

REPORT

Inpatient Management of Diabetes Mellitus

Monitoring and evaluation plan

Health Economics and Evaluation Team



Collaboration. Innovation. Better Healthcare.

The Agency for Clinical Innovation (ACI) works with clinicians, consumers and managers to design and promote better healthcare for NSW. It does this through:

- *service redesign and evaluation* – applying redesign methodology to assist healthcare providers and consumers to review and improve the quality, effectiveness and efficiency of services
- *specialist advice on healthcare innovation* – advising on the development, evaluation and adoption of healthcare innovations from optimal use through to disinvestment
- *initiatives including guidelines and models of care* – developing a range of evidence-based healthcare improvement initiatives to benefit the NSW health system
- *implementation support* – working with ACI Networks, consumers and healthcare providers to assist delivery of healthcare innovations into practice across metropolitan and rural NSW
- *knowledge sharing* – partnering with healthcare providers to support collaboration, learning capability and knowledge sharing on healthcare innovation and improvement
- *continuous capability building* – working with healthcare providers to build capability in redesign, project management and change management through the Centre for Healthcare Redesign.

ACI Clinical Networks, Taskforces and Institutes provide a unique forum for people to collaborate across clinical specialties and regional and service boundaries to develop successful healthcare innovations.

A key priority for the ACI is identifying unwarranted variation in clinical practice. ACI teams work in partnership with healthcare providers to develop mechanisms aimed at reducing unwarranted variation and improving clinical practice and patient care.

www.aci.health.nsw.gov.au

AGENCY FOR CLINICAL INNOVATION

Level 4, Sage Building
67 Albert Avenue
Chatswood NSW 2067

PO Box 699 Chatswood NSW 2057
T +61 2 9464 4666 | F +61 2 9464 4728
E aci-info@health.nsw.gov.au | **www.aci.health.nsw.gov.au**

SHPN (ACI) 170413, ISBN 978-1-76000-685-3.

Produced by: ACI Health Economics and Evaluation Team

Further copies of this publication can be obtained from
the Agency for Clinical Innovation website at **www.aci.health.nsw.gov.au**

Disclaimer: Content within this publication was accurate at the time of publication. This work is copyright. It may be reproduced in whole or part for study or training purposes subject to the inclusion of an acknowledgment of the source. It may not be reproduced for commercial usage or sale. Reproduction for purposes other than those indicated above, requires written permission from the Agency for Clinical Innovation.

Version: 1 **TRIM:** ACI/D17/3926

Date Amended: 03/07/2017

© Agency for Clinical Innovation 2017

Acknowledgements

The Agency for Clinical Innovation (ACI) recognises the work and significant contributions to this monitoring and evaluation plan by the New South Wales (NSW) Diabetes Taskforce and the NSW Diabetes Taskforce In-Hospital Management Working Group.

NSW Diabetes Taskforce		
Name	Role	Organisation
Judy Luu	Clinical Lead of Diabetes Stream	Hunter New England Local Health District (LHD)
Stephen Twigg	Head of Department, Endocrinology	Sydney LHD
Vanessa Nube	Director, Podiatry	Sydney LHD
Linda Soars	Director, Integration Partnerships and Enablers	Western Sydney LHD
David Peebles	Chronic Care Manager	Western NSW LHD
Glen Maberly	Program Lead, Western Sydney Diabetes	Western Sydney LHD
Wah Cheung	Head of Department, Diabetes and Endocrinology	Western Sydney LHD
Martha Parsons	Diabetes Alliance Program Manager	Hunter New England and Central Coast Primary Health Network
Ai-Vee Chua	Clinical Lead, Dubbo Integrated Care Project	Western NSW Primary Health Network
Steve Blunden	Chief Executive Officer	Casino Aboriginal Medical Service
Jamie Newman	Chief Executive Officer	Orange Aboriginal Medical Service
Natalie Cochrane	General Practitioner	Mt Druitt Medical Centre
Michael Atalla	General Practitioner	Tottenham Medical Centre
Tim Hampton	Executive Director, Social Policy	Department of Premier and Cabinet
Daniel Comerford	Program Director, Leading Better Value	NSW Ministry of Health
Sturt Eastwood	Chief Executive Officer	Diabetes NSW & ACT
Jennie Pares	A/Manager, Health Economics & Evaluation Team	Agency for Clinical Innovation
Regina Osten	Program Manager, Primary & Chronic Care Services	Agency for Clinical Innovation
Brihony Porter	Project Officer, Acute Care	Agency for Clinical Innovation
Marina Davis	Network Manager, Acute Care Project Teams	Agency for Clinical Innovation

