

Study design

The first of three articles on study design explains the cross-sectional survey

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How would you design a study to see if the use of a particular antibiotic in your practice was raising levels of resistance (trimethoprim for the treatment of cystitis, for example)?

One way to approach this would be to take a look at the proportion of midstream urine (MSU) test results that come back showing resistance to trimethoprim over the next month, and use the practice computer to see how many trimethoprim prescriptions are issued over the same period.

This would constitute a cross-sectional survey, which is like a single snap-shot in time of the prescribing rate and resistance level.

The results might read as follows:

No of prescriptions for trimethoprim per 10,000 patients on list	% of MSU tests showing resistance to trimethoprim
15	75%

This is difficult to interpret by itself as you have nothing to compare it with, so you might approach a neighbouring practice to measure the same variables over the same time-frame and come up with the following:

	No of prescriptions for trimethoprim per 10,000 patients on list	% of MSU tests showing resistance to trimethoprim
Your practice	15	75%
Nearby practice	30	85%

How would you interpret these results? You think that this suggests that higher

trimethoprim usage may be causing higher levels of resistance in the other practice, but it could simply be chance variation, as the numbers are rather small.

To obtain larger numbers, you ask the prescribing adviser for PACT data for the whole PCT and check on resistance levels in the local microbiology lab. Now you find a different picture:

	No of prescriptions for trimethoprim per 10,000 patients on list	% of MSU tests showing resistance to trimethoprim
Your practice	15	75%
Nearby practice	30	85%
PCT	60	60%

Both your practice and the neighbouring one have lower levels of trimethoprim prescribing but higher levels of resistance. So what is going on?

There are many alternative explanations, because this type of cross-sectional survey can measure association between prescribing and resistance but cannot assess causation.

In this case, it is quite likely that there is reverse causation as the doctors who are most aware of resistance to trimethoprim may choose a different antibiotic for cystitis, leading to lower levels of prescribing of the drug in areas where there is high resistance.

Question – if you were to survey the patients in your practice with lung cancer and compare their current smoking status with that of the rest of the population, why might the level of smoking be lower than expected?

I will give you the answer with next month's article, which will discuss the strengths and weaknesses of the case-control study design.

