

# Audit, Service Improvement and Research: Guidance on data analysis and drawing conclusions

**IT IS THE RESPONSIBILITY OF ALL USERS OF THIS SOP TO ENSURE THAT  
THE CORRECT VERSION IS BEING USED**

All staff should regularly check the R&D Unit's website and/or Q-Pulse for information relating to the implementation of new or revised versions. Staff must ensure that they are adequately trained in the new procedure and must make sure that all copies of superseded versions are promptly withdrawn from use unless notified otherwise by the SOP Controller.

The definitive versions of all R&D Unit SOPs appear online. If you are reading this in printed form check that the version number and date below is the most recent one as shown on the R&D Unit website: [www.research.yorkhospitals.nhs.uk/sops-and-guidance-/](http://www.research.yorkhospitals.nhs.uk/sops-and-guidance-/) and/or Q-Pulse

Guidance Document Reference:	R&D/G08
Version Number:	4.0
Author:	Deborah Phillips
Implementation date of current version:	10 <sup>th</sup> October 2023

Approved by:	Name/Position:	Monica Haritakis, Research QA Manager
	Date:	11 <sup>th</sup> September 2023
	Name/Position:	Sarah Sheath, SOP Controller
	Date:	11 <sup>th</sup> September 2023

This SOP will normally be reviewed every 3 years unless changes to the legislation require otherwise

### Version History Log

This area should detail the version history for this document. It should detail the key elements of the changes to the versions.

<b>Version</b>	<b>Date Implemented</b>	<b>Reviewers</b>	<b>Details of significant changes</b>
1.0	1 <sup>st</sup> June 2015		
2.0	18 <sup>th</sup> September 2017		Change of Author, change of title, review and re format
3.0	15 <sup>th</sup> July 2019		Change of link to R&D website. Minor formatting changes
4.0	10 <sup>th</sup> October 2023	Deborah Phillips	Change of Trust name

## 1 Introduction

Clinical audit, service improvement/ evaluation and research projects are sometimes confused because they have many things in common. For example;

- They all involve asking a question about clinical practice
- They can focus on the structure, process or outcome of that clinical practice
- All require careful identification of the sample
- Both use similar methods for collecting information.

Audit / service evaluation and research are also linked and help to inform each other: without research we don't know what constitutes best practice and without audit / service evaluation we don't know whether we are offering best practice to patients. However audit / service evaluation and research projects are distinct from each other in many ways. For example;

- The extent and type of formal approvals required
- Their purpose
- The rigour with which they are carried out
- How the data is analysed
- The claims that can be made from the data that is gathered.

When writing up audits and service evaluation projects, especially for external publication including conference presentations, great care has to be taken especially with the way the data are analysed and the conclusions that are reached. An audit or service evaluation cannot really tell us, for example, that a treatment is effective; only a research project in the shape of a randomised controlled trial can answer that question.

The following table provides guidance on data analysis and drawing conclusions for the different types of projects mentioned above.

	Audit and Service Improvement / Evaluation	Research																		
<b>Data Analysis</b>																				
<u>Descriptive Statistics</u>	 <p>Frequencies (number counts)                      Percentages                      Mean (average)                      Median (middle value)                      Mode (most frequently occurring value)                      Standard deviation or range (the extent to which the data varies)</p>	 <p>Frequencies (number counts)                      Percentages                      Mean (average)                      Median (middle value)                      Mode (most frequently occurring value)                      Standard deviation or range (the extent to which the data varies)</p>																		
<i>Examples</i>	<p>Audit of management of fractured neck of femur (# NoF)</p> <p>College of Emergency Medicine Standard:                      75% of patients with # NoF should have an X ray within 60 minutes of arriving at the ED</p> <p>Result found in audit: 45% of patients with # NoF had an X ray within 60 minutes of arrival at the ED</p> <p>Service review of patients having a paramedial forehead flap procedure</p> <p>Of the 25 nasal paramedial forehead flaps undertaken, 23 were for skin cancer (age range 46-88 years) and 2 for traumatic nasal avulsion (ages 33 and 35 years). The average pedicle division time was 36 days (range 14 to 65 days). Five patients required a more complicated 3 stage procedure. All patients surveyed were satisfied with the cosmetic result (average score = 9.3 /10) and the service provided (average score = 9.5 /10).</p>	<p>Participants were randomised to be nursed on an alternating pressure mattress (n = 982) or an alternating pressure overlay (n = 990). Overall 207 (10.5%) people developed a total of 305 new pressure ulcers, most of which (n = 207) were grade 2 ulcers (97.4%). Eight people developed grade 3 pressure ulcers, three in the overlay group and five in the mattress group.</p> <table border="1" data-bbox="1191 992 2047 1136"> <thead> <tr> <th></th> <th>Overlay group</th> <th>Mattress group</th> </tr> </thead> <tbody> <tr> <td>Men</td> <td>365 (36.9%)</td> <td>346 (35.2%)</td> </tr> <tr> <td>Women</td> <td>624 (63.1%)</td> <td>636 (64.8%)</td> </tr> </tbody> </table> <table border="1" data-bbox="1191 1184 2047 1279"> <thead> <tr> <th>Age</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Mean</td> <td>75.4 years</td> <td>75.0 years</td> </tr> <tr> <td>Std Dev</td> <td>9.7 years</td> <td>9.2 years</td> </tr> </tbody> </table>		Overlay group	Mattress group	Men	365 (36.9%)	346 (35.2%)	Women	624 (63.1%)	636 (64.8%)	Age			Mean	75.4 years	75.0 years	Std Dev	9.7 years	9.2 years
	Overlay group	Mattress group																		
Men	365 (36.9%)	346 (35.2%)																		
Women	624 (63.1%)	636 (64.8%)																		
Age																				
Mean	75.4 years	75.0 years																		
Std Dev	9.7 years	9.2 years																		

