1. Introduction

1.1 The NSW Biostatistical Officer Training Program

The Biostatistics Collaboration of Australia (BCA) was established in 2000 using innovation funds from the federal government's Public Health Education and Research Program (PHERP). A review of the PHERP program conducted in 1999 identified a lack of skilled biostatisticians in Australia (Biostatistics Collaboration of Australia, 2003). This phenomenon is also experienced in other countries and is being driven by an increased demand for biostatistical skills in areas such as epidemiology and clinical research, health services evaluation, laboratory research, genomics and bioinformatics (Dixon and Legler, 2003).

The BCA was established to develop, deliver and support a three-tier award structure in Australia for delivering postgraduate training in biostatistics. This was done following an industry survey to assess demand and a consultative process involving representatives from government departments, the pharmaceutical and other industries, and universities. This consultative process identified the gap between the requirement for highly qualified and skilled biostatisticians and the level of technical competence that could be provided at that time through existing degrees in public health and epidemiology on the one hand, and the orientation to the diverse and challenging needs of health research in general statistics courses, on the other. The BCA has since developed a national standard curriculum and teaching materials for post-graduate courses in biostatistics and the first postgraduate courses were offered in 2001.

The BCA defines biostatistics in the following way:

Biostatistics is the discipline that underpins the use of statistical methods, both descriptive and inferential, in health and medical research. Its foundation is the mathematics of variability and it encompasses the science of designing quantitative research studies, managing and analysing data, and interpreting the results.

In NSW, the growing emphasis on evidence-based public health and the collection of vast amounts of increasingly complex health data, have resulted in a greater need for high-level biostatistical skills within the public health workforce. In recognition of this need, the NSW Department of Health established a three-year Biostatistical Officer Training Program in 2000, within the Centre for Epidemiology and Research. The Program provides a career path for biostatisticians working in public health by bridging the gap between academic studies and development as a professional biostatistician.

The NSW Biostatistical Officer Training Program aims to produce consultant biostatisticians for the NSW health system. The role of Trainees is to:

1. Undertake statistical analysis of health data sets for periodic and ad hoc reports on the health of the NSW population, to inform health policy making, planning and evaluation in NSW;

2. Provide expert biostatistical advice to staff of the Department and Area Health Services regarding design of public health investigations and studies and analysis of health data sets, to ensure that optimal methods are used; and
3. Build the biostatistical capacity and capability of the NSW public health workforce.

During their three years of training in the NSW Department of Health, the Trainee Biostatistical Officers rotate through a range of placements throughout the NSW public health system. They are supported to undertake the Masters Degree in Biostatistics through the BCA part-time through distance learning. The current Trainee Biostatistical Officers are among the first students to participate in the BCA program.

At the end of the three-year Program, the Trainee Biostatistical Officers should have completed the necessary requirements for the relevant Masters degree, as well as have three years' working experience as a Biostatistician. The Program provides a broad training that will enable graduates to subsequently apply their biostatistical expertise to many different spheres of public health practice. Graduates should be capable of working as Biostatisticians in a range of public health service, research, development, policy, and planning positions.

Projects undertaken in placements by the current Trainee Biostatistical Officers include:

- examination of the feasibility of a Burden of Disease study in NSW;
- indicator development and data analysis for reports on the epidemiology and management of cardiovascular and respiratory diseases in NSW;
- data analysis and preparation of chapters for the report, *The health of the people of New South Wales—Report of the Chief Health Officer;*
- data management and analysis for the *2001 NSW Child Health Survey;*
- data analysis for reports on key population health indicators for NSW health areas by local government area;
- development of an index of need for the Resource Distribution Formula (RDF) using statistical models;
- sample design and development of weights for the continuous NSW Health Survey Program;
- development of an analytical plan and undertaking analysis of the Australian Secondary Schools Alcohol and Drug Survey;
- multivariate analyses of NSW Health Survey data;
- a study of trends in cancer incidence on the Rhodes peninsula;
- time series analysis of February asthma outbreaks.

This report describes the process and results of a project to develop competency standards for the NSW Biostatistical Officer Training Program. The primary purpose of the standards is to assist Biostatistical Officers and their supervisors in monitoring progress towards the development of knowledge and skills in specific learning areas, as well as to ensure that the Biostatistical Officers are competent to at least a minimum defined standard in a range of areas. These areas include:

- study design and advice;
- data management and analysis;

- professional practice;
- communication;
- management.

