# The Evaluation of Fever in the Post Operative Patient

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# Disclosures

# Objective

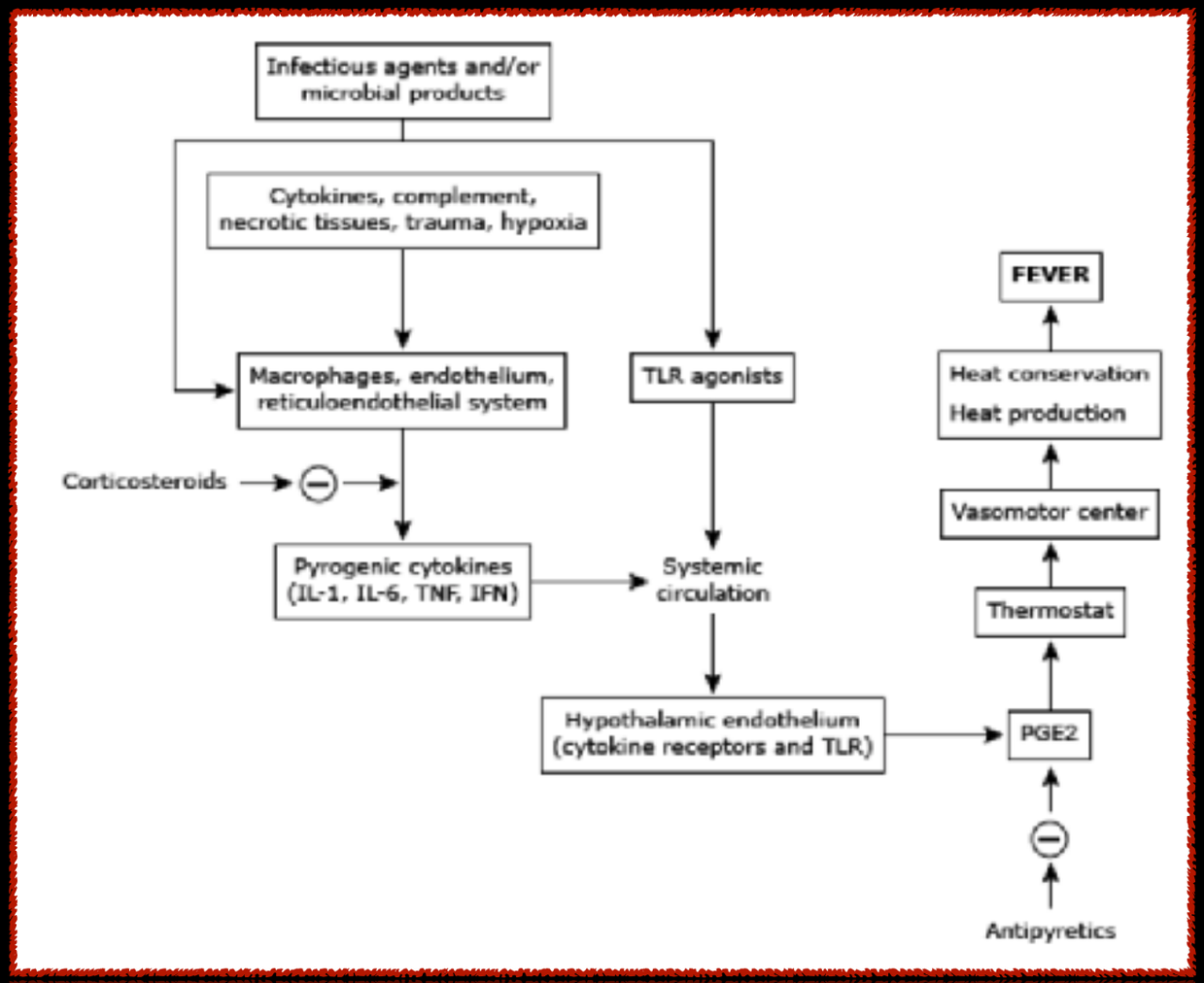
At the conclusion of this section, participants will be able to;

- Comprehend that fevers after an operative procedure can be related to operative procedure itself; tissue trauma and inflammation.
- Identify the common medications that can produce fever.
- Understand the temporal relationship to fever and an operative procedure.
- Identify common sources for fever in relationship to the procedure preformed.

# Post Operative Fever; Pathophysiology

# Post Operative Fever; Pathophysiology

- Fever is a manifestation of cytokine release in response to a variety of stimuli.
- Fever-associated cytokines, including interleukin (IL)-1, IL-6, tumor necrosis factor (TNF)-alpha, and interferon (IFN)-gamma, are produced by a variety of tissues and cells.
- There is some evidence that IL-6 is the cytokine most closely correlated with postoperative fever.

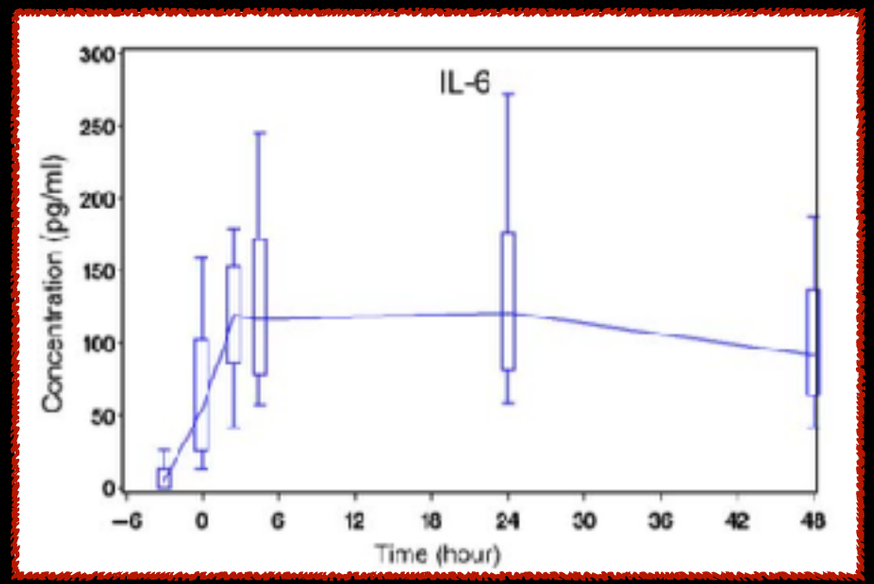



**IL-6 is the cytokine most closely correlated with postoperative fever.**

Clin Infect Dis. 2000;31 Suppl 5:S178.

# Post Operative Fever; Pathophysiology

- In 355 primary elective CABG patients, serum cytokines were measured before surgery, at cessation of CPB and 2.5, 4.5, 24, and 48 h post-CPB.
- IL-6 peaked early after bypass and remained elevated at 48 h.
- No other cytokine showed a significant association with fever development.



