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## Post-operative fever

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### ABSTRACT

*Postoperative fever is common and occurs in about 30% of patients. Non-Infectious causes are more common and occur usually in the first 24 hours while infectious causes can occur anytime. The presentation of infectious and non- the infectious cause is almost the same and it is important to know the cause of fever so as to investigate and treat the patient in a minimum cost yet effective manner.*

**Keywords**— *Post-operative fever, Infectious causes, Non-infectious causes, Time of post-operative fever*

### 1. INTRODUCTION

Post-operative fever is defined as a temperature greater than 38<sup>0</sup> C (or > 100.4<sup>0</sup> F) on 2 consecutive post-operative days or > 39<sup>0</sup> C (or > 102.2<sup>0</sup> F) on any post-operative day.<sup>1</sup>

Any fever which occurs after any operative procedure irrespective of the type of anaesthesia is called post-operative fever. Post-operative fever is common, occurring in up to 50% of patients. The cause of fever could be infectious or non-infectious. Infectious causes should be considered mainly for fever presenting later than 48 hours after surgery, whereas early postoperative fever is most commonly attributed to non-infectious causes.<sup>2</sup> Post-operative fever is generally believed to be benign and frequently ascribed to non-infectious causes.<sup>3</sup> Because the non-infectious causes of postoperative fever are commoner the entity "Postoperative Fever" requires better definition.<sup>4</sup> Non-infectious fever generally occurs due to release of pyrogenic cytokines following surgical trauma.<sup>5</sup> It is important to rule out infectious causes of post-operative fever which have more dire consequences and a very different set of management; it is also important to evaluate patients with early postoperative fevers. If no focus is identified, empiric antibiotic therapy should not be initiated nor should prophylactic antibiotics be extended for prolonged durations. Unexplained fevers will resolve in time without specific therapeutic interventions.<sup>6</sup>

Fever that continues beyond 96 hours post-operatively warrants further attention. Knowledge of differential diagnosis, as well as a systematic approach, proves useful in narrowing down the differential diagnosis and instituting proper management.<sup>7</sup>

### 2. CAUSES OF POST- OPERATIVE FEVER

There are several potential causes of post-operative fever. Patients may have more than one cause of fever and infectious and non-infectious causes may co-exist. Among patients with purely infectious causes of fever, multiple infections may co-exist.<sup>8</sup>

Infectious cause includes pre-existing infection in patients that required surgical treatment, occult community-acquired infection, and surgical site infections, IV line sites, urinary and respiratory tract infections.

Potential non-infectious causes include tissue ischemia/infarction, pro-inflammatory response to tissue injury and surgical stress, hematoma, venous thromboembolic disease, pneumonic embolus, drug-related, pyrogens in IV fluids, anaesthetic drugs, Transfusion-related, Endocrine-related, for example, adrenal insufficiency or thyroid storm) and controversially, atelectasis.

Early postoperative fevers (within 48h) are usually due to the inflammatory response to surgery and are not associated with infections and are usually benign and self-limiting. In contrast, fevers due to infection tend to occur later in the postoperative period.<sup>9</sup> In cases of Infectious cause of fever, the timing of fever is an important guideline as to the cause of the fever.

The specific post-operative day on which the fever develops may indicate the source of the infection:

Day 1-2: Consider a respiratory source

Day 3-5: Consider a urinary tract source

Day 5-7: Consider a surgical site infection or abscess/collection formation

Any day post-operatively: Must consider infected IV lines or central lines as a source.

The investigation of the infection source should also be tailored to the patient. For example, a patient who has undergone a bowel resection, the post-anastomotic leak is an important differential to be considered and should be investigated as a matter of urgency.

Other Causes of Pyrexia could – with any foreign body, for example after an AAA repair, a low-grade fever may be evident

**Malignant hyperthermia:** high-grade fever (greater than 40 °C), occurs shortly after inhalational anaesthetics or muscle relaxant is another common non- infectious cause which can be managed conservatively.