NSW Diabetes Taskforce In-Hospital Management Working Group

Name	Role	Organisation
Brett Fenton	Nurse Unit Manager, Diabetes Service	Central Coast LHD
Margaret Layton	Head of Department, Endocrinology	Central Coast LHD
Alison Gebuehr	Inpatient Diabetes Educator, CNC	Hunter New England LHD
Judy Luu	Clinical Lead of Diabetes Stream	Hunter New England LHD
Debbie Scadden	Area CNC – Diabetes Education	Murrumbidgee LHD
Barbara Depczynski	Senior Staff Specialist	South Eastern Sydney LHD
Julie Gale	CNC, Diabetes Centre	South Eastern Sydney LHD
Maria Guirguis	Clinical Pharmacist	South Eastern Sydney LHD
Andrea Long	CNC, Chronic & Complex Care	Sydney LHD
Glynis Ross	Endocrinologist	Sydney LHD and South West Sydney LHD
Wah Cheung	Head of Department, Diabetes and Endocrinology	Western Sydney LHD
Fiona Bailey	Lead for High Risk Medicines	Clinical Excellence Commission
Jennie Pares	A/Manager, Health Economics & Evaluation Team	Agency for Clinical Innovation
Mahendra Sharan	Data and Statistical Analyst, Health Economics & Evaluation Team	Agency for Clinical Innovation
Rajah Supramaniam	Data and Statistical Analyst, Health Economics & Evaluation Team	Agency for Clinical Innovation
Brihony Porter	Project Officer, Acute Care	Agency for Clinical Innovation
Marina Davis	Network Manager, Acute Care Project Teams	Agency for Clinical Innovation

Abbreviations

Term	Definition
ACI	Agency for Clinical Innovation
AIHW	Australian Institute of Health and Welfare
BGL	Blood Glucose Level
BHI	Bureau of Health Information
CEC	Clinical Excellence Commission
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
IHI	Institute of Healthcare Improvement
IIMS	Incident Information Management System
IMDM	Inpatient Management of Diabetes Mellitus
LBVC	Leading Better Value Care
LHD	Local Health District/s
LOS	Length of Stay
M&E	Monitoring and Evaluation
Ministry	NSW Ministry of Health
NHMRC	National Health and Medical Research Council
NWAU	National Weighted Activity Unit
NSW	New South Wales
PREM	Patient reported experience measure
PROM	Patient reported outcome measure
PROMIS-29	Patient Reported Outcomes Measurement Information System
Roadmaps	A program management tool to oversee achievement of program milestones
ROI	Return on investment
SAPHaRI	Secure Analytics for Population Health and Research Intelligence
SLA	Service Level Agreement

Glossary of evaluation terms

Baseline a pre-intervention assessment that is used to compare changes after implementation.

Dose response in this context is the examination of the link between dose and response as part of determining if a program caused the outcome and to what extent.

Economic evaluation is the process of systematic identification, measurement and valuation of inputs and outcomes of two alternative activities, and the subsequent comparative analysis of these. Economic evaluation methods provide a systematic way to identify, measure, value, and compare the costs and consequences of various programs, policies, or interventions.

Efficiency is a measure of how economic inputs (resources such as funds, expertise, time) are converted into results.

Evaluability is an assessment of the extent that an intervention can be evaluated in a reliable and credible fashion.

Evaluand is the subject of an evaluation, typically a program or system rather than a person.

Focus group is a group of people, selected for their relevance to an evaluation. Focus groups are facilitated by a trained facilitator in a series of discussions designed to share insights, ideas, and observations on a topic of concern.

Evaluation domains

Appropriateness is the extent that program activities are appropriate for the outcomes in which it is to achieve.

Effectiveness measures program effects in the target population/patient cohort by assessing the progress in the outcomes that the program is to achieve.

Impact is the long-term, cumulative effect of programs/interventions over time on what they ultimately aim to change. It assesses program effectiveness in achieving its ultimate goals.

Sustainability is the extent that the benefits of a program are maintained after formal support has ended.

Access and reach measures how accessible the program is to the target population (access) and how many of the target population have accessed the program (reach).

