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| **TABLE 1. MYTHS AND FACTS ABOUT INFECTION CAUSED FEVER (PYREXIA)** | | | |
| **S.No.** | **MYTHS [58]** | **FACTS [58]** | **COMMENTS** |
| 1. | \* *“****fever will hurt their child****” Or them (FEVER PHOBIA)* | *“In fact, fevers are harmless and often helpful.”*  [\*Still, the **Most Pervasive Fear** Among **Pediatricians (65%), Nursing Staff (70%),** and **Adults (95%) for indicating aggressive fever reduction treatment**]  \**Myth originated from the observations in uncontrolled fever (Thermia)* | **Myth NOT** applicable to brain-controlled harmless fever ‘*Pyrexia*’ – for infection control. **Fevers are most helpful for bacterial & viral infections without therapeutics.** |
| 2. | ***“All fevers are bad for children”*** | *“Fevers turn on the body’s immune system. They help the body fight infection.* ***Normal fevers between 100° and 104° F (37.8° - 40° C) are good for sick children****.”* | ***Note the 40°C*** *is more than* ***39° C*** *limit currently erroneously suggested by many for COVID-19 and other viral fever patients who are mostly adults.* |
| 3. | **“Fevers above 104° F (40° C) are dangerous. They can cause brain damage.”** | ***“Fevers with infections don't cause brain damage.***  ***Only temperatures above 108° F (42° C) can cause brain damage. It's very rare for the body temperature to climb this high.*** *It only happens if the air temperature is very high. An example is a child left in a closed car during hot weather.”* | **Fevers don’t cause brain damage.**  **Fevers around 108F is a rarity but still harmless** and can be observed in hot weather or cases when infection could not get controlled at lower temperatures observed previously. |
| 4. | ***“Without treatment, fevers will keep going higher***.” | * ***“Wrong***, because the ***brain knows when the body is too hot***. * Most fevers from infection don't go above 103° or 104° F (39.5°- 40°C). * They rarely go to 105° or 106° F (40.6° or 41.1° C). ***While these are "high" fevers, they also are harmless ones***.” | * In infections, the level of fever **(Pyrexia) is** **actively controlled** by brain, **unlike hyperthermia**. * Generally bacterial and viral. * Mostly viral |
| 5. | “With treatment, fevers should come down to normal.” | “With treatment, most fevers come down 2° or 3° F (1° or 1.5° C)” | **Unnecessary dosage or increase in dosage is futile for *Pyrexia* causing hepatotoxicity [3,49,93-96]**. Frequent dosage needed to manage Hyperthermia. |
| 6. | “Anyone can have a seizure triggered by fever.” | “Only 4% of children can have a seizure with fever.” | Harmless febrile seizures occur in 3-5% of genetically susceptible children [91]. |
| 7. | “Seizures with fever are harmful.” | “These seizures are scary to watch, but they stop within 5 minutes. **They don't cause any permanent harm.** They don't increase the risk for speech delays, learning problems, or seizures without fever.” | Seizures are harmless and don’t cause any permanent brain damage. |
| 8. | “All fevers need to be treated with fever medicine.” | ***“Fevers only need to be treated if they cause discomfort*** (makes your child feel bad). Most fevers don't cause discomfort until they go above 102° or 103° F (39° or 39.5° C**).”** | **For adults the threshold for discomfort is generally around 41oC or higher** |
| 9. | “The exact number of the temperature is very important.” | “How your child looks and acts is what’s important. The exact number of the temperature is not.” | It applies to adults as well. If it feels very sick (discomfort), the cause is more likely to be serious & needs medical attention. |
| 10. | “Oral temperatures between 98.7° and 100° F (37.1° to 37.8° C) are low-grade fevers.” | “These temperatures are normal. The body's normal temperature changes throughout the day. It peaks in the late afternoon and evening. A true low-grade fever is 100° F to 102° F (37.8° - 39° C).” | Body temperatures vary by age, sex, day time, physical activity etc. Fever ≥39° C may precipitate inconsequential seizures in <5% children. |
|  | **“SUMMARY. Keep in mind that fever is fighting off your child's infection. Fever is one of the good guys.”**  [PYREXIA IS ESSENTIALLY A BRAIN-CONTROLLED HARMLESS MECHANISM TO FIGHT OFF INFECTIONS FOR WHICH WE MAY NOT HAVE OTHER THERAPEUTIC OPTIONS AVAILABLE. Incremental increase in fever over days is part of normal immune response and should not be reduced unless causing ‘discomfort’.  Usually, fever little over 39 oC clears most common infections, whereas temperature > 39 oC may be needed for other pathogens requiring higher restrictive temperatures including the novel ones, *e.g.,* strains of influenzae, measles, SARS-CoVs] | | **Additionally, fevers at**   * **~**39°C generates the heat shock response to prepare the host deal with higher temperature later. * .~ 40oC enhances interferons production if viruses are still around (permissive) and prepares for safer inflammation resolution.   **Reduction of fever in diseases** with limited antibiotics/ antivirals availability **increases the chances of complications and mortality** |
