NSW Biostatistics Training Program

NSW Biostatistics Training Program Competency Framework

July 2015

NSW GOVERNMENT Health

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FOREWORD

The NSW Biostatistics Training Program was established in 2000 as part of a broader workforce strategy aimed at building the biostatistical capacity and capability of the New South Wales health system.

The rapid evolution of data linkage, informatics and big data presents new opportunities for biostatisticians. In 2015, a review of the Program's competencies has been undertaken to ensure that they continue to reflect contemporary biostatistical practice, and are adaptable, to meet the priorities of a dynamic health system.

The development of this competency framework took six-months of intensive, collaborative work. The process drew from other contemporary competency frameworks and extensive discussion by key stakeholders regarding the current and future expectations of professional biostatisticians. The process was overseen by a working group comprising representatives from: the Ministry's Population and Public Health Division; the University of Sydney; program graduates; and the current group of Trainee Biostatisticians.

The competency framework reflects the key skills and knowledge expected of graduates, and aims to ensure that the NSW Biostatistics Training Program remains at the forefront of biostatistical training.

Dr Kerry Chant
Chief Health Officer and Deputy Secretary
Population and Public Health

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INTRODUCTION

The NSW Biostatistics Training Program aims to build the biostatistical capacity and capability of the NSW health system. The three-year workplace-based training program offers a supervised learning experience for people who have completed undergraduate study in statistics and are committed to a career in biostatistics.

The Program is delivered by the NSW Ministry of Health in partnership with the University of Sydney and the Biostatistics Collaboration of Australia (BCA). The BCA represents a consortium of biostatistical experts from around Australia, including representatives from universities, government and industry who have combined to offer a range of postgraduate courses via an alliance of universities.

Over three years, Trainee Biostatisticians rotate through a series of work placements within the NSW health system, and complete a Master of Biostatistics degree part-time via distance learning through the University of Sydney. Learning is guided by a competency framework and the strategic and operational priorities of NSW Health.

Upon successful completion of the Program, graduates are eligible for:

- award of a Master of Biostatistics, conferred by the University of Sydney;
- a Certificate of Completion, conferred by the NSW Ministry of Health;
- accreditation as a graduate statistician with the Statistical Society of Australia Incorporated.

The Competency Framework

Since 2003, the Program has used a detailed competency framework to describe the intended learning outcomes for Trainee Biostatisticians, and guide the delivery of workplace learning and assessment.

The current competency framework comprises five competency areas, representing a comprehensive blueprint for professional biostatistical practice. The framework is based on adult learning principles; an understanding of contemporary workplace practice in this field; and years of practical experience in learning and assessment since the Program's inception.

Trainees must demonstrate competence in each of the five core competency areas, through evidence of applied workplace practice. There is no prescribed sequence for addressing the competencies.

Each competency area comprises the following components:

Competency elements – which guide the scope of practice in each competency area.

Performance criteria – which describe activities, skills, knowledge and understanding that provide evidence of competent performance of each competency element.

Evidence guide – which prescribes the evidence that trainees are required to present for assessment.

Assessment

Competence is demonstrated through direct evidence of workplace performance and the resulting products such as written reflections, reports and published papers, as well as academic results. Trainees compile evidence throughout the three years of training and develop a portfolio of evidence for assessment, which is undertaken jointly by the NSW Ministry of Health and the University of Sydney.

The portfolio of evidence is attributed to two (of twelve) units of the University of Sydney's Master of Biostatistics.

