

Respiratory rate

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Respiratory rate (RR) (aka **respiration rate**, **pulmonary ventilation rate** or **ventilation rate**) is the number of breaths a living being, such as a human, takes within a certain amount of time (frequently given in breaths per minute).

There is only limited research on monitoring respiratory rate, and these studies have focused on such issues as the inaccuracy of respiratory rate measurement and respiratory rate as a marker for respiratory dysfunction.

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Measurement

The human respiration rate is usually measured when a person is at rest and simply involves counting the number of breathes for one minute by counting how many times the chest rises. Respiration rates may increase with fever, illness, OR other medical conditions. When checking respiration, it is important to also note whether a person has any difficulty breathing.

Inaccuracies in respiratory measurement have been reported in the literature. One study compared respiratory rate counted using a 15 second count period, to a full minute, and found significant differences in the rates. ^[*citation needed*] Respiratory rates measurement in children under five years, for a 30 second or 60 second period, suggesting the 60 seconds resulted in the least variability. Another study found that rapid respiratory rates in babies, counted using a stethoscope, were 20–50% higher than those counted from beside the cot without the aid of the stethoscope. ^[*citation needed*] Similar results are seen with animals when they are being handled and not being handled—the invasiveness of touch apparently is enough to make significant changes in breathing.

Normal findings

Average respiratory rate reported in a healthy adult at rest is usually given as 12 breaths per minute ($^{12}/_{60}$ Hz)^{[1][2]} but estimates do vary between sources, e.g., 12–20 breaths per minute, 10–14,^[3] between 16–18,^[4] etc. With such a slow rate, more accurate readings are obtained by counting the number of breaths over a full minute.

Optimum breathing

A trained, systematic approach to deep breathing may lower respiration rates in cardiac patients, helping them to maintain healthy blood oxygen levels and become more physically fit. In one study, 15 cardiac patients were assigned to one of two experimental groups. One of the groups learned "complete yoga breathing," a style of respiration that encourages slow, deep breathing at a rate of about six breaths per minute. Those patients continued practicing the breathing method at home for an hour a day. After a month, the patients practicing the breathing technique breathed more slowly, had higher levels of blood oxygen, and performed better on exercise tests.^[5]

Average respiratory rates, by age:

- Newborns: Average 44 breaths per minute
- Infants: 20–40 breaths per minute
- Preschool children: 20–30 breaths per minute
- Older children: 16–25 breaths per minute
- Adults: 12–20 breaths per minute
- Adults during strenuous exercise 35–45 breaths per minute
- Athletes' peak 60–70 breaths per minute^[6]

Examples

- 5-year-old child sitting (Breathing frequency: $\frac{23}{60}$ Hz, Tidal volume: 0.213 L)
- Adult male sitting (Breathing frequency: $\frac{12}{60}$ Hz, Tidal volume: 0.75 L)^[7]

Minute volume

Respiratory minute volume is the volume of air which can be inhaled (inhaled minute volume) or exhaled (exhaled minute volume) from a person's lungs in one minute.

Diagnostic value

The value of respiratory rate as an indicator of potential respiratory dysfunction has been investigated but findings suggest it is of limited value.

One study found that only 33% of people presenting to an emergency department with an oxygen saturation below 90% had an increased respiratory rate.^[citation needed] An evaluation of respiratory rate for the differentiation of the severity of illness in babies under 6 months found it not to be very useful. Approximately half of the babies had a respiratory rate above 50 breaths per minute, thereby questioning the value of having a "cut-off" at 50 breaths per minute as the indicator of serious respiratory illness.

It has also been reported that factors such as crying, sleeping, agitation and age have a significant influence on the respiratory rate.^[citation needed] As a result of these and similar studies the value of respiratory rate as an indicator of serious illness is limited.

See also

- Dyspnea
- Spirometer

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