



Home Management of Fever

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Fever generally refers to temperature above 100.4 F or 38.0 C and is a product of inflammatory biochemical produced by the body, usually in response to an infection. These inflammatory molecules affect the brain's thermoregulatory set point and produces a new set point. The body will then increase metabolic rate generating heat until that new set point is reached. Before you embark on therapy for fever, remember many experts would remind you that the body's response to infection or illness by producing a fever response may be beneficial in the patient's effort to resolve the infection. The biochemistry of "infection-fighting" is believed by some to function better with fever. The flip-side of this conversation also includes the suspicion that the "tolerance" of the microbe / infective agent may be less than the human host and a "game of chicken" with regards to fever between microbe and host may be worthy of some consideration. Having said that, in application, modest fever could be easily left alone while more significant fever (>102 F or so) would likely be treated if for no reason other than to mitigate suffering by the patient.

There is little in pediatrics that more quickly provokes parental concern than fever. In and of itself, fever is not harmful to the child. Temperature elevations much beyond 105.0 F are uncommon, but can rise as high as 106.7 F in response to infection. So as long as the illness-producing fever is not life threatening, these temperature elevations, though anxiety provoking, will not harm the child. Fever-induced seizures are the one sudden and unpredictable event that makes reassurance about the benign nature of most fever more difficult. It is true that fever-induced seizures are almost always a benign event for the child, but a terrible experience for the parent. Fortunately, they are uncommon and affects only one percent of the child population from six months to six years of age. If you have a child with pre-existing cardiac or respiratory compromise, the increased cardiac and respiratory demands of fever may be unwise and this patient's physician may recommend a more stringent control of fever. These children are clearly a decided minority.

"Fever phobia" is likely here to stay, but in modern times the immunized child lives in a relatively safe environment compared to thirty years ago. Though meningitis, pneumonia, sepsis and other grave infectious diseases are still with us, the incidence of these illnesses is less now, making more benign infections the likeliest cause of fever.

If you are a parent with an unvaccinated or under-vaccinated infant or child, that decision confers additional risk of serious infection during times of fever. This issue you should bring to the attention of any physician not in possession of that information at the time of phone consultation or actual examination. It's probable that a somewhat more thorough investigation of the patient would be warranted in the circumstance of the poorly vaccinated patient.



It should be noted that young infants less than three months of age and especially those less than one month of age are in a category of their own with regards to fever. They are not yet protected by vaccination (even those who've received two month vaccines have too little protective antibodies) and have a very immature immune system that will need time before specific targeted response to infection can occur. As a result, fever above 100.4 F or 38.0 C is a medical emergency in infants less than a month of age and will result in immediate hospitalization. Much of the time, the infection-causing fever will be a benign infection that will resolve on its own. Nevertheless, that will be known only after the fact while medical investigations are conducted and antibiotics are being administered. Infants from one to three months of age are in a similar category of medical urgency and fever will still result in immediate hospitalization much of the time, but not with the certainty of the infant less than a month of age. As parents, be reminded that regardless of the time of day, fever in these young infants require a prompt pediatric medical opinion. The parental decision to use fever-reducing medications in this group of patients should come only after a qualified pediatric opinion recommends doing so.

Measuring temperature has in recent years become more complicated in terms of the number of different ways to measure fever. The "gold standard" method in children too young to tolerate oral measurement would be rectal measurements. This is especially true in the very young infant when clinical decision making will hinge to a large extent on the presence and magnitude of fever. Rectal assessment would likely not be appropriate in cancer patients or others with extremely low white blood cell counts. Parents unfamiliar with the rectal technique will often choose another technique. Oral temperature measurements in children old enough to be compliant would be a preferred method. These values can be spurious if there is significant mouth breathing or recently consumed hot or cold beverages. Axillary, tympanic membrane thermistor (ear drum), and infrared contact or non-contact methods (temporal or forehead measurements) are parentally preferred techniques because the speed of the assessment largely obviates the need for patient compliance in the measurement process. In research settings or when used by anesthesiologists in surgery, these techniques can be accurate and relevant. Most commercial products available for home use and the techniques used at home will confer enough variation in accuracy to make the values sometimes suspect. As a parent, try to use the most accurate method you are comfortable and familiar with. Report the value and technique used to gather that value in a medical evaluation.

Fever therapy, when indicated, should always be done within guidelines that would insure no child would be harmed or demised by that therapy. This is especially true if one accepts the premise that fever is often due to self-limiting illness that must "run their course". Even in those illnesses that will not "run their course" and need medication (presumably antibiotics), it's the antibiotic that will quell the infection and limit the fever. To injure a child with fever medication when that medication does not help to limit infection like antibiotics do, is a tragic decision.



The available sanctioned choices of medication for fever related to illness include acetaminophen after three months and only after a medical evaluation if the patient is less than three months of age (Tylenol is the dominant brand). After six months of age, ibuprofen (Advil and Motrin are the dominant brands) can also be used. The use of aspirin or aspirin-containing products should not be used to treat fever unless done under the specific instruction of a knowledgeable physician. As with all medications, both acetaminophen and ibuprofen, though generally safe, have specific toxicities that deserve your respect and mandate safe, accurate and judicious dosing of either medication. The toxicity of acetaminophen is predominately liver toxicity, while that of ibuprofen is predominately kidney toxicity.