SUMMARY OF COMPETENCY AREAS

Competency Area	Competency Element
1 PRINCIPLES OF DESIGN	1.1 Applies biostatistical principles and methods to support the design of studies 1.2 Applies biostatistical principles to optimise the use of surveillance data 1.3 Provides high-level and accurate biostatistical advice to support health system priorities
2 DATA MANAGEMENT AND ANALYSIS	2.1 Efficiently manages and manipulates large data sets 2.2 Leads a range of complex biostatistical analyses 2.3 Accurately documents data management and analysis 2.4 Summarises and interprets statistical results
3 PROFESSIONAL PRACTICE	3.1 Actively participates in the NSW Biostatistics Training Program 3.2 Demonstrates understanding of the Australian and NSW health systems 3.3 Applies regulatory frameworks and guidelines to the use of data 3.4 Develops evidence to inform health policy or practice 3.5 Demonstrates ethical professional practice
4 COMMUNICATION	4.1 Disseminates evidence through the preparation of reports and peer review articles 4.2 Produces timely briefings and government correspondence 4.3 Communicates statistical concepts to a range of audiences
5 MANAGEMENT	5.1 Works effectively in multi-disciplinary teams 5.2 Manages and leads projects 5.3 Develops recommendations based on evidence and context

COMPETENCY AREAS

1. PRINCIPLES OF DESIGN

Specifies the outcomes required to apply biostatistical principles to the design of studies, including studies involving surveillance data.

Competency Element	Performance Criteria	Evidence Guide*
1.1 Applies biostatistical principles and methods to support the design of studies	i. Understands the nature of the study questions and hypothesis ii. Investigates available data sources and appropriate study designs iii. Describes the sampling frame and study population iv. Considers statistical methods specific to the nature of the data and the study questions v. Justifies analysis methods, clearly outlining potential sources of bias and study limitations	1a. One example of applying biostatistical principles to optimise the use of linked data, including: - a one-page written reflection describing the context for this work, including justification of the biostatistical method and its potential limitations; and - details of biostatistical aspects of the design of the study: its aim, study population, and methods of analysis. 1b. One example of applying biostatistical principles to enhance the use of routinely collected surveillance data, including: - a one-page written reflection describing the context for this work, including justification of the biostatistical method and its potential limitations; and - details of biostatistical aspects of the design of the study: its aim, study population, and methods of analysis. 1c. One example of applying biostatistical principles to the design of a study, including: - a one-page written reflection describing the context for this work, including justification of the biostatistical method and its potential limitations; and - details of biostatistical aspects of the design of the study: its aim, study population, and methods of analysis. 1d. One example of high-level biostatistical advice that you have provided. The example must clearly define the request, issues, scope of the advice and the outcome. *All evidence must clearly show your role or contribution.
1.2 Applies biostatistical principles to optimise the use of surveillance[1] data	i. Defines the objectives of the surveillance system, the population under surveillance and how information is collected ii. Describes the quality of the data including its limitations iii. Justifies new or updated methods or analyses that will maximise the utility of surveillance data iv. Determines appropriate summary statistics or indices for the analysis	
1.3 Provides high-level and accurate biostatistical advice to support health system priorities	i. Liaises with senior staff, clarifies requirements and understands current analytic and policy imperatives ii. Develops advice based on biostatistical principles and methods iii. Explains statistical concepts clearly and checks for understanding iv. Resolves issues to help reach consensus about the design of the study or analysis plan	

[1] Surveillance is defined as systematic ongoing collection, collation and analysis of data and the timely dissemination of information to those who need to know so that action can be taken (Source: World Health Organization). Surveillance data includes data collected through routine administration processes as well as systematic surveys. The Centre for Health Record Linkage website outlines routinely collected data: http://www.cherel.org.au/data-dictionaries

2. DATA MANAGEMENT AND ANALYSIS

Specifies the outcomes required to manage and analyse data and report the results in a clear and comprehensible form, following liaison with senior staff to clarify requirements and identify analytic and policy imperatives.