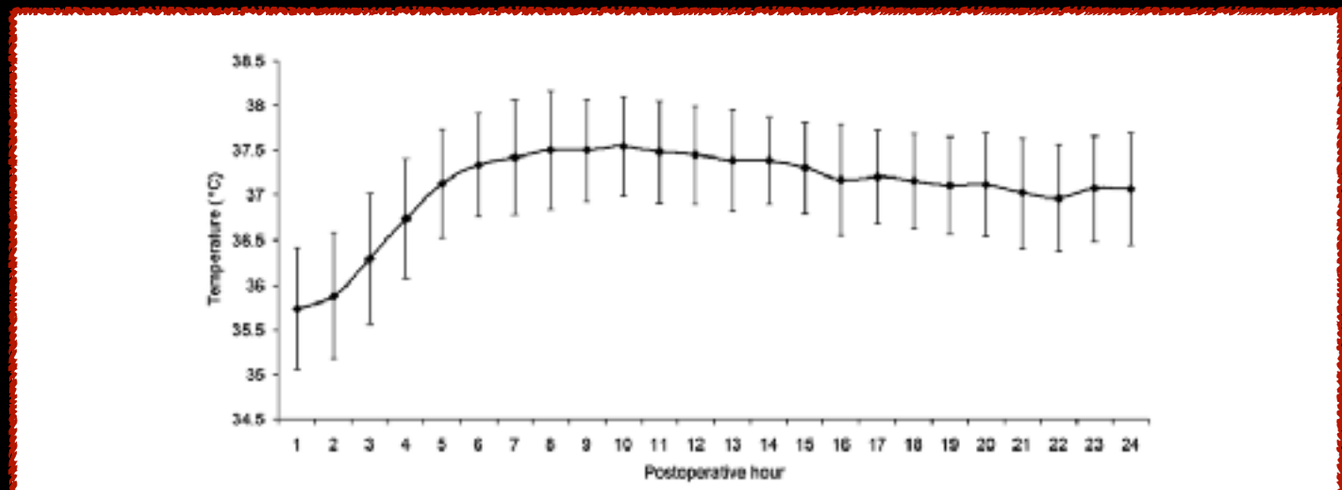




Fig. 3. Body temperature during the first 24 h after CABG surgery (mean ± SD). Mean peak postoperative temperature was 37.8 ± 0.5 °C.

**The association of fever with IL-6 levels suggests inflammatory mediation.**

Cytokine 38 (2007) 37–42

# Post Operative Fever; Pathophysiology

The magnitude of the surgical trauma is correlated with the degree of the fever response;

- Off-pump CABG surgery patients experience less hyperthermia compared with on-pump CABG patients and this maybe related to a reduced inflammatory response.

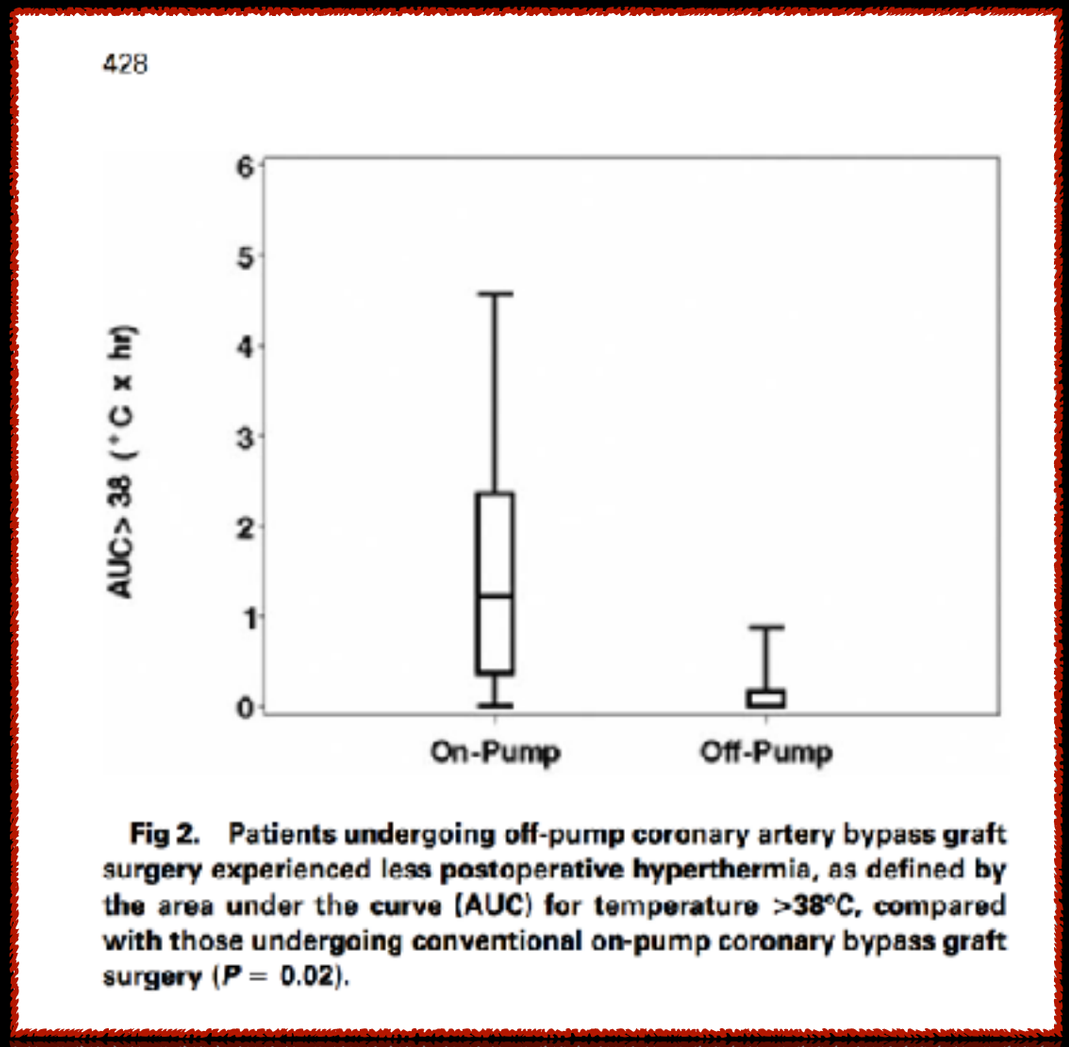



**Fig 2.** Patients undergoing off-pump coronary artery bypass graft surgery experienced less postoperative hyperthermia, as defined by the area under the curve (AUC) for temperature >38°C, compared with those undergoing conventional on-pump coronary bypass graft surgery ($P = 0.02$).

Fever-associated cytokines are released by tissue trauma and do not necessarily signal infection.

Journal of Cardiothoracic and Vascular Anesthesia, Vol 19, No 4 (August), 2005: pp 426-429

# Post Operative Fever; Pathophysiology

"All that wheezes is not asthma."

Dr. Every Mentor


Not all fevers are infectious.

Post Operative Fever;
Timing of Fever; Immediate

# Post Operative Fever;
# Timing of Fever

TIMING OF FEVER;

- The timing of fever after surgery is one of the most important factors to consider in generating a prioritized differential diagnosis of postoperative fever:

<u>Immediate</u>;

- Onset in the operating suite or within hours after surgery.

<u>Acute</u>;

- Onset within the first week after surgery.

<u>Subacute</u>;

- Onset from one to four weeks following surgery.

<u>Delayed</u>;

- Onset more than one month after surgery.

# Post Operative Fever;
# Timing of Fever; Immediate

**Immediate;**

The potential causes of fever in the immediate operative and postoperative period;

- Medications/ drug fever.
- Nonhemolytic febrile transfusion reactions.
- Trauma suffered prior to surgery.
- Infections that were present prior to surgery.