| **Note:**  ***Unless indicated otherwise ‘fever’ refers to temperature increase caused by acute infection or ‘Pyrexia’.*** The information in quotes “ ..” is taken verbatim from Seattle Children’s hospital web page (updated as on 13 May 2021) [58]. Other information is provided to further clarify the meaning. The temperatures are indicative not absolute and are closest approximate. It may be little different for each individual as everyone is unique. | | | |

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| **TABLE 2a: FEVER REDUCTION GUIDELINES: WHO (2013)** | |
| **FEVER MANAGEMENT GUIDELINE** | **COMMENTS** |
| **WHO GUIDELINES, 2013 (in “quotes”) [29]**  “***10.3 Management of fever***  The temperatures given in these guidelines are rectal temperatures, unless otherwise stated. Oral and axillary temperatures are lower by approximately 0.5 °C and 0.8 °C, respectively.  **FEVER** is **NOT** ***an indication for antibiotic treatment*** and **MAY HELP THE IMMUNE DEFENCE AGAINST INFECTION**.  High fever (> 39 °C or > 102.2 °F) can have harmful effects, such as:  • reducing the appetite  • making the child irritable  • precipitating convulsions in some children aged 6 months to 5 years  • increasing oxygen consumption (e.g. in a child with very severe pneumonia, heart failure or meningitis).  All children with fever should be examined for signs and symptoms that indicate the **underlying cause of the fever, and should be treated accordingly** (see Chapter 6, p. 149).  ***Antipyretic treatment***  ***Paracetamol***  Treatment with oral paracetamol should be restricted to children aged ≥ 2 months who have a fever of ≥ 39 °C (≥ 102.2 °F) **AND** are uncomfortable or distressed because of the high fever. **CHILDREN WHO ARE ALERT AND ACTIVE ARE UNLIKELY TO BENEFIT** from paracetamol.” | * The section deals with both *pyrexia* (**brain-regulated during infections)** and *thermia* (unregulated, *e.g.,* heat shock) * In pyrexia, the body temperature is increased in response to pathogen **to prepare fight off an infection - including incapacitating the pathogen at restrictive temperature**. Temperatures can rarely increase upto 42oC if risk remains. * **FEVER IS GOOD FOR IMMUNE SYSTEM**. * **Unregulated increase in temperature (thermia)** > **39 °C** (103-105F) when body is not prepared for the shock, **can be lethal** and **subject to emergency fever reduction,** WHEREAS ***Hyperpyrexia upto 108F*** *can be* ***well tolerated*** *and* ***remains important mechanism for pathogen control***(SEE TABLE 1. for facts and myths about pyrexia) * *Convulsions* occur in *genetically predisposed* children (<5%) but has not *harmed a kid in any way* [91]. * ***Asks for the treatment of the ‘cause’. Chapter 6, p. 149 deals with antibiotics choice*** making the guidelines more aligned to bacterial diseases. ***At higher temperature antibiotics efficiency increase, so antibiotics administration without antipyretics would be more efficient.*** * The fever of ≥ 39 °C treatment should be only considered when the defined ‘uncomfortable or distressed’ conditions are present. * Antibiotics coadministration with antipyretics for most of the common bacterial diseases would not affect disease resolution. However, **REDUCING FEVER in VIRAL DISEASES with causative agents having ≥39oC restrictive temperature**, e.g., strains of Influenzae, Measles, SARS-CoVs, **the effects can vary from inconsequential to severe (death)** depending upon the presence of preexisting immunity, previous heat shock response/temperature and ability to handle cytokine storm |

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| **TABLE 2b: FEVER REDUCTION GUIDELINES: OTHERS DURING COVID-19 PANDEMIC** | |
| **FEVER MANAGEMENT GUIDELINE** | **COMMENTS** |
| **NATIONAL HEALTH SERVICE. FEVER IN ADULTS. 2020 [23].**  The page, includes even reference to COVID-19 management, states “***Fever helps your body fight infections by stimulating your immune system: your body’s natural defense. By increasing your body’s temperature, a fever makes it harder for the bacteria and viruses that cause infections to survive.***” **BUT** considers “***fever/high temperature (37.8C or greater)***” and goes on to suggest it to be “***fit for treatment”*** on the unqualified ***“uncomfortable feelings associated with a fever”***.  The supposed guidance given latter for adults leaves much to individuals’ interpretation whether to take antipyretics or not, i.e.,  “**Treating a fever**  Most fevers will improve of their own accord in a few days. However, there are a number of things you can do to help the **uncomfortable feelings** associated with a fever.   1. Don't over dress.... 2. Drink more fluids, ... 3. **Take a medicine that reduces fever such as paracetamol (unless you're allergic or have been told by a healthcare professional that you can't take it)**.”   