Competency Element	Performance Criteria	Evidence Guide*
2.1 Efficiently manages and manipulates large data sets	i. Uses and documents systematic approaches to managing and storing data and meta-data ii. Uses quality control processes to protect data integrity iii. Transforms data using reliable and valid rules iv. Understands and uses valid and reliable health statistical classifications	2a. Evidence that you have prepared or contributed to the preparation of a dataset for use by other health professionals. The evidence could include a data dictionary, quality assurance report, or end-user documentation. The following (2b and 2c) must include at least one analysis of linked data. 2b. One example of a complex multi-variable analysis of data. The example must include: - a written reflection to contextualise the analysis, including how you approached it and its strengths and limitations; - documentation to support scrutiny of the methods including diagnostics for the model fitting; - accurate summaries of the data and analysis in graphs or tables according to the *BCA Guidelines for Reporting Statistical Results;* and - interpretation of the results, written clearly and concisely, without jargon, and drawing conclusions based on the analysis. 2c. One example of the analysis of data from a complex study design. The example must include: - a written reflection to contextualise the analysis, including how you approached it and its strengths and limitations; - accurate summaries of the data and analysis in graphs or tables according to the *BCA Guidelines for Reporting Statistical Results*; and - interpretation of the results, written clearly and concisely, without jargon, and drawing conclusions based on the analysis. 2d. A one-page written reflection which demonstrates your understanding of the potential limitations in data relating to Aboriginal people. Where possible, your reflection should relate to the work presented in response to item 2a, 2b, or 2c (above). *All evidence must clearly show your role or contribution.
2.2 Leads a range of complex biostatistical analyses	i. Defines the objectives and proposed outcomes of complex analyses ii. Performs descriptive analysis to summarise and check the data iii. Undertakes complex analysis, using diagnostics to check model assumptions iv. Adjusts analysis as required	
2.3 Accurately documents data management and analysis	i. Maintains documentation about the data set, data management and statistical analysis ii. Documents analytical reasoning to justify the methods used	
2.4 Summarises and interprets statistical results	i. Summarises statistical results in graphs and tables to support clear interpretation ii. Interprets results in light of the original research question iii. Describes the limitations of the study and their implications iv. Understands the limitations and gaps in data collection for Aboriginal people	

3. PROFESSIONAL PRACTICE Specifies the outcomes required of a biostatistician working within the NSW health system, including working within relevant regulatory and ethical frameworks and developing evidence to inform policy and practice.		
Competency Element	**Performance Criteria**	**Evidence Guide***
3.1 Actively participates in the NSW Biostatistics Training Program	i. Demonstrates commitment to competency-based training and the Master of Biostatistics ii. Actively participates in learning activities including coursework requirements of the Master of Biostatistics iii. Communicates with the program management team regarding employment related issues iv. Responds effectively to changes in organisational requirements v. Continually reflects and adapts practice	3a. A two-page written reflection showing: - your understanding of the Australian and NSW health systems, including how the role of different levels of government, stakeholders and governance issues influenced a project direction and why a particular course of action was justified; - how and why regulatory frameworks were applied to your work and the impact of doing so; and - any ethical issues that were considered as part of your work, and how these were addressed. 3b. A report, publication, briefing and/or other document outlining your work to monitor, evaluate or research an area of health policy or practice using health indicators. The document should include the background and aims, the intended effects on population sub-groups and a critique of the quality of the evidence produced. *All evidence must clearly show your role or contribution.
3.2 Demonstrates understanding of the Australian and NSW health systems	i. Organises work effectively based on an understanding of national, state and local health system structures and processes ii. Identifies the role and function of relevant agencies, stakeholders and partners across the health systems iii. Understands governance structures within NSW Health	
3.3 Applies regulatory frameworks and guidelines to the use of data	i. Describes the role and purpose of data collections held by health agencies ii. Identifies relevant regulatory frameworks and guidelines iii. Applies relevant legislation, ethical requirements, policies, guidelines and procedures to data use, sharing/exchange, linkage and curation	
3.4 Develops evidence to inform health policy or practice	i. Understands the policy context and drivers underpinning projects and activities ii. Develops evidence to evaluate and target policy or practice iii. Describes inequalities in health/health status of different population groups iv. Consistently reflects on the quality of evidence for informing policy or practice	
3.5 Demonstrates ethical professional practice	i. Consistently applies the core values of NSW Health in professional conduct ii. Applies biostatistical principles to guide ethical appraisal of research design iii. Manages the sensitivity of information, adhering to relevant guidelines iv. Discerns ethical implications for public health decision-making, arising from statistical results	