# Post Operative Fever; Timing of Fever; Immediate

## Medications/ Drug Fever

**Table 1. Drugs Reported in the Literature to Cause Drug Fever**

| Category | Drug |
|---|---|
| Antimicrobials | Acyclovir,[10] amphotericin B,[7] aureomycin,[12] declomycin,[12] erythromycin,[7] furadantin,[12] isoniazid,[43–45] minocycline,[51–53] nitrofurantoin,[7,55] novobiocin,[12] rifampin,[7] streptomycin[12,65] terramycin,[12,a] tetracycline,[11,12] trimethoprim-sulfamethoxazole,[7,60] vancomycin[70] |
| Penicillins | Ampicillin,[11] carbenicillin,[20] cloxacillin,[27] mezlocillin,[20] nafcillin,[7] oxacillin,[11] penicillin,[11,12] piperacillin,[7,20] staphcillin,[12] ticarcillin[7] |
| Cephalosporins | Cefazolin,[7] cefotaxime,[7] ceftazidime,[7] cephalexin,[7] cephalothin[11,a] |
| Antineoplastic agents | 6-Mercaptupurine,[9] bleomycin,[17] chlorambucil,[21] cisplatin,[24,25] cytosine arabinoside,[28] daunorubicin,[9] hydroxyurea,[36–41] interferon,[9] L-asparaginase,[46] procarbazine,[9] streptozocin,[66] vincristine[71] |
| Cardiovascular agents | Clofibrate,[26] diltiazem,[29] dobutamine,[30,31] furosemide,[34] heparin,[35] hydrochlorothiazide,[7] methyldopa,[7,49,50] oxprenolol,[57] procainamide,[39] quinidine and quinine,[50–63] triameterene[69] |
| Immunosuppressants | Azathioprine,[13–16] everolimus,[33] mycophenolate mofetil,[54] sirolimus[64] |
| NSAIDs | Ibuprofen,[42] naproxen,[7] tolmetin[68] |
| Sympathomimetic and hallucinogenic agents | Amphetamine,[9] lysergic acid,[9] 3,4-methylene dioxymethamphetamine[47] |
| Anticonvulsants | Carbamazepine,[7,18,19] phenytoin[7,9] |
| Antidepressants | Doxepin,[32] nomifensine[36,a] |
| Other | Allopurinol,[7] cimetidine,[22,23] folate,[9] iodide,[9] mebendazole,[48] metoclopramide,[9] piperazine adipate,[58] propylthiouracil,[9] prostaglandin $E_2$,[9] ritodrine,[9] sulfasalazine,[57] theophylline,[7] thyroxine[7] |

NSAIDs = nonsteroidal antiinflammatory drugs.
[a]Discontinued from the U.S. market.

PHARMACOTHERAPY Volume 30, Number 1, 2010

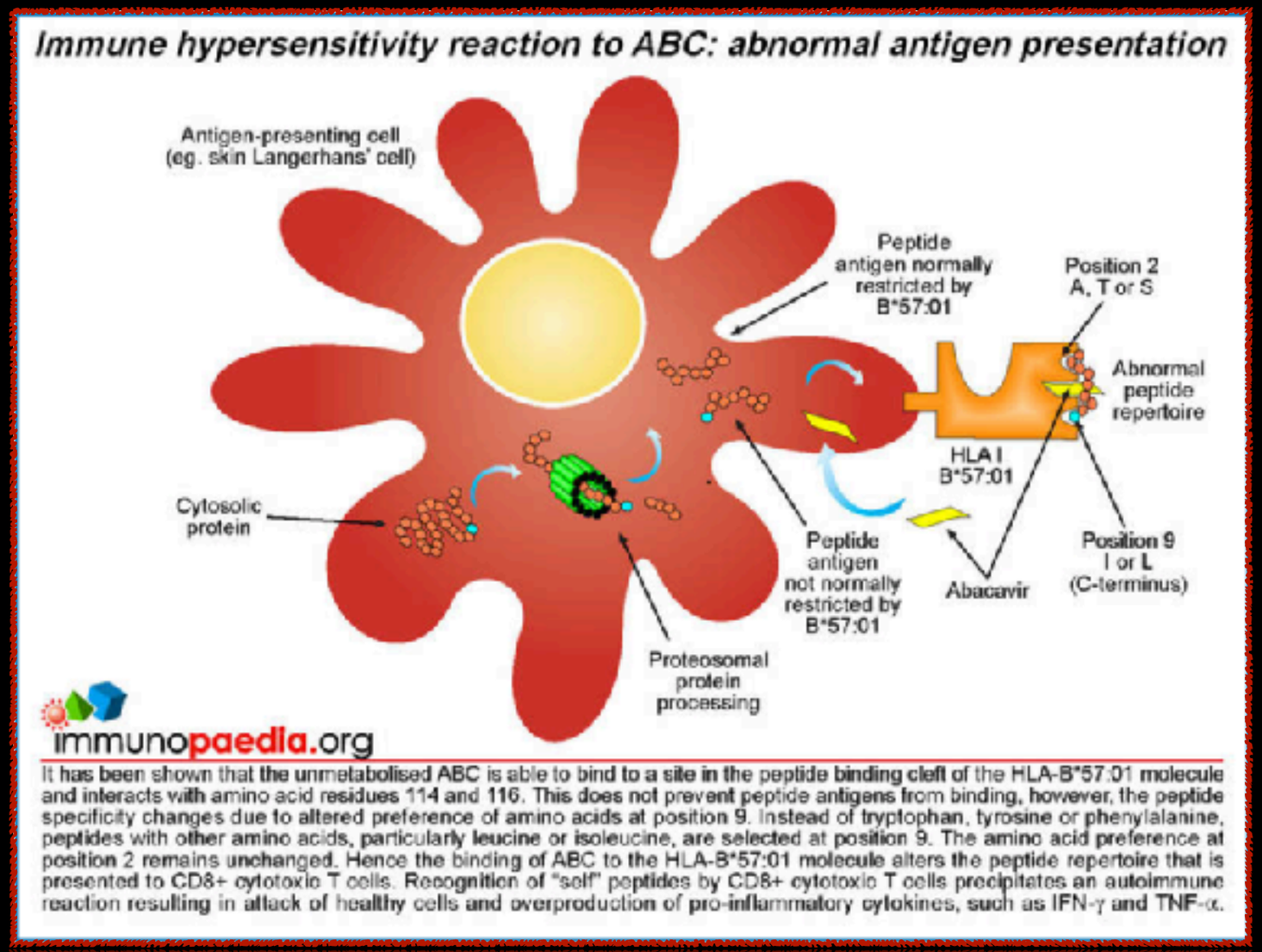
# Post Operative Fever; Timing of Fever; Immediate

The mechanisms of drug fever are multiple and classic into five broad categories:

- Hypersensitivity reactions.
- Altered thermoregulatory mechanisms.
- Reactions that are directly related to administration of the drug.
- Reactions that are direct extensions of the pharmacologic action of the drug.
- Idiosyncratic reactions.

# Post Operative Fever; Timing of Fever; Immediate

Hypersensitivity reactions



# Post Operative Fever; Timing of Fever; Immediate

## Hypersensitivity reactions

Table 4. Drugs Associated with Stevens–Johnson Syndrome and Toxic Epidermal Necrolysis.

| Drugs Most Frequently Associated* | Drugs Also Associated |
|---|---|
| Sulfadoxine | Cephalosporins |
| Sulfadiazine | Fluoroquinolones |
| Sulfasalazine | Vancomycin |
| Co-trimoxazole | Rifampin |
| Hydantoins | Ethambutol |
| Carbamazepine | Fenbufen |
| Barbiturates | Tenoxicam |
| Benoxaprofen† | Tiaprofenic acid |
| Phenylbutazone | Diclofenac |
| Isoxicam† | Sulindac |
| Piroxicam | Ibuprofen |
| Chlormezanone | Ketoprofen |
| Allopurinol | Naproxen |
| Amithiozone | Thiabendazole |
| Aminopenicillins | |

*Together these drugs account for approximately two thirds of the cases attributed to drugs in large series in France, Germany, and the United States.[1,3,19,33,43]

†This drug is no longer marketed.