Many uncertainties arise about the simultaneous use of both acetaminophen and ibuprofen to control fever. Generally this is not necessary. There remains interest in this subject though because of the "fever phobia" prevalent among parents and other caregivers. Certainly, the start of fever therapy will begin with a choice between one of the two medications, acetaminophen or ibuprofen. Some experts would recommend acetaminophen over ibuprofen given the longstanding safety profile of acetaminophen. This recommendation is a fairly subtle differentiation. If you chose to use ibuprofen, remember, not before six months of age. You also need to be aware there are two formulations of liquid ibuprofen (infant's and children's) with different concentrations. The infant product is twice as concentrated, so to give the same dose you would administer half the volume of the children's product. Be careful to know which product you have so you give the proper volume of medication.

Typically, both products' dosages (acetaminophen and ibuprofen) are based on the weight of the child much more than the age of the child. As a result, unless a health care provider has specified a dose for your child, you will need to also know the weight of the child before you begin to dose on your own. Many times we'll have stipulated doses of both acetaminophen and ibuprofen at a recent office visit for your child. Keep these doses in a medical file with a calendar date on it for future reference. Beyond the first year or two of life, weight gain is slow enough that relevant doses would remain essentially unchanged for a year. The "age-based doses" on the package will typically be calculated to assure that even the smallest child in a certain age classification will not be receiving inappropriately large doses of medication. Consequently, these dose recommendations will typically insure that overdosing will not occur.

Individual doses of acetaminophen should be given no more closely spaced than four to six hours and not more than five times in a twenty-four hour period. Individual doses of ibuprofen should not be given more closely spaced than six to eight hours.

The co-administration of both medications by families can be the result of "fever phobia". Whatever the motivation, the safety of co-administration is rooted much more in the observation that parents have done this for decades with little or no observed injury to the children involved.



Experts believe that adequate hydration is important in maintaining tolerance to the fever-reducing medication. As a result, liquid intake often using one of the oral rehydration liquids rather than water, sport drinks etc. will be advisable. The younger the child, the more true the statement is. Keep track of urine output / frequency and if this is waning another reason for seeking a medical evaluation is brewing.

As with the use of a single fever medication, understanding the dose and frequency of administration (if you are to co-administer) is essential to the safe use of the medications. Generally, it is recommended that you pick one of the two medications (acetaminophen-Tylenol or ibuprofen-Motrin/Advil) and use that one as the primary medication. Let's use acetaminophen as an example since some experts would slightly prefer this choice over ibuprofen given our longer experience with acetaminophen and its safety record. So, fever begins and the decision to administer a carefully measured appropriate dose of acetaminophen is acted upon. It's best to use a syringe or similar device and measure in metric milliliters (mls) for the sake of the all-important accuracy. Avoid silverware and approximations of teaspoons at all costs as these measures are unacceptably inaccurate and resultantly carry considerable risk of harming your child! Once administered, the "clock begins to tick" on the interval to the potential next dose of acetaminophen. That interval is four to six hours and for all the reasons discussed above, "fudging" on dose or interval is just NOT TO BE DONE, period!

In the next paragraph a lengthy example of the parental practice of alternating / co-administering fever-reducing medications will follow. Experts modestly discourage this practice out of concerns of dosing and interval of administration errors as well as latent concerns about toxicity as the practice has not been thoroughly evaluated in some experts' opinions. Before that, it should be said that after one or two doses of your first choice of fever-reducing medications proves to be ineffective, SWITCHING to the other fever-reducing medication would be more appropriate than alternating / co-administration as some children will respond better to the other medication.

So, three hours have passed and fever of significance has returned and a desire to administer more fever medication has also returned. It's inside the accepted interval of administration for more acetaminophen, so the choice to administer more medication would include only ibuprofen at this point. It could be effectively argued that waiting one to three hours to administer another dose of acetaminophen while removing clothing to allow for radiational cooling would be a reasonable course of action. So, this time you've chosen to administer ibuprofen along with radiational cooling. When you give this dose of ibuprofen, the "clock begins to tick" on the potential next dose of ibuprofen. That interval is six to eight hours and "fudging" on dose or interval is just NOT TO BE DONE, period!



