose sepsis.

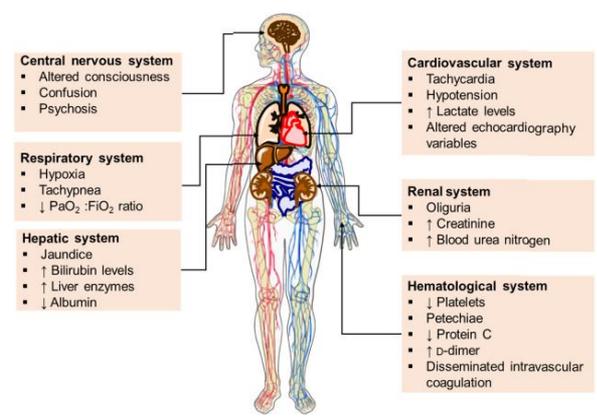
- Sepsis plus organ dysfunction is consistent with severe sepsis.
- Severe sepsis plus refractory hypotension (refractory to fluid resuscitation) is consistent with septic shock.



Pathophysiology

Signs of Organ Dysfunction

- Systolic BP less than 90 mm Hg or mean arterial pressure less than 65 mm Hg.
- Drop in BP greater than 40 mm Hg (especially in hypertensive patients)
- Lactate greater than 2 mmol/L
- Urine output less than 0.5 mg/kg/hr for 2 consecutive hours
- Drop in Glasgow coma scale (GCS) or abbreviated mental test scores



History and Physical

01

Immediate Fever

Fever occurs immediately after surgery or within hours on postoperative days (POD) 0 or 1.

02

Acute Fever

Fever occurs in the first week (1 to 7 POD).

03

Subacute Fever

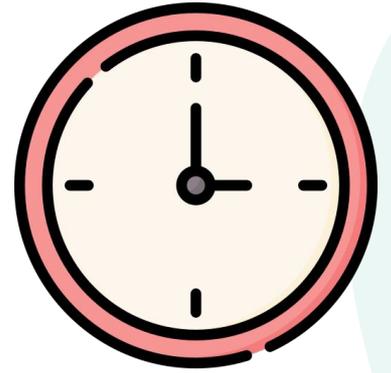
Fever occurs between postoperative weeks 1 and 4.

04

Delayed Fever

Fever after more than 4 weeks

History and Physical



The above 4 **differential diagnosis** is for causes that are categorized based on timing. However, there are many other causes that may have specific signs on physical exam and occur after specific surgery that are not included in the above differential.

01

Immediate Fever

- **shortly after inhalational anesthetics or muscle relaxant which causes malignant hyperthermia** (e.g., halothane or succinylcholine)
- **Bacteremia:** High-grade fever (greater than 40 C) occurring 30 to 40 minutes after the beginning of the procedure (e.g., Urinary tract instrumentation in the presence of infected urine). And most common cause for UTI is E.coli

01

Immediate Fever

- **Gas gangrene of the wound:** High-grade fever (greater than 40 C) occurring after gastrointestinal (GI) surgery due to contamination with *Clostridium perfringens*; severe wound pain; treat with surgical debridement and antibiotics.
- **Febrile non-hemolytic transfusion reaction:** Fevers, chills, and malaise 1 to 6 hours after surgery (without hemolysis). Management: -Stop transfusion (rule out hemolytic transfusion reaction) -give antipyretics (avoid aspirin in the thrombocytopenic patient).

02 Acute Fever

- POD 1 to 3: occurs during the first 48 hours.[\[5\]](#)
- POD 3: pneumonia, most common cause for pneumonia is hospital acquired and ventilators

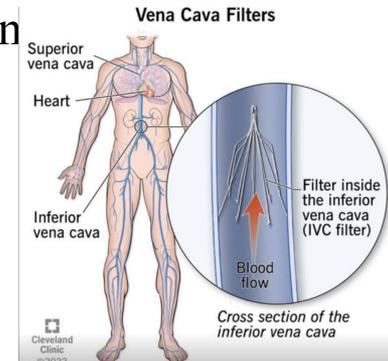


(b) Bacterial Pneumonia

02 Acute Fever

- POD 5: **Thrombophlebitis** cuz of bed rest after op and general anesthesia(may be asymptomatic or symptomatic, diagnose with Doppler ultrasound of deep leg and pelvic veins and treat with heparin)
- POD 7: **Pulmonary embolism** (tachycardia, tachypnea, pleuritic chest pain, , arterial blood gas with hypoxemia and hypocapnia, confirm the diagnosis with CT angiogram, and treat with heparin if recurrent pulmonary en , Inferior vena cava filter

placement is the next step



02 Acute Fever

- POD 7 (5 to 10): **Wound infection**: Risk increases if the patient is immunocompromised, abdominal wound, duration of surgery greater than 2 hours, or contamination during surgery. Signs include erythema, warmth, tenderness, discharge.
- If an *abscess is present*, drainage and antibiotics are needed. Prevention is by careful surgical technique and prophylactic antibiotics (e.g., **intravenous cefazolin** at the time of induction of anesthesia as well as postoperatively if needed)



03 Subacute Fever

- POD 10: **Deep infection** (*pelvic* or *abdominal* abscess and if abdominal abscess could be *sub-hepatic or sub-phrenic*). A digital rectal exam to rule out the pelvic abscess and CT scan to localize intra-abdominal abscess. *Treatment* includes radiological guided percutaneous drainage.

