**What are cohort studies?**

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In 1951, Richard Doll and Austin Bradford-Hill commenced a groundbreaking research project by writing to all registered doctors in the UK to ask about their smoking habits. The *British Doctors Study* recruited and followed-up over 40,000 participants, monitoring mortality rates and causes of death over the subsequent years and decades. Even by the time of the first set of preliminary results in 1954, there was evidence to link smoking with lung cancer and increased mortality. Over the following decades, the study provided further definitive evidence of the health risks from smoking, and was extended to explore other causes of death (e.g., heart disease) and other behavioural variables (e.g., alcohol intake).

The *Doctors Health Survey* is one of the largest, most ambitious and best-known cohort studies and demonstrates the value of this approach in supporting our understanding of disease risk. However, as a method, cohort studies can have much wider applications. This article provides an overview of cohort studies, identifying the opportunities and challenges they present to researchers, and the role they play in developing the evidence base for nursing and healthcare more broadly.

**What are cohort studies?**

Cohort studies are a type of longitudinal study—an approach that follows research participants over a period of time (often many years). Specifically, cohort studies recruit and follow participants who share a common characteristic, such as a particular occupation or demographic similarity. During the period of follow-up, some of the cohort will be exposed to a specific risk factor or characteristic; by measuring outcomes over a period of time, it is then possible to explore the impact of this variable (e.g., identifying the link between smoking and lung cancer in the *British Doctors Study*.) Cohort studies are, therefore, of particular value in epidemiology, helping to build an understanding of what factors increase or decrease the likelihood of developing disease.

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**Strengths and weaknesses of cohort studies**

Cohort studies are an effective and robust method of establishing cause and effect. As they are usually large in size, researchers are able to draw confident conclusions regarding the link between risk factors and disease. In many cases, because participants are often free of disease at the commencement of the study, cohort studies are particularly useful at identifying the timelines over which certain behaviours can contribute to disease.

However, the nature of cohort studies can cause challenges. Collecting prospective data on thousands of participants over many years (and sometimes decades) is complex, time-consuming, and expensive. Participants may drop out, increasing the risk of bias; equally, it is possible that the behaviour of participants may alter because they are aware that they are part of a study cohort. The analysis of data from these large-scale studies is also complex, with large numbers of confounding variables making it difficult to link cause and effect. Where cohort (or ‘cohort-like’) studies link to a specific intervention (as in the case of the Lansperger *et al* study into nursing practitioner-led critical care intervention), the lack of randomisation to different arms of the study makes the approach less robust than randomised controlled trials.

One way of making a cohort study less time-consuming is to carry it out retrospectively. This is a more pragmatic approach, as it can be completed more quickly using historical data. For example, Wray *et al* used a retrospective cohort study to identify factors that...
were associated with non-continuation of students on nursing programmes. By exploring characteristics in five previous cohorts of students, they were able to identify that factors such as being older and/or local were linked to higher levels of continuation. However, this retrospective approach increases the risk of bias in the sampling of the cohort, with greater likelihood of missing data. Retrospective cohort studies are also weakened by the fact that the data fields available are not designed with the study in mind—instead, the researcher simply has to make use of whatever data are available, which may hinder the quality of the study.

**Reporting and critiquing of cohort studies**

When reporting a cohort study, it is recommended that STROBE guidance is followed. STROBE is an international, collaborative enterprise which includes experts with experience in the organisation and dissemination of observational studies, including cohort studies. The aim is to STrengthen the Reporting of OBservational studies in Epidemiology. The STROBE checklist for cohort studies - available at https://www.strobe-statement.org/fileadmin/Strobe/uploads/checklists/STROBE_checklist_v4_combined.pdf - includes detail related to the introduction/methods/results/discussion of the study.

Critical appraisal of any cohort study is essential to identify the strengths and weaknesses of the study and to determine the usefulness and validity of the study findings. Components of critical appraisal in relation to cohort studies include evaluation of the study design in relation to the research question, assessment of the methodology, suitability of statistical methods used, conflicts of interest and how relevant the research is to practice.

**Conclusion**

Cohort studies are the cornerstone of epidemiological research, providing an understanding of risk factors for disease based on findings in thousands of participants over many years. Disease prevention guidelines used by nurses and other healthcare professionals across the globe are based on the evidence from high-profile studies, such as the British Doctors Study, the Framingham Heart Study and the Nurses’ Health Study. However, cohort studies offer opportunities outside epidemiology: in nursing research, the approach is useful in exploring areas such as factors that influence students’ progression through their programme or nurses’ progression through their career.

This approach to research does bring with it some important challenges—often related to their size, complexity and longevity. However, with careful planning and implementation, cohort studies can make valuable contributions to the development of evidence-based healthcare.

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