NEJM Vol 331; 19 1994

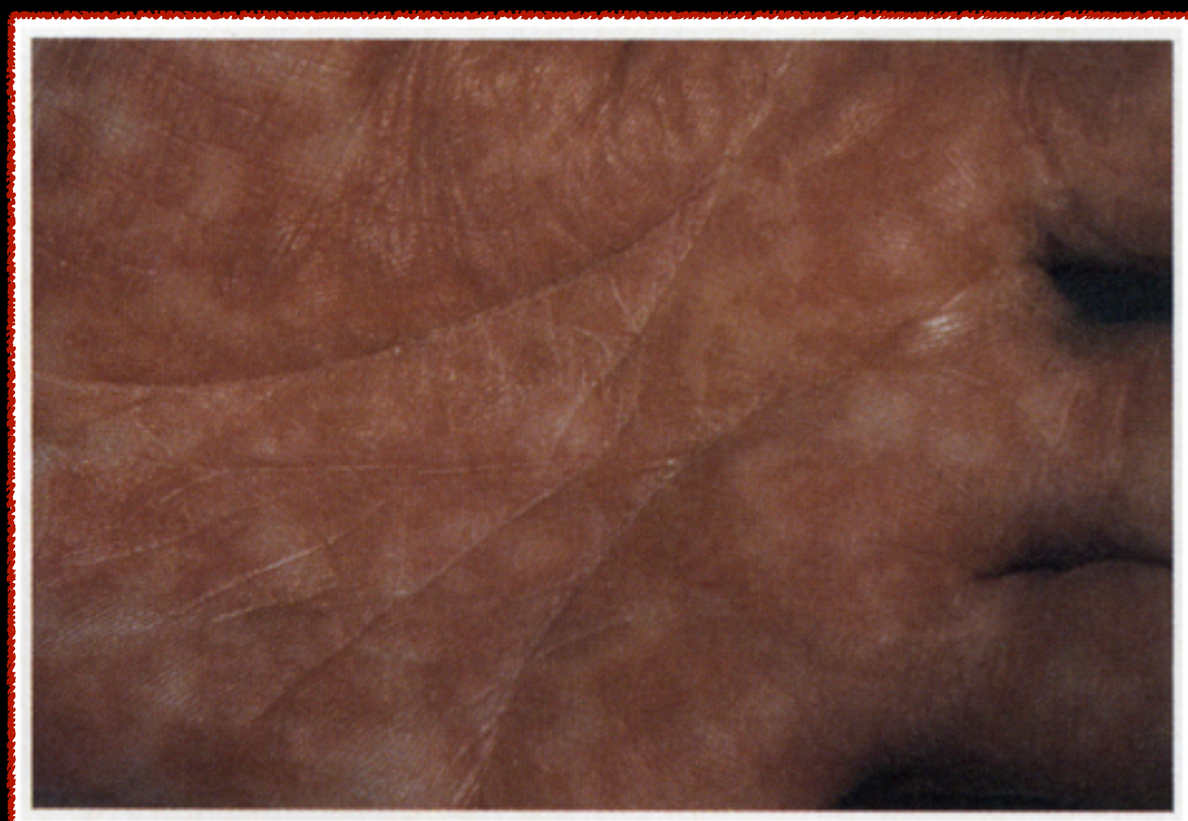


Figure 3. Dusky or Purpuric Macules Typical of Stevens–Johnson Syndrome.

# Post Operative Fever; Timing of Fever; Immediate

## Hypersensitivity reactions

**Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS) syndrome**;

- Drug-induced hypersensitivity syndrome, is a distinct, potentially life-threatening adverse reaction.
- Morbilliform cutaneous eruption with fever, lymphadenopathy, hematologic abnormalities, and multiorgan manifestations.
- Linked with phenytoin and known as phenytoin hypersensitivity syndrome… linked to carbamazepine and other anticonvulsants.

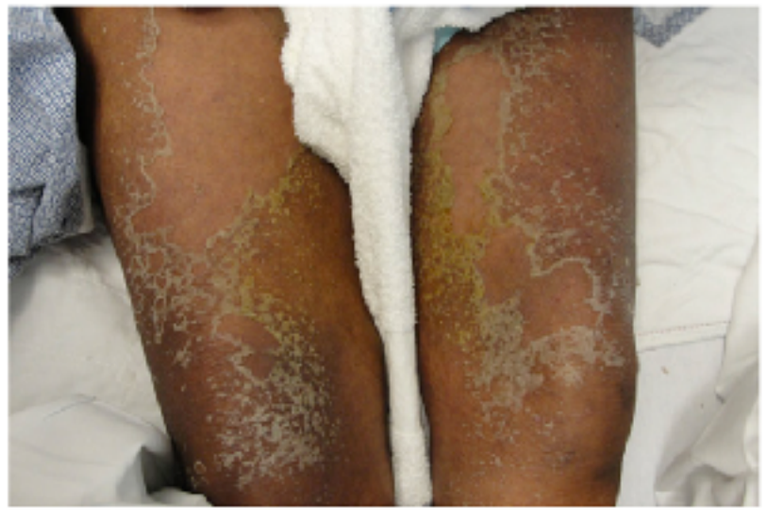


**Fig 4.** Patient with phenytoin-induced drug reaction with eosinophilia and systemic symptoms syndrome. Diffuse scaling of legs.

J AM ACAD DERMATOL MAY 2013

# Post Operative Fever;
# Timing of Fever; Immediate

## Hypersensitivity reactions

**Malignant hyperthermia;**

- Malignant hyperthermia is a rare but dramatic event characterized by the sudden appearance of fever over 40°C, muscle rigidity, metabolic acidosis, and hemodynamic instability during general anesthesia.
- The condition is inherited as an autosomal-dominant trait in 50 percent of cases.
- Triggered by muscle-depolarizing agents, such as succinylcholine, and inhaled anesthetic agents, such as halothane.
- It is critical to recognize this syndrome in patients under general anesthesia because early intervention and treatment with dantrolene may be lifesaving.

# Post Operative Fever; Timing of Fever; Immediate

Nonhemolytic febrile reactions;

Nonhemolytic febrile transfusion reactions are usually caused by cytokines from leukocytes in transfused red cell or platelet components;

- Causing fever, chills, or rigors.
- Diagnosis of exclusion, because hemolytic and septic reactions can present similarly.

# Post Operative Fever; Timing of Fever; Immediate

Infections that were present prior to surgery

**Case Study;**

Elderly resident from an LTAC in the New Orleans area in late January presented with abdominal pain and rigors. A workup in the ER revealed cholangitis resulting in an urgent cholecystectomy.

Her labs and physical exam settled down, but fever persisted. I rearranged antibiotics so that s/he was not on beta lactams, but fever persisted.

On post-op day 3, a simple test and a call to the nursing home solved the question of the fevers.

# Post Operative Fever; Clinical Vignette

Case Study;

A 58-year-old man is is hospitalized for an elective bilateral total knee arthroplasty. He has well-controlled hypertension, hyperlipidemia, and osteoarthritis.

The day after surgery, the patient is feeling well except for moderate knee pain controlled by pain medication.

- New medications: cefazolin for prophylaxis of surgical site infection.
- Physical examination: normal except for a small amount of serosanguineous drainage from the right knee.
- Vital signs: temperature 38.7°C (101.6°F), blood pressure 130/72 mm Hg.
- Laboratory results: white blood cell count 11,000/mm3.

# Post Operative Fever; Clinical Vignette

Which of the following diagnostic studies and treatment options do you recommend?

A. Blood and UA/urine cultures
B. Choice A plus chest radiography
C. Choice B and begin vancomycin
D. Observation only

# Post Operative Fever; Clinical Vignette

Which of the following diagnostic studies and treatment options do you recommend?