04 Delayed Fever

- Skin and soft tissue infections (SSTI)
- Viral infections



EVALUATION

Initial assessment includes general appearance, GCS, and vital signs to determine how sick the patient is. [\[6\]](#)[\[7\]](#)

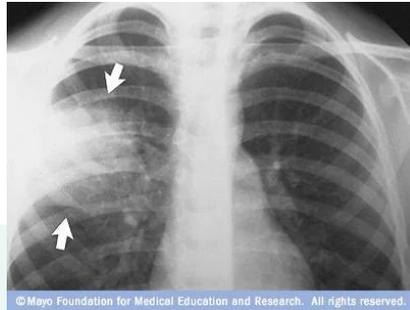
- Airway, Breathing, Circulatory, Disability, Exposure (quick assessment to identify and simultaneously provide appropriate management)
- Check patient notes (the type of procedure, timing of the procedure, intraoperative complications, anesthesia records, patient comorbidities, last ward rounds)
- Check patient Intake and Output (including the type of stools, if the patient with type 7 stools rule out *Clostridium difficile* enterocolitis)
- Check patient orders (is the patient being treated with antibiotics or not, receiving deep vein thrombosis prophylaxis or not)
- System based assessment (pulmonary, cardiac, gastrointestinal, urinary)
- Sites of infection that are visible (i.e., skin for bedsores, cellulitis, vascular access sites)

EVALUATION

- Besides tests, vital signs should be monitored.
- Blood tests: WBC, CRP especially if trending upward might point towards a septic response, hemoglobin level would point toward the oxygen-carrying capacity of the blood, liver function tests to rule out liver injury, coagulation parameters, and platelets to rule out disseminated intravascular coagulation, renal function to rule out kidney injury or electrolyte abnormalities

EVALUATION

- Microbiology: Cultures (blood, urine, wound, and sputum if producing it), if suspecting line sepsis (blood culture from the line, remove the line and send the tip to the lab)
- Imaging: Chest x-ray (prove or rule out pneumonic process), abdominal imaging (ultrasound, CT scan to rule out collections)
- Venous doppler of the legs to rule out deep vein thrombosis



Treatment/Management

Treatment can include oxygen, fluid balance, intravenous fluids, and a urinary catheter, or antibiotics.

- Drugs: antibiotics, analgesia, antiemetics
- Venous thromboembolism prophylaxis (low molecular weight heparin and wearing pneumatic stocking)
- Escalation (relay information to a senior health professional and ask for further advice from infectious disease physician)

Differential Diagnosis

As discussed earlier, the differentials are based on the timing of the fever, among other factors. Some of the important differentials are listed below.

- Pneumonia
- Pulmonary embolus
- Wound infection
- Urinary tract infection
- Transfusion reaction
- Sinusitis

5 W's of Post-Operative Fever

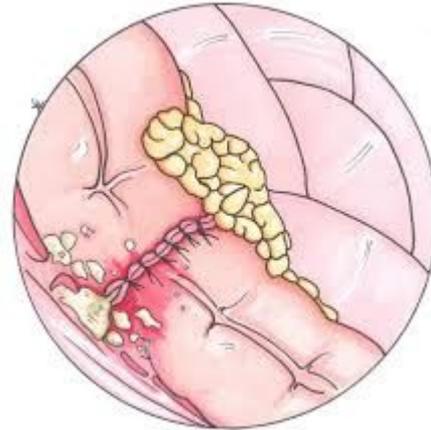
The timing of a patient's fever should guide your diagnostic approach.

POD 1-2	POD ≥3	POD ≥5	POD 7-10	Anytime!
				
WIND	WATER	WOUND	WALKING	WONDER DRUGS
pneumonia	<u>UTI/PNA</u> •Stagnant fluid in lungs or urinary tract •Obtain CXR/Urinalysis •Remove catheters after 2 days if possible •Abx	<u>SSI</u> •Suspect in patients with diabetes, hx of smoking, immunosuppressed •Wound exploration •Abx if cellulitis present	<u>DVT/PE</u> •Prevention: ambulation and anticoagulation (often enoxaparin or subcutaneous heparin) •Mgmt: Anticoagulation and CT Pulmonary Angiogram	<u>Drug Reaction</u> •Malignant Hyperthermia (succinylcholine, anesthetic inhalation agents); Tx: dantrolene •Other causes: beta-lactam abx, sulfa drugs, phenytoin, heparin, morphine

Less common but serious causes of post-op fever may include myocardial infarction, adrenal insufficiency, aspiration pneumonia, fistula formation, abscess development, transfusion reaction, necrotizing fasciitis, catheter infection, anastomotic leak, and alcohol withdrawal.

Prognosis

In most patients, postoperative fever is due to a benign cause and resolves spontaneously. Patients with deep vein thrombosis and pulmonary embolism usually have a low-grade fever that resolves within a few days of treatment. The prognosis is worse for patients who have anastomotic leaks or bowel obstruction.



Complications

Failure to diagnose the cause of fever or identify the severity of it can lead the patient into SIRS, sepsis, severe sepsis, or septic shock. This can lead to prolonged hospitalization and even increase the mortality rate.





Thanks

Do you have any questions?

Pls no

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