

should next note the frequency, the rhythm, the tension, volume and force of the pulse, and lastly, any peculiarities, if present. Moreover, the pulse of one side of the body should always be compared with the other. It should also be remembered that forcible extension or flexion of the forearm will sometimes arrest the radial pulse. In taking the pulse in children and infants, it is well to count the pulse, if possible, while they are asleep. This can often be done nicely in the temporal artery. In taking the pulse at the wrist, asleep or awake, there are often involuntary movements of the arm and twitchings of the muscles, which render it difficult to keep the finger of the observer on the pulse. The difficulty may be overcome in a great degree by grasping the entire hand of the child, and then extending the index finger upon the pulse.

It is also advisable not to take the pulse of the patient until some little time has elapsed after the appearance of the physician.

The factors of the pulse, and the several phenomena dependent upon them, are shown in the following table:

2. Heart.	a. Rate or frequency.	
	b. Rhythm—intermittency and irregularity.	
	c. Force or strength.	
	d. Quantity of the blood.	
2. Degree of resistance to the passage of blood through small arteries and capillaries.	a. Degree of tension.	{ Hard or long. Soft or short.
	b. Size of vessels.	{ Large. Small.
3. Elasticity of vessels.	a. Dicrotism, hyperdicrotism.	
	b. Non-dicrotism (senile pulse).	

In health, changes in the frequency and rhythm of the pulse are often met with.

I subjoin a table of the variations in the frequency of the pulse in health which is taken from Hooper's "Physician's Vade-mecum," edited by Drs. Guy and Harley, and from this work is also taken most of what follows on the changes of the frequency of the pulse in health.

Infant asleep at birth.....	140
Infancy.....	120
Child five years of age.....	100
Youth.....	90
Male adults.....	72-80
Female adults.....	80-85
Old age.....	70

Heberden records 42, 30, and 26 beats to the minute, in an old man of eighty, apparently in perfect health; Fordyce, another of 26 (Hooper's "Vade-mecum," p. 179, London, 1869). Great frequency in health is not often met with, but I have under observation a case where the pulse ranges from 100 to 120, and the individual states that this frequency has existed all his life.

Sex has some influence. Up to seven years of age the frequency is about the same in both sexes, but later the female pulse is from 6 to 14 beats—average 9, greater than in the male.

Posture also affects the pulse. It is most frequent in the standing, and least in the recumbent position. The pulse of a man is twice as much

affected by change in position as that of a woman. When the pulse is much increased in frequency, change in position has but little effect, and for the higher numbers entirely disappears. When the head is lower than the body the pulse falls (a hint for the treatment of some forms of palpitation). The general law as to the degree of frequency of the pulse as affected by position is as follows—the frequency is directly proportioned to the amount of muscular effort required to support the body in different positions.

The pulse falls in sleep as much as ten beats. Sleeplessness increases its frequency. On awakening from sleep there is usually a decided increase in frequency.

Food increases the rate. Mental excitement and activity of the emotions increase the frequency; mental depression is often accompanied by a decrease. Cold lowers and heat raises the rate. Among other causes producing an increase in the frequency of the pulse in health may be mentioned spirituous and warm drinks, tobacco, diminished atmospheric pressure. Among the remaining causes producing diminished frequency there are fatigue, long-continued rest, debility without disease, and increased atmospheric pressure. Occasionally the pulse is *irregular* in health, but when that is so it is usually congenital.

Intermittency is not infrequent in health, and it is then either congenital, or, as Dr. B. W. Richardson* has shown, may be due to terror, anxiety, grief, passion, mental or physical fatigue, adverse fortune, and old age. The intermittency may be only temporary, or it may become permanent; and if it becomes very frequent, may be pathological.

I now ask your attention to the pulse in disease, and I shall consider the subject under the following heads:

1st.—The condition of the walls of the vessel the seat of pulsation.

2d.—Changes referable to the several factors of the pulse.

3d.—Names and significance of certain pulses.

1st.—The condition of the walls of the vessel the seat of the pulsation. In health, an artery of the size of the radial should not be felt in the interval of pulsation. When the artery can be easily appreciated in this interval, the coats of the vessel have undergone some pathological change, or else the vessel is over-distended with blood; the blood pressure is greatly increased. The artery sometimes feels like a rubber tube with thick walls, or a pipe with rigid walls, or, again, resembles a string of beads. It is often tortuous or serpentine, and may be traced up almost the entire forearm. These changes in the walls of the artery are the result of chronic inflammation with subsequent degeneration—deposition of calcareous matter. Usually these changes are widely distributed in the arteries throughout the body. The temporal

* Discourses on Practical Medicine: On Intermittent Pulse and Palpitation. London, 1871.