A. Blood and UA/urine cultures

B. Choice A plus chest radiography

C. Choice B and begin vancomycin

D. Observation only

Most early postoperative fevers (within the first 48 hours after surgery) have no clearly defined infectious cause and resolve without therapy.

The correct answer is D.

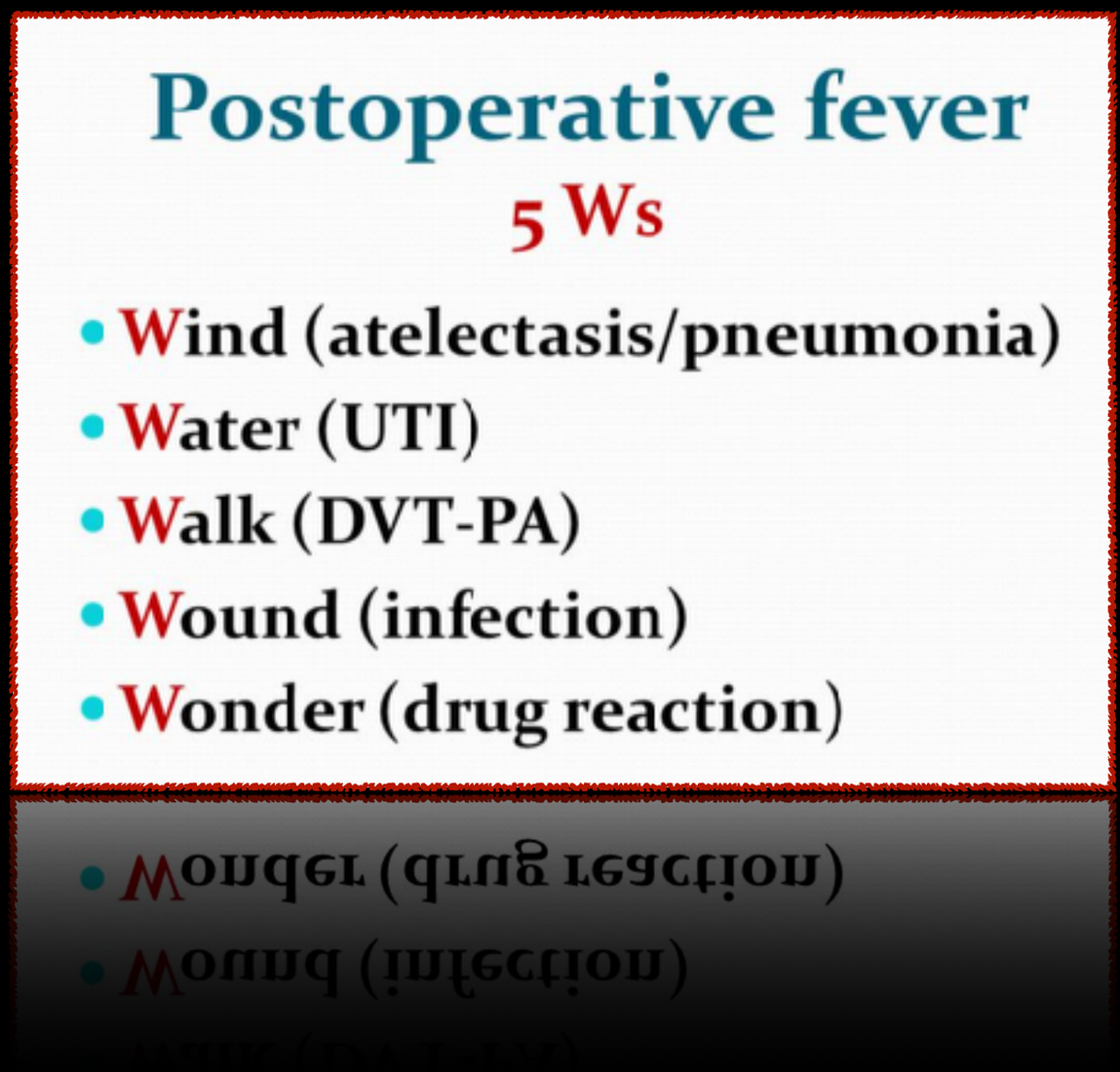
# Post Operative Fever; Timing of Fever; Acute

# Post Operative Fever; Timing of Fever; Acute

**Acute;**

There are many causes of infectious fever in the first week after surgery, nosocomial infections are common during this period;

- Pneumonia.
- Surgical site infection.
- UTI.
- Catheter exit site infections.



# Post Operative Fever; Timing of Fever; Acute

Does atelectasis cause fever?

- No clinical evidence supporting the concept that atelectasis is associated with postoperative fever.
- No clear evidence that atelectasis causes fever at all.
- Large studies are needed to precisely evaluate the contribution of atelectasis in postoperative fever.

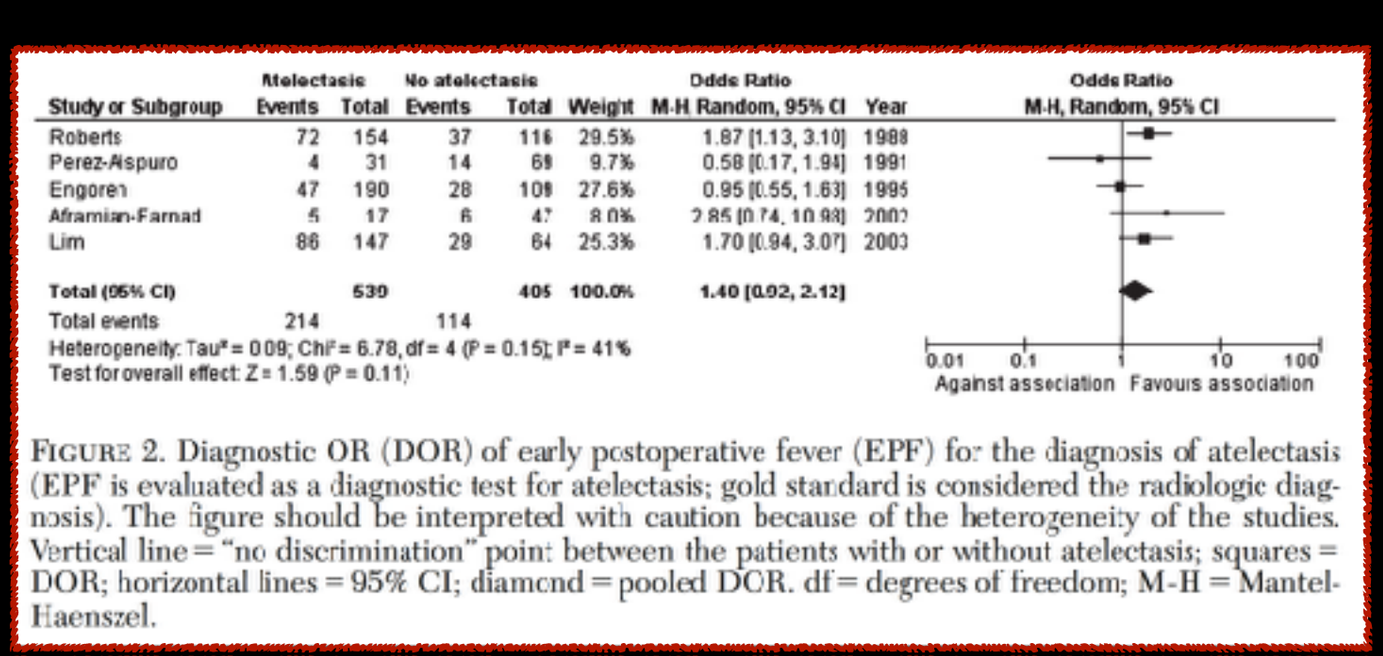



FIGURE 2. Diagnostic OR (DOR) of early postoperative fever (EPF) for the diagnosis of atelectasis (EPF is evaluated as a diagnostic test for atelectasis; gold standard is considered the radiologic diagnosis). The figure should be interpreted with caution because of the heterogeneity of the studies. Vertical line = "no discrimination" point between the patients with or without atelectasis; squares = DOR; horizontal lines = 95% CI; diamond = pooled DOR. df = degrees of freedom; M-H = Mantel-Haenszel.