Formative and summative evaluation

Formative evaluation (monitoring) in formative (early) evaluation, programs or projects are typically assessed during their development or early implementation to provide information about how to revise and modify for improvement. In terms of the Leading Better Value Care program, there are two realms of formative evaluation. The first is the formative evaluation of the statewide program to indicate if programs are progressing towards goals and to define what improvements can be made to the overall program. The second realm is the assessment of the program at a site level to determine what is needed for local improvements.

Summative evaluation (impact) the purpose of summative evaluation is to make value judgements on the worth, merit and significance of a program. This is typically assessed at the end of an operating cycle or once a program has been settled. Findings are used to help decide whether a program should be adopted, continued, or modified.

Implementation fidelity is the degree that an intervention has been delivered as intended and is critical to the successful translation of evidence-based interventions into practice.

Implicit design is a design with no formal control group and where measurement is made before and after exposure to the program.

Indicator is a specific, observable, and measurable characteristic or change that shows the progress a program is making toward achieving a specific outcome.

Inferential statistical analysis is statistical analysis using models to confirm relationships among variables of interest or to generalise findings to an overall population.

Interrupted time series analysis is a continuous sequence of observations on a population, taken repeatedly (normally at equal intervals) over time to measure changes and map trends.

Interview guide is a list of issues or questions that guide the discussion in an interview.

Linear mixed models are an extension to the linear model. It includes random effects in addition to the usual fixed effects.

Longitudinal data or pre and post analysis is collected over a period of time, sometimes involving a stream of data for particular persons or entities to show trends.

Macro-meso-micro evaluation approach refers to a three level approach to evaluation. In terms of Leading Better Value Care, this is:

- macro – statewide
- meso – LHD
- micro – local sites.

Measuring tools or instruments are devices used to collect data (such as questionnaires, interview guidelines, audits and observation record forms).

Monitoring and evaluation (M&E) is a process that helps improve performance and achieve results. Its goal is to improve current and future management of outputs, outcomes and impact.

Multiple lines of evidence is the use of several independent evaluation strategies to address the same evaluation issue, relying on different data sources, analytical methods, or both.

Primary data is collected by an evaluation team specifically for the evaluation study.

Program in terms of program evaluation, a program is a set of activities managed together over a sustained period of time that aims to achieve outcomes for a client or client group.

Program evaluation is a rigorous, systematic and objective process to assess a program's effectiveness, efficiency, appropriateness and sustainability.

Program theory and program logic

Program theory explains how and why the program is intended to work and the causal links between activities and consequences.

Program logic is a pictorial depiction of the program theory.

Qualitative data are observations that are categorical rather than numerical, and often involve knowledge, attitudes, perceptions, and intentions.

Quantitative data are observations that are numerical.

Secondary data is collected and recorded by another person or organisation, usually for different purposes than the current evaluation.

Stakeholders are people or organisations that are invested in a program or that are interested in the results or what will be done with the results of an evaluation.

Statistical analysis is the manipulation of numerical or categorical data to predict phenomena, to draw conclusions about relationships among variables or to generalise results.

Stratified sampling is a probability sampling technique that divides a population into relatively homogeneous layers called strata, and selects appropriate samples independently in each of those layers.

Surveys are a data collection method that involves a planned effort to collect needed data from a sample (or a complete census) of the relevant population. The relevant population consists of people or entities affected by the program.

Triangulation, in the context of Leading Better Value Care, facilitates validation of data through cross verification from more than two sources.

Utility is the extent that an evaluation produces and disseminates reports that informs relevant audiences and have beneficial impact on their work.

The following table sets out the monitoring and evaluation cycle for LBVC programs.

Table 1 LBVC monitoring and evaluation cycle

Evaluative perspectives	Expected economic benefits from the intervention – predicted	Evidence foundations of the intervention – program theory/logic model	Implementation evaluation – intervention coverage, fidelity of implementation and contributing factors	Outcomes evaluation – patient and provider experience and patient outcomes	Economic evaluation – benefits and return on investment
Planning	Quantitative	Qualitative/ quantitative			
Formative evaluation – early and ongoing alongside quarterly reporting			Qualitative/ quantitative	Quantitative	Quantitative
Summative evaluation – at 12 months and 2 years			Qualitative/ quantitative	Quantitative	Quantitative

