Understanding absolute and relative risk reduction

- The differences between relative and absolute risk reductions are often poorly understood by health professionals, and even more poorly understood by patients. However these concepts are critical for communicating information to your patients.

- The **event rate** is the proportion of people in the population who experience the particular event. The event rate changes according to baseline risk. While an event rate is reported in a clinical trial, you can only ever estimate an event rate for your patient using an understanding of their disease and risk factors.

- The **relative risk reduction** is the difference in event rates between two groups, expressed as a proportion of the event rate in the untreated group. For example, if 20% of patients die with treatment A, and 15% die with treatment B, the relative risk reduction is 25%. If the treatment works equally well for those with a 40% risk of dying and those with a 10% risk of dying, the absolute risk reduction remains 25% across all groups.

- The **absolute risk reduction** is the arithmetic difference between the event rates in the two groups. This varies depending on the underlying event rate, becoming smaller when the event rate is low, and larger when the event rate is high. In the example above, there is a 5% absolute risk reduction with treatment B if the event rate is 20%. However as the event rate increases to 40%, the absolute risk reduction increases to 10%. As the event rate decreases to 10%, the absolute risk reduction decreases to 2.5%. The treatment still works just as well, but the numbers have changed.

- If a patient is told that treatment B reduces their risk of dying by 25% (the relative risk reduction), they may make a different decision to the one they would make when told that treatment B reduces their risk of dying by 2.5%.

- The **number needed to treat** is calculated as 1/ARR. It is the number of people that you would have to treat with treatment B in order to save one additional life. In the examples above, treatment B may give a NNT that varies from 10 to 40 depending on the expected event rate.

The absolute risk reduction is dependent upon the baseline risk of the study population or the individual patient.