Does atelectasis cause fever? NO!!!!!

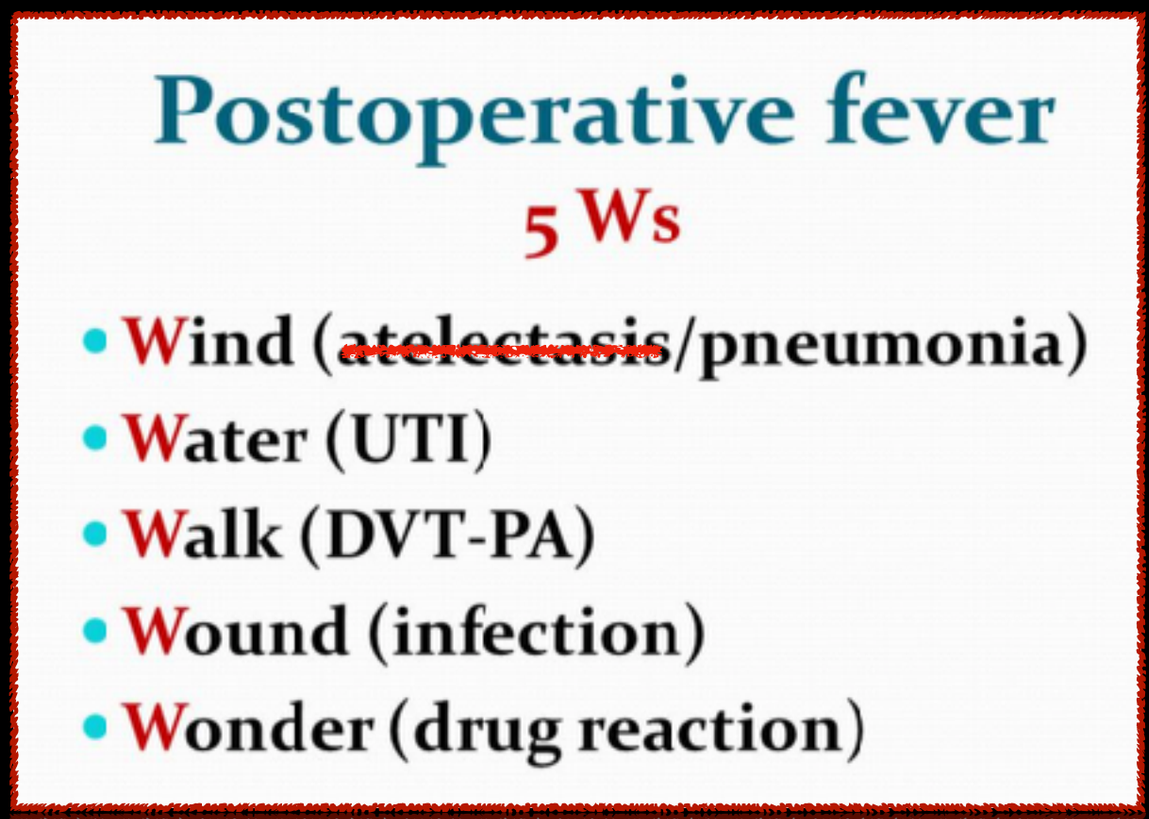
Chest. 2011 Aug;140(2):418-424

# Post Operative Fever; Timing of Fever; Acute

**Acute;**

There are many causes of infectious fever in the first week after surgery, nosocomial infections are common during this period;

- Pneumonia.
- Skin and soft tissue.
- UTI.
- Catheter exit site infections.



# Post Operative Fever; Timing of Fever; Acute

**Table 3** Ventilator utilization and incidences of VAP between the pre-VAP bundle and post-VAP bundle phases

| Variables | Pre-VAP bundle phase | Post-VAP bundle phase | *p* |
|---|---|---|---|
| SICU utilization [mean] (patient days) | 81,958 [1781.7] | 71,753 [1750.1] | 0.982 |
| Ventilator utilization [mean] (ventilator days) | 52,829 [1148.5] | 39,201 [956.1] | <0.001 |
| Ventilator utilization ratio (%) | 64.5 | 54.6 | <0.001 |
| VAP counts [mean] (cases) | 176 [3.8] | 56 [1.4] | <0.001 |
| VAP incidence (per 1000 patients) | 13.6 | 3.9 | <0.001 |
| VAP density (cases/1000 ventilator days) | 3.3 | 1.4 | <0.001 |

SICU = surgical intensive care unit; VAP = ventilator-associated pneumonia.

Implementation of VAP bundle care decreases the incidence of VAP at SICU.

**'Not every infiltrate is a PNA'**

- **Look at RNs notes.**
- **Look for increased O2 needs.**
- **Not every aspiration is a PNA.**
- **Sputum with yeast is thrush.**

Journal of Microbiology, Immunology and Infection (2015) 48, 316e321

# Post Operative Fever; Timing of Fever; Acute

**SSI Bundle;**

- Preoperative shower.
- Hair clipped.
- Body temperature.
- Antibiotic prophylaxis.

**TABLE 3** Operations stratified by surgery categories: univariate and multivariate analyses of the relationship among SSI rates and independent variables

| Variables | Univariate analysis | | | Multivariate analysis | | |
|---|---|---|---|---|---|---|
| | OR | CI | *P* value | OR | CI | *P* value |
| Colon intervention | | | | | | |
| Bundle | | | | | | |
| No | 1 | - | - | 1 | - | - |
| Yes | 0.56 | 0.39-0.80 | <.001 | 0.55 | 0.38-0.78 | <.001 |
| ASA[a] score | | | | | | |
| <3 | 1 | - | - | 1 | - | - |
| ≥3 | 1.80 | 1.26-2.57 | <.001 | 1.57 | 1.10-2.24 | <.012 |
| Emergency | | | | | | |
| No | 1 | - | - | 1 | - | - |
| Yes | 1.81 | 1.22-2.66 | <.001 | 0.97 | 0.63-1.50 | <.915 |
| Class of contamination | | | | | | |
| <3 | 1 | - | - | 1 | - | - |
| ≥3 | 2.32 | 1.62-3.31 | <.001 | 2.02 | 1.37-2.97 | <.001 |

**The use of surgical bundle seems to reduce significantly the SSIs rate in the colon surgery.**

- **Look at wounds.**
- **Interpret wound ‘swabs’ cautiously.**
- **Infected wounds need I&Ds.**
- **GPCs and GNRs; need lower doses.**

Journal of evaluation in clinical practice :2017 vol:23 iss:3 pg:642 -647

# Post Operative Fever; Timing of Fever; Acute

A national prevention program appears to reduce catheter use and catheter-associated UTI rates in non-ICUs.