<p><u>Inferential Statistics</u> and <u>Confidence Intervals</u></p>	<p></p> <p>Not appropriate for this type of project.</p> <p>We use Inferential statistics when we want to 'infer' something about the data we have collected in terms of a wider population. In other words we are trying to 'generalise' the findings from our project to a wider population of patients or to other hospitals or settings. This is a feature of <u>research</u>.</p>	<p></p> <p>e.g. <i>t</i> tests, ANOVA, Mann Whitney U test, Wilcoxon test, Chi square test, Pearson correlation coefficient</p> <p>The results of the above tests are used to assess the probability that your study findings may just be due to 'chance'. You quote the probability or 'p' value in your results. Any p value less than 0.05 (5%) is regarded as 'statistically significant'. In other words there is only a small probability your findings are due to chance.</p> <p>95% Confidence intervals are also frequently quoted in the results of research studies. Confidence intervals are used to estimate what the result might be for the whole population of relevant patients (rather than just the patients in your study). It is quoted as a range with a lower limit and an upper limit.</p>
<p><i>Examples</i></p>	<p></p> <p>Not relevant</p>	<p>The primary outcome was the number of participants who developed a new grade 2 pressure ulcer (nursed on an alternating mattress compared to an overlay). The data were analysed using a Chi square test.</p> <p>There was no difference in the proportion of participants who developed a new pressure ulcer of grade 2 or worse. The difference in proportion of patients developing an ulcer was 0.4% (10.7% of overlay patients; 10.3% of mattress patients); <math>p = 0.75</math>, 95% confidence interval = -2.3% to 3.1%)</p>

Writing Conclusions	Audit and Service Improvement / Evaluation	Research
<p><b>Guidance</b></p>	<p>In drawing conclusions from a local project, you must take care that you <u>do not generalise</u> the findings to a wider population as this is a feature of research. Your project has probably not been designed in a way that would allow you to draw generalised conclusions. If conclusions from a local project are generalised they may carry much more weight with readers than they deserve and have more influence on clinical practice than they should. A good way of avoiding this is to make it clear that the audit / service evaluation was only carried out in your institution / or locally e.g. 'The aim of this project was to look at outcomes following xxxx procedure carried out <u>in our institution</u>'.</p>	<p>If your research project has been designed properly, and has the appropriate approvals, you should be able to make 'generalisable' claims as this is the purpose of doing a research project. In other words the results from your study are being used to make claims that could be applied more widely. For example you are making a claim that an intervention is effective / not effective which is going much further than saying the outcomes for that intervention have been good within your institution.</p>
<p><i>Examples</i></p>	<p> Not relevant</p> <p>When we offered additional physiotherapy to patients in <u>our local intensive care unit</u>, this <u>appeared</u> to improve the level of mobility they achieved on discharge from ICU.</p> <p>xxxx procedure was well tolerated by <u>patients in our institution</u> and they experienced very little short term morbidity. However these results would need to be confirmed in a prospective randomised controlled trial.</p>	<p>No difference was found between alternating mattresses and alternating pressure overlays in the proportion of people who develop a pressure ulcer.'</p> <p>If this service evaluation on physiotherapy in ICU had been designed and carried out as a proper research study, you would be able to make a wider (generalised) claim about its impact e.g. 'Increased physiotherapy staffing in the form of specialist critical care rehabilitation teams is effective in improving the level of mobility within critical care. This increased function was also associated with a reduced length of stay and shorter weaning times'.</p> <p>If this service evaluation on xxx procedure had been designed and carried out as a proper research study, you would be able to make a wider (generalised) claim about its effectiveness etc e.g. 'xxxx procedure is well tolerated, safe, and only results in short term morbidity'.</p>