4. COMMUNICATION Specifies the outcomes required for effective communication related to working as a biostatistician within the health system, with the broader aim of interpreting, disseminating and translating evidence to enhance the data literacy of others.		
Competency Element	**Performance Criteria**	**Evidence Guide***
4.1 Disseminates evidence through the preparation of reports and peer review articles	i. Writes high quality reports and peer review articles ii. Structures and formats reports or peer review articles for the intended audience and purpose iii. Clearly outlines the background, aims, statistical methods and interpretation of results based on analyses iv. Presents data to support clear interpretation v. Uses appropriate references	4a. A two-page written reflection on your experiences of verbally communicating statistical concepts to a range of audiences in different settings, including: - how well the background, methods and results were communicated; - how successfully questions were fielded; and - how this experience has influenced your approach to presenting in future. 4b. A copy of a formal presentation, such as at a professional conference or formal meeting. 4c. A submitted or published peer-reviewed article (in which you are included as an author) *or* a final report, written to a standard acceptable for publication. The article or report should clearly and concisely present the background, methods, results and discussion of statistical analysis according to relevant NSW Government guidelines. 4d. A signed briefing document for the release of unit record data which communicates the background and validity of the data to answer the research question, as well as the confidentiality requirements for the release. *All evidence must clearly show your role or contribution.
4.2 Produces timely briefings and government correspondence	i. Prepares high quality briefings and government correspondence ii. Clearly expresses the current issues and likely consequences that might impact on decision-making iii. Adheres to organisational sign-off processes iv. Understands and complies with organisational media protocols	
4.3 Communicates statistical concepts to a range of audiences	i. Develops presentations suitable for the target audience, setting or conference theme ii. Communicates complex statistical information in easy to understand language. Logically explains methods, interprets results and checks for understanding iii. Listens to counter-arguments and provides effective responses iv. Applies cultural competence when reporting information about the health of Aboriginal people and other priority populations	

5. MANAGEMENT

Specifies the outcomes required for working in a team, managing a project and developing advice and recommendations.

Competency Element	Performance Criteria	Evidence Guide*
5.1 Works effectively in multi-disciplinary teams	i. Regularly informs other team members of plans, progress and outcomes ii. Understands and reinforces the role of other team members iii. Manages and negotiates conflict to achieve project outcomes	5a. A two-page written reflection outlining: - your role within a multi-disciplinary team, including management of situations where conflicting views emerge, and negotiation of an outcome; - the processes you followed to manage and lead a major project to meet organisational and time requirements, and ensure high quality outputs; - the process you applied to develop recommendations based on project work; and - the potential implications of the recommendations for the health system, specific stakeholders and/or population sub-groups. 5b. A final report and/or associated materials from a major project or activity that demonstrates effective multi-disciplinary team work and project management. *All evidence must clearly show your role or contribution.
5.2 Manages and leads projects	i. Demonstrates situational leadership to influence project directions ii. Leads project planning in consultation with senior staff and stakeholders iii. Manages quality and time requirements of a project iv. Monitors project deliverables and reporting	
5.3 Develops recommendations based on evidence and context	i. Works with supervisors and other stakeholders to discuss project outcomes and develop recommendations ii. Investigates problems, checks assumptions and considers options iii. Identifies the implications of recommendations for the health system, stakeholders and population sub-groups	

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The development of this competency framework was overseen by an advisory group comprising representatives from: the Ministry's Centre for Epidemiology and Evidence; the University of Sydney; workplace supervisors; program graduates; and the current group of Trainee Biostatisticians.

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