**Table 3.** Multivariable-Regression Estimates of Changes in Catheter-Associated UTI Rates, According to Unit Type.*

| Variable | Non-ICU (N=553) | | ICU (N=373) | |
|---|---|---|---|---|
| | IRR (95% CI) | P Value | IRR (95% CI) | P Value |
| Time†‡ | 0.68 (0.56–0.82) | <0.001 | 1.01 (0.87–1.17) | 0.90 |
| Teaching hospital | 1.76 (1.03–3.01) | 0.04 | 1.92 (1.32–2.80) | 0.001 |
| Rural hospital | 0.90 (0.66–1.23) | 0.51 | 0.83 (0.58–1.18) | 0.30 |
| Critical-access hospital | 2.36 (1.65–3.37) | <0.001 | 2.60 (0.94–7.20) | 0.07 |
| Hospital size (per 100-bed increase)‡ | 0.97 (0.90–1.05) | 0.45 | 1.09 (1.02–1.16) | 0.01 |

- **Never EVER get a urine cx without UA.**
- **Anything more than a few Sq- contaminated.**
- **Yeast colonizes the urethral tract.**
- **Change catheters; use condom catheters if app.**
- **GNRs; use anbx that pass through the kidneys.**

NEJM 374;22 nejm.org June 2, 2016

# Post Operative Fever; Timing of Fever; Acute

- The recommended procedures are;
  - Hand washing.
  - Using full-barrier precautions.
  - Cleaning the skin with chlorhexidine.
  - Avoiding the femoral site, and removing unnecessary catheters.

**Table 4.** Incidence-Rate Ratios for Catheter-Related Bloodstream Infections.*

| Variable | Incidence-Rate Ratio (95% CI) | P Value |
|---|---|---|
| Study period | | |
| Baseline | 1.00 | |
| During implementation | 0.76 (0.57–1.01) | 0.063 |
| After implementation | | |
| 0–3 mo | 0.62 (0.47–0.81) | 0.001 |
| 4–6 mo | 0.56 (0.38–0.84) | 0.005 |
| 7–9 mo | 0.47 (0.34–0.65) | <0.001 |
| 10–12 mo | 0.42 (0.28–0.63) | <0.001 |
| 13–15 mo | 0.37 (0.20–0.68) | 0.001 |
| 16–18 mo | 0.34 (0.23–0.50) | <0.001 |
| Teaching hospital | 1.34 (0.73–2.46) | 0.35 |
| Bed size (per 100 beds) | 1.03 (0.97–1.09) | 0.33 |

- **GPCs, CNS, GNRs.**
- **Remove lines ASAP.**
- **Try to give line holidays.**
- **Antibiotic locks.**
- **PICC vs mid lines.**

n engl j med 355;26 www.nejm.org december 28, 2006

# Post Operative Fever; Timing of Fever; Acute

- Catheterization of the subclavian vein was associated with a lower risk of catheter-related blood stream infection and symptomatic deep-vein thrombosis.
- However, subclavian-vein catheterization was associated with a higher risk of pneumothorax.

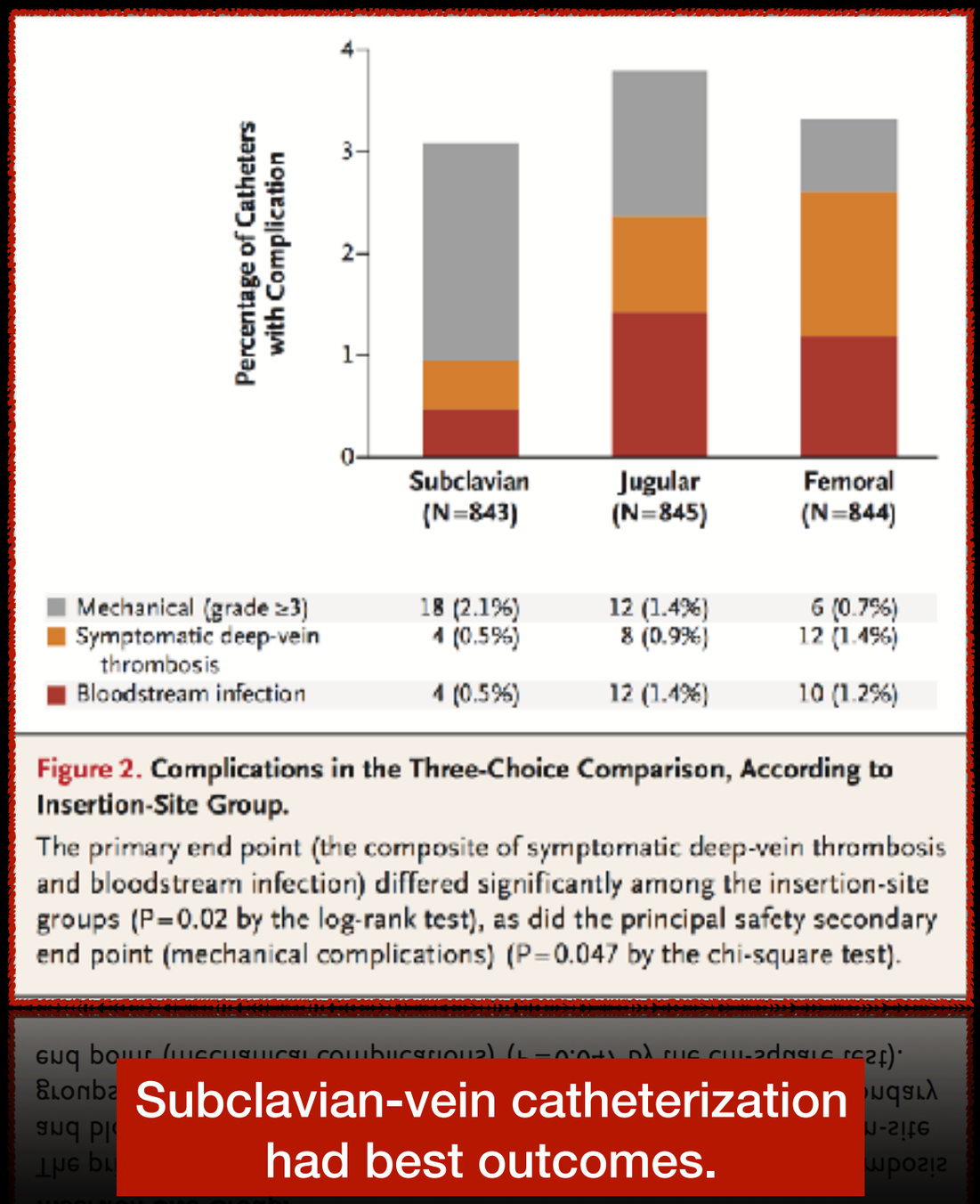



**Figure 2. Complications in the Three-Choice Comparison, According to Insertion-Site Group.**

The primary end point (the composite of symptomatic deep-vein thrombosis and bloodstream infection) differed significantly among the insertion-site groups (P=0.02 by the log-rank test), as did the principal safety secondary end point (mechanical complications) (P=0.047 by the chi-square test).

**Subclavian-vein catheterization had best outcomes.**

N Engl J Med 2015;373:1220-9.

# Post Operative Fever; Timing of Fever; Subacute

**Subacute;**

- SSI is a common cause of fever more than one week after surgery; many patients have already been discharged from the hospital by this time.
- Fever from antibiotic-associated diarrhea, typically attributed to Clostridium difficile, also occurs more commonly during this period.
- Thrombophlebitis should be considered as a cause of subacute fever in a patient with impaired mobility.

# Post Operative Fever; Clinical Vignette

A 61-year-old woman with rheumatoid arthritis (MTX, hydroxychloroquine) who is otherwise in generally good health undergoes a left total hip replacement. A Foley catheter is placed during surgery. She begins to ambulate the day following surgery. A fever of 38.1°C (100.6°F) is noted on the first postoperative day. Her Foley catheter is removed on postop day 2. Her temperature is normal on postop days 2 and 3, but on postop day 4, her temperature is 38.5°C (101.3°F).