**Table 1: Causes of Postoperative Fever**

Non-Infectious	Infectious
Adrenal Insufficiency	Abscess
Alcohol Withdrawal	Bloodstream Infections
Atelectasis	Cholecystitis
Blood [Hematoma/CSF]	Clostridium difficile colitis
Dehydration	Endocarditis
Drug Fever	Infusion-related infections
Factitious	Intravascular device infections
Malignant Hyperthermia	Parotitis
Myocardial Infarction	Pneumonia
Neoplasms	Prostatitis
Pancreatitis	Sinusitis
Pheochromocytoma	Surgical Site Infections
Pericarditis/Dressler’s syndrome	Transfusion related
Pulmonary Embolism	Urinary Tract infections
Thrombophlebitis	
Thyrotoxicosis	
Tissue Trauma	
Transfusion reaction	

Table Data from Steinberg JP, Zimmer S. *Fever and Infection in the postoperative setting.* In: Lubion MF, Smith RB, Dobson TF, et al, editors. *Medical Management of the Surgical Patient: A Textbook of Perioperative Medicine.* 4th edition. Cambridge: Cambridge University Press; 2006

Because in almost 30% of cases of post-operative fever the cause may not be isolated in spite of all investigations managing this patient is expensive and frustrating.<sup>10,11</sup> To help ease the determining of the causative factor, a special mnemonic was developed in the 1980s by Hyder. This has come to be known as the 5 W’s of post-op fever.<sup>12</sup>

1. **W**ind (atelectasis).
2. **W**ater (urinary tract infection [UTI]).
3. **W**ound (wound infection).
4. **W**alking (venous thromboembolism [VTE])
5. **W**onder drug (drug fever).

“Over time, the Rule of W has undergone numerous variations, but no research has been conducted to establish how the rule was formed or explore its veracity, including whether or not the teaching of the rule may be broadened to include patients without fever,” Dr Hyder says. “These are important shortcomings because multimodal perioperative analgesia, with drugs like acetaminophen and NSAIDs, has become increasingly common to help decrease rates of postoperative fever.”

### 3. A REVISED MNEMONIC

As a test of timing patterns, and after calculating the median time to event for each index complication, a revised Rule of W was proposed. Hyder later proposed a mnemonic for postoperative complication timing and frequency, independent of fever.

1. **W**aves (myocardial infarction)
2. **W**ind (pneumonia)
3. **W**ater (urinary tract)
4. **W**ound (superficial or deep surgical site infection)
5. **W**alking (venous thromboembolism) in the order of likelihood.

The revised mnemonic begins with **W**aves of the electrocardiogram because MI is the most common complication on POD 0. The next complication is still **W**ind, but this was revised from atelectasis to pneumonia, which represents a new target for prevention, diagnosis, and treatment. There is a striking distinction from the original Rule of W in that VTE was never the most common complication.<sup>13</sup>

#### Variations to the 5 W’s

Some other variations of the 5 W’s have surfaced over the years. The most popular version of the 5 W’s includes two other possible causes:

- Pulmonary embolism, alcohol withdrawal and Intra-abdominal wound abscess which pertains to the infection of space or organ, and usually occurs 5 to 7 days post-op. Though this item can be considered a subsection of the third **W** in the traditional – wound.

However, it is important to note that the distinction lies in the fact that a fever caused by infection of space or organ does not necessarily involve the surgical incision, and may thus require completely different treatment angle.

- **Waterway** refers to a fever caused by a bloodstream infection. Otherwise called septicemia that infection occurs when a bacterial infection elsewhere in the body makes its way into the blood. This poses a particular threat as blood travels throughout the entire system, so any bacteria can easily infect other parts of the body through the vessels. Bloodstream infections can occur any time after surgery. So medical practitioners are urged to consider all the signs and symptoms before making a conclusion.<sup>14</sup>

#### **4. CONCLUSION**

Postoperative fever is commonly a normal inflammatory response to surgery and usually requires no treatment but infectious causes must be ruled out or else the end result can be disastrous. The timing of fever is an important criterion to find out the cause of the fever. Both non-infectious and infectious fever present in a similar pattern hence proper investigations to find the cause is important. This requires extensive investigations and hence having knowledge about the probable cause goes a long way to help clinicians cut down on cost and treatment options with goal-directed action.

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