It's likely that the administration of two doses of fever-reducing medication, first acetaminophen and secondly, ibuprofen in roughly a three hour interval will quell the fever for at least a few hours. The appropriate interval of administration of acetaminophen is four to six hours and the "clock has been ticking" and now you'll have the option to give the potential next / second dose of acetaminophen one to two hours after this first dose of ibuprofen (**four to six hours after the first / initial dose of acetaminophen**) in the scenario described here. Let's assume that fever did stay away for eight hours after the first dose of ibuprofen (you'd have given acetaminophen before the ibuprofen as fever began, so this was the second dose of fever-reducing medication). Some parents would ask if they should continue to give fever-reducing medication on a scheduled basis in the absence of fever. To this, I would say no. The fever may be gone for good after those two doses of medication and this practice will result in administration of medications for no purpose. All medications, even these fever reducers have potential toxicity, hence all the labor to detail how to use them safely. Remember the reality that the fever is not the enemy, so the proactive use of medication, even those as safe as fever reducers just doesn't make sense. Eight hours have now passed, fever of significance has returned and no fever reducers have been given for eight hours. Your primary medication is acetaminophen, so you can give the carefully measured milliliter dose and once again "the clock begins to tick" on the interval to the potential administration of the next dose of acetaminophen. If fever of significance recurs before the four to six intervals to the next dose of acetaminophen, ibuprofen can be carefully measured and administered if that is your decision. So this pattern of co-administration can proceed inside these guidelines.

Remember the earlier advice that changing classes of fever-reducing medication is preferred over co-administration. Also remember co-administration is seldom necessary, but when done, extra care in administering the proper doses of the two medications (the volume of the doses will be slightly different between the two classes of fever-reducing medication) at the appropriate intervals is the best way to avoid toxicity related to the medications themselves when you co-administer.

I haven't said much about the use of capsule or tablet fever reducers, but the concepts are the same. The biggest difference is that because the doses come in discrete sizes, individualization of doses cannot be done to the extent that it can be with liquid medications. However, general rules still apply. Do not violate the minimum interval of four to six hours for acetaminophen (and five doses per twenty-four hours) and six to eight hours for ibuprofen. Know your weight based doses and round DOWN to the nearest dose in milligrams by capsules or tablets that meets that "under dosing" requirement.

At some point based on age (young > older), apparent severity of the symptoms, willingness to drink and eat, pattern of urination more than defecation, level of activity with and without fever during the illness, respiratory symptoms or distress, confusional symptoms, newly evolving



symptoms and your level of experience with an ill child, a medical opinion about the nature of the illness will be desirable. These crises often seem to come outside the confines of office hours and if the judgement to have a child seen for illness accompanied by fever occurs urgently and outside office hours, seeking that opinion will usually be most useful if the opinion comes from a physician trained in pediatrics who has laboratory access.

So summarizing the high points:

1. Fever is not necessarily the enemy. Being the harbinger of trouble is related much more to the illness-causing fever than the fever itself.
2. It makes no reasonable sense to harm a child with fever-reducing medication when the illnesses causing the fever are more likely to be self-limiting than life threatening.
3. Even when the illness is life threatening, misuse of fever-reducing medication will only make more certain a poor outcome and is therefore unwarranted.
4. Safe usage of the two fever-reducing medications hinges on accurate doses and maintaining the proper minimum intervals between those doses.
5. It is generally believed by experts that an adequately hydrated patient using fever-reducing medication is at less risk of toxicity than one who is dehydrated.
6. Inaccuracies in dose measurements and "fudging" on doses and intervals are most often the proximate cause of toxicities related to the fever-reducing medications.
7. If the first choice of fever-reducing medication proves to be less effective than desired, switching to the other class of fever-reducing medication rather than co-administering both medications would be the preferred course of action.
8. When seeking an urgent opinion about an illness associated with fever, a physician with laboratory access and pediatric training would likely generate the most valuable opinion.
9. Unvaccinated / under-vaccinated patients are in a special risk category and the involved physician should be made aware by the parents of a child in that special risk status.
10. Milligrams (mgs) are metric units used to define mass, in this application, the dose of medication. The dose in fever-reducing medication varies with the weight of the child. In liquid medications though you need to know the milligram dose, you cannot measure milligrams (unless you have an exceedingly sophisticated scale) at home so don't try. You're actually going to measure milliliters as described next. The two units are not at all interchangeable!!!!
11. Milliliters (mls) are metric units used to define the volume of liquid medication to be administered to deliver the dose (remember the "dose" is measured in milligrams). Milliliter doses vary based on the concentration of the liquid and the weight of the child. This (milliliters) is generally the "number" you are looking for because this is the volume you measure up into the syringes to administer. If there is only one concentration of your liquid medication (acetaminophen) and you know the volume of liquid (milliliters) to administer with certainty, then you're good to go. If there is more than one concentration of your liquid medication (ibuprofen), then you will need to know that the volume (milliliters) matches the



concentration (infant's or children's) or you will administer an incorrect dose. As a point of reference, one accurately measured teaspoon is five milliliters, two accurately measured teaspoons is ten milliliters and so on. If you're calculating the dose of medication on your own and you're about to give more than package recommendations, more than five milliliters to an infant, more than fifteen milliliters to an eight year old, you may be at risk to give too large of a dose and verification before giving the dose would be wise.

One final thought, I'm going to include a dose calculator for acetaminophen and ibuprofen to make accurate administration of medication a bit more simple and certain for parents. If after viewing this page and you are uncertain in your calculations, verify the dose with a knowledgeable authority before you give a dose. You will need to have a recent, accurate WEIGHT IN POUNDS and know which of the various ibuprofen and acetaminophen products you plan to use. This dose calculator is an excel spreadsheet, so you will need that application on the device you plan to use to perform these calculations.

[Dose Calculator](#)