

HOW TO CALCULATE A HOSPITALS OBSERVED/EXPECTED MORTALITY RATIO

The method for calculating a hospital's observed/expected mortality ratio is described below.

Note that risk-adjustment for NELA will ultimately use a re-calibrated version of P-POSSUM and will therefore lead to different estimates to those calculated from the P-POSSUM predicted risk in the NELA data entry tool. For a more detailed explanation of calculating observed/expected mortality ratios please refer to Spiegelhalter, Statist. Med. 2005; 24:1185–1202¹

Explanation

Observed deaths: the number of patients who died at the hospital

Expected deaths: the sum of predicted risk of death (expressed as a decimal rather than %) of all patients at the hospital, not just those who died (e.g. by P-POSSUM or other prediction model).

O/E ratio: Observed deaths / Expected deaths

Worked example

The most commonly used outcome is **30-day mortality** and P-POSSUM was in fact designed for the adjustment of death within 30 days of surgery.

The worked example below uses **30 day mortality**. This could be modified to risk adjust 90-day, 1 year etc. but note that P-POSSUM may be less accurate beyond 30 days.

A data export was performed at hospital "y" (please refer to the 'worked example' CSV file)

10 patients underwent surgery

Observed inpatient deaths = 2

Observed deaths within 30 days of surgery = 1

1 patient died within 30 days of surgery ("patient 5")

("Patient 6" died 43 days after surgery)

Expected deaths within 30 days of surgery = 3 (well, 2.995 to be precise!)

O:E ratio = 0.33

¹ http://www.medicine.cf.ac.uk/media/filer_public/2010/10/11/journal_club_-_spiegelhalter_stats_in_med_funnel_plots.pdf

HOW TO PERFORM THESE CALCULATIONS:

Step 1: Download your hospital's data from the NELA webtool using the first export option 'NELA proforma'

Step 2: A zero in column GM identifies patients who died in hospital (inpatient deaths)

Step 3: Calculate length of stay (LOS) and exclude any cases with a LOS >30 days. Length of stay (days) can be calculated using the formula [=GN-CC].

(This formula is provided in column GP in the attached spreadsheet (O-E-ratio-calculation Worked Example) and can be copied and pasted directly into the spreadsheet of your own data)

Step 4 : Column BZ contains the preoperative P-POSSUM predicted 30-day mortality

The sum of the values in column BZ, when expressed as decimals, represent the expected number of deaths within 30-days of surgery. To explain this, these data from the spreadsheet are shown in Table 1.

The equations in cells BZ13 and BZ14 can be copied and pasted into your spreadsheet for these calculations. **But note** you'll need to change the range of cells (i.e. BZ11) to include the number of patients in your spreadsheet

Patient	1	2	3	4	5	6	7	8	9	10	Total
%	17.3%	37.2%	3.9%	29.7%	96.5%	89.5%	21.2%	0.8%	1.7%	1.7%	
decimal	0.173	0.372	0.039	0.297	0.965	0.895	0.212	0.008	0.017	0.017	2.995

Table 1.

Step 5: Calculation of the observed deaths within 30 days/ Expected deaths within 30 days (O/E ratio)

$$1 \div 2.995 = 0.33 \text{ (ie result of Step 2 / result of Step 4)}$$

In other words, the number of observed deaths within 30 days at hospital "y" was approximately one-third of the deaths expected for patients with these characteristics.

Please note that it is important to ensure that the ratio is the correct way round!