The secondary purpose of the competency standards is for them to be used for assessing the Work Placement Project unit (WPP unit) of the Masters Degree in Biostatistics at the University of Sydney (which is one of the universities collaborating in the BCA). All students completing the Masters degree, undertake the WPP unit for a whole semester. At the University of Sydney, assessment for the unit can take different forms; for example, a portfolio, treatise, report or journal article may be prepared based on project work carried out during the semester. For the NSW Department of Health Trainees however, the form of assessment is a Portfolio of Evidence based on work conducted over the entire three-year training period. The requirements for the Portfolio of Evidence are based on the competencies outlined in this document. The competency standards were therefore developed in consultation with the School of Public Health, University of Sydney.

This report also specifies the learning contract for Trainee Biostatistical Officers and provides information about the assessment process for the Portfolio of Evidence. The process of assessing the Portfolio of Evidence for the Masters degree is also considered by the NSW Department of Health as evidence of satisfactory performance of the Trainees. The assessment of the Portfolio of Evidence is conducted by a panel with representation from the NSW Department of Health and the School of Public Health, University of Sydney.

For the NSW Department of Health, the two components, the Portfolio of Evidence and the completion of formal Masters Degree in Biostatistics combine to satisfy the Department's requirements for the NSW Biostatistical Officer Training Program.

1.2 Training requirements of the NSW Biostatistical Officer and the NSW Public Health Officer Training Programs

The NSW Biostatistical Officer Training Program consists of two main parts:

- the off-the-job coursework for the Masters Degree in Biostatistics;
- the on-the-job training given by the Department of Health in six work placements over a three-year period.

This differs from the approach taken in the NSW Public Health Officer Training Program, in which all off-the-job training is delivered by the NSW Department of Health. The on-the-job training is similarly through six work placements over three years. The Public Health Officers enter the program with a Masters degree in a public health field and at least three years work experience in health. Public Health Officers leave the Program with the vocational qualification of a Graduate Diploma in Applied Epidemiology, accredited by the NSW Vocational Education Training and Accreditation Board. This qualification is gained through the preparation of a Portfolio of Evidence based on competency standards that have been developed for the Program (Public Health Training and Development Unit, 2000).

By contrast, the Trainee Biostatistical Officers enter with a four-year degree (or equivalent) in mathematical statistics and undertake a program of training at the Masters degree level delivered by the University of Sydney. This requires, in addition to their work at the Department in a placement, 18–24 hours of study per week. To assist Trainees with coping with the coursework, the Department grants the Trainees four hours study leave per week, but the remainder comes from the Trainees' own time. The Department also supports the Trainees by paying their University fees. The Trainee Biostatistical Officers must satisfactorily complete the Masters degree, including the assessment of a Portfolio of Evidence based on the competency standards and compiled from their six work placements.

The satisfactory assessment of the portfolio is the sole requirement for completing the NSW Public Health Officer Training Program and gaining the graduate diploma. The requirements for preparing this portfolio are therefore more detailed and onerous than that for the Biostatistical Officer Program, as the portfolio only forms a part of the assessment for the Biostatistical Officers.

1.3 Process for developing competency standards for the NSW Biostatistical Officer Training Program

The process used in the development of the competency standards included the following activities.

Stage 1

Activities undertaken in Stage 1 included:

- review of the existing competency standards in related areas (for example, the NSW Public Health Officers and others);
- review of the initial proposals for seven competency units;
- consultation with the Coordinator of the NSW Biostatistical Officer Training program;
- discussions with Trainees;
- development of a first draft (seven units) including range statements and Evidence Guides for each unit.

Stage 2

Activities undertaken in Stage 2 included:

- workshop with the representative of the School of Public Health, University of Sydney;
- input from the managers in the relevant sections of the NSW Department of Health including Epidemiologists. This included a brief discussion at a meeting and comments on draft standards;
- input from the Senior Biostatisticians;
- further comments on the draft from the representative of the School of Public Health, University of Sydney;
- comments from the Trainee Biostatistical Officers.

Stage 3

Activities undertaken in Stage 3 included:

- adjustment of the standards in line with the comments. This involved reducing the number of units to five and concentrating the major technical skills needed by biostatisticians in the first two units and developing three supporting units that describe the additional skills needed to work effectively in the role of a consulting biostatistician;
- reducing the number of assessment items and clarifying the requirements;
- circulation of the final drafts to all those involved.

Representatives of the pharmaceutical industry were also consulted to ascertain how well the competency standards met their needs and suggested what should be added to them to ensure that their industry needs were covered.

The competency standards, with a brief introduction, are given in Section 2. For an explanation of the different sections of the competency units, see the Introduction to the Standards in Section 2.