What is the most likely cause of her fever now?

A. Joint hemarthrosis

B. Urinary tract infection

C. Superficial wound infection

D. Prosthesis infection

# Post Operative Fever; Clinical Vignette

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What is the most likely cause of her fever now?

A. Joint hemarthrosis

B. Urinary tract infection- UA with 100 WBCs/ 0 sq epi's; Klebsiella- CFTX

C. Superficial wound infection

D. Prosthesis infection

B is correct. Although all choices are possible, UTI is the most common cause of fever appearing 4 days after surgery.

# Post Operative Fever;
# Non Infectious

# Post Operative Fever; Non Infectious

**Noninfectious**;

- Noninfectious causes of postoperative fever include underlying conditions that are unmasked by the stress of surgery;
  - Inflammation — Surgical site inflammation without infection, including seroma and hematoma.
  - Gout — Gout and pseudogout in association with joint inflammation and effusion.
  - Pancreatitis — Pancreatitis can result from surgery involving the upper abdomen an adverse reaction to perioperative medications, or preoperative alcoholism.
  - Fat embolism — Fat embolism occurs most frequently after surgeries for major blunt trauma or major orthopedic surgery (particularly those involving long bone and pelvic fractures).
  - Cardiovascular and stroke — Myocardial infarction, stroke, and subarachnoid hemorrhage can cause postoperative fever.
  - Neuroleptic malignant syndrome — Neuroleptic malignant syndrome causing high fever and rigidity can develop perioperatively in patients receiving antipsychotic agents, especially haloperidol.

# Post Operative Fever; Non Infectious

A 49-year-old man is admitted to the vascular surgery service with dry gangrene of the left foot. He has a history of lower extremity arteriosclerosis obliterans, hyperlipidemia, gout, and hypertension, as well as a 60-pack-year smoking history.

- Medications: hydrochlorothiazide, lisinopril, atorvastatin, aspirin.
- Magnetic resonance imaging: evidence of osteomyelitis in the left foot.

The patient undergoes a left transmetatarsal amputation. He is given combined piperacillin and tazobactam postoperatively, as well as his previous medications and opiates for pain. He does well over the first 2 days. On day 3, however, he develops a temperature of 38.5°C (101.3°F) and right knee pain. The knee is warm and tender.

What is the next step?

A. Aspirate the knee

B. Change his antibiotics to imipenem

C. Begin indomethacin

D. “Pan-culture” and obtain a chest radiograph

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Since the patient is known to have a history of gout, my colleague empirically began indomethacin. He cited a study that found a 15% incidence of gouty attacks in the early postoperative period among patients with a history of gout.

**Craig MH, Poole GV, Hauser CJ. Postsurgical gout. Am Surg 1995; 61:56–59.**

# Post Operative Fever; Specific Surgical Procedures

# Post Operative Fever; Specific Surgical Procedures

**Abdominal surgery;**

- The primary cause of postoperative fever that is unique to abdominal surgery is deep abdominal abscess.
- Distinguishing between abscess, hematoma, and a benign peritoneal fluid collection can be difficult.
- Imaging studies and needle aspiration may be helpful, but exploration is sometimes necessary.
- Empiric antimicrobial treatment should be directed at the combination of aerobic Gram negative enteric bacilli and anaerobes… sometimes may need to cover for yeast.

# Post Operative Fever; Specific Surgical Procedures

**Cardiothoracic surgery;**

- Fever is common in the first few days after cardiothoracic surgery;
  - Tissue injury.
  - Additional investigation in febrile but otherwise clinically unremarkable postoperative patients is probably not indicated until the third postoperative day.
- Pneumonia is a common cause of fever after cardiac surgery.
  - Pleural effusions are the rule in patients following cardiac surgery; thoracentesis is rarely required during the evaluation of fever in such patients.

# Post Operative Fever; Specific Surgical Procedures

**Neurosurgery;**

- Meningitis is a frequent and serious cause of fever after neurosurgery.
- Classic symptoms and signs of meningeal inflammation, such as headache, photophobia, and nuchal rigidity, are usually not helpful because they can be caused either by infection or by hemolyzed blood from the surgery irritating the meninges.
- DVT occurs more frequently after neurosurgery than after many other types of surgery.

# Post Operative Fever; Specific Surgical Procedures

**Orthopedic surgery;**

- Self-limited fever; common
- The dominant special considerations in the differential diagnosis of persistent fever are surgical site infection (SSI), infected prosthesis, hematoma, and DVT.

# Post Operative Fever; Specific Surgical Procedures

**Urologic surgery;**

- Infection of the urinary tract at any level is the major consideration in evaluating patients with fever after urologic surgery.
- Deep infections, such as prostatic and perinephric abscess, may present with fever and pain, but relatively benign urine findings.

# Post Operative Fever; Specific Surgical Procedures

**Sternal wound infection and mediastinitis;**

- Sternal wound infection occurs in 1 to 5 percent of patients after median sternotomy.
- It is detected about 7 day postoperative.
- Risk factors for sternal wound infection include surgeries that are emergent, longer, more complex, or include internal mammary artery grafting; and patients who are older, diabetic, dialysis-dependent, obese, or smoke.
- Staphylococcus aureus from the blood raises the possibility of mediastinitis, even if the wound appears uninfected.

# Post Operative Fever;
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**Vascular surgery;**

- Graft infections after vascular surgery may occur by direct inoculation of the surgical site or, less frequently, by hematogenous spread.
- Infection is more common in grafts at inguinal and upper leg surgical sites.
- Vascular graft infections most commonly present soon after surgery, but can occur months to years later.

# Post Operative Fever; Specific Surgical Procedures

**Obstetric and gynecologic surgery;**

- Fever in the first day or two after gynecologic surgery usually resolves spontaneously.
- The differential diagnosis of fever after gynecologic surgery includes urinary tract infection (UTI), cellulitis, necrotizing fasciitis, superficial abscess, deep abscess, and pelvic thrombophlebitis.
- Postpartum endometritis, manifested by fever, pelvic pain and purulent vaginal discharge, is more common in patients with preexisting medical problems, after premature rupture of membranes, difficult deliveries, and after the use of internal fetal monitoring.
- Identifying a fluid collection and distinguishing between abscess, hematoma, and a benign fluid collection can be critically important.

# Post Operative Fever; Clinical Vignette

A 48-year-old woman in generally good health under- goes an abdominal hysterectomy. On the first day fol- lowing surgery, she develops a maximum temperature of 38.7°C (101.7°F), and she remains febrile on post- operative day 2. She has some pain at the incision. She looks comfortable and is hemodynamically stable.

• Physical examination: normal except for mild bibasilar crackles heard in the lung fields.

• Chest radiography: atelectasis in both lung bases.

• Laboratory results: white blood cell count 10,500/mm3.

What is the most likely cause of her fever?

A. Urinary tract infection

B. B. Atelectasis

C. Deep venous thrombosis

D. Other

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The answer is D. Considering that it is still only 2 days after surgery, and that the patient generally looks and feels well, the fever is more likely to be caused by cytokine release from the surgical trauma than from infection.

# Summary

- Not every post-op fever is infectious in nature.
- Look for sx's in VAP/HCAP/HAP.
- Watch for dirty UA's in evaluating UTIs/CAUTIs.
- Change lines early and often ;-) vote early and often.
- Image ab/pelvis in abdominal procedures.
- Central fevers and brain bleeds/crani's.
- Dont blow off CONs, especially with prosthetic material.

# The Evaluation of Fever in the Post Operative Patient

Thank You!
Questions


Follow me on Twitter @DrDery