The link provided for ‘ibubrofen’ use for whom who may like to use it instead of paracetamol is even more confusing, i.e.,  **“Ibuprofen [25]**  There’s no evidence to show a link between ibuprofen, or other non-steroidal anti-inflammatory medications (NSAIDs), and catching or making coronavirus worse.  Paracetamol or ibuprofen can be used to help with the symptoms of coronavirus if needed, unless your doctor has told you paracetamol or NSAIDs are not suitable for you..”.  The ‘**Coronavirus (COVID-19): Self-care advice**’ [25b] page goes on to advice as under:  **“Treating a fever at home**  It’s safe to treat most fevers at home. However, you may be at risk of becoming dehydrated.  **Do**   * wear loose, comfortable clothing .. * drink more fluids … * monitor your pee colour … * **take paracetamol if you have a temperature** – always follow the manufacturer’s instructions…” | **IT CONTRADICTS WHO GUIDELINES FOR FEVER REDUCTION** in infectious disease, that specifically asks for cause treatment > 39 °C not just any fever in any infection that too just > 37.8 °C.  **The “uncomfortable feeling” in the guidelines alluding to explicit definition of ‘uncomfortable’ needing treatment in WHO guidelines (2013) for children that is known to physicians could create confusion in general public promoting unnecessary medication.**  **The unqualified ‘uncomfortable feelings’ is open to conjecture by masses when considering what is fit for treatment.**  In the limited access of well qualified practitioners during the pandemic situation antipyretics usage for any fever could essentially contribute to increased hospital visits, admissions, complications and mortality by unspecified numbers.  ‘**No evidence to show a link**’ or ‘Lack of evidence’ is **NOT** equivalent to ‘**Evidence of no link**’ or ‘Evidence of no effect’. The **latter should be relied in practice** not the former.  Usually in situations of ‘Lack of Evidence’, the ‘theoretical considerations prevail’.  Antipyretics alone are known to prolong recovery and increased transmission of respiratory tract infections esp. for microbes with no therapeutic agent available. (see main text for examples)  **STICK TO WHO GUIDELINES, 2013 [29]** |
| **Indian Council of Medical Research, India. [31]**  For acute fever management it states:  **“Management of Acute Fever. Chapter 2**  **2.1.7 Principles of empiric therapy**  a. **Supportive: Acetaminophen 650 mg every 6 hours** round the clock is advisable, accompanied by tepid sponging **for fever >103 F**. Replace fluid and electrolytes as required.  b. **No antibiotics are required for the majority of patients** with **acute febrile illness** without an obvious clinical diagnosis.”  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **The FAQ for COVID-19 [28] states**:  “**What can I take (for) pain or fever**?   * …**Paracetamol** is one of the safest pain killers to use if needed.” | It considers 103 F as acute illness and recommends giving antipyretics, even acknowledging antibiotics may be of no use.  It defeats the purpose of WHO recommendations where cause is to be treated not the fever *per se*.  **STICK TO WHO GUIDELINES, 2013 [29]** |
| **CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC), USA [24]**  “CDC considers a person to have a fever when he or she has a measured temperature of 100.4° F (38° C) or greater, or feels warm to the touch, or gives a history of feeling feverish”  **NATIONAL INSTITUTES OF HEALTH (NIH), USA [26]**  COVID-19 treatment guidelines (Last Updated: April 21, 2021) do not specifically elaborates on fever management. However, ‘**Outpatient Management of Acute COVID-19**’ under ‘**Symptom Management**’ p. 41 rather cursorily advises:  “Symptomatic treatment includes using **over-the-counter antipyretics, analgesics, and antitussives for fever, headache, myalgias, and cough**.” | **CDC at multiple places clarifies that it considers** 100.4° F (38° C) or above a fever for diseases.  **May be appropriate for promoting people to seek medical advice but cursory remarks could promote inappropriate intake.**  Widespread availability and use can increase complications and mortality from seasonal viral diseases including COVID-19.  **Specific recommendation cautioning against antipyresis would have been better as risk of overuse has increased during covid-19 pandemic**.  **STICK TO WHO GUIDELINES, 2013 [29]** |
| **Note:** The guidelines floating around for COVID-19 are for qualified physicians for their discretion. These guidelines would need to go extra mile to be in the public domain. ***These guidelines need to align with WHO guidelines on fever management. Extra caution is desired when in public domain*** as any unqualified remark open to alternative interpretation may cause more harm than good to the heath of common masses. It would have potential to result in health issues, extra hospital visits, complications and deaths putting pressure on already stretched medical system of most countries during COVID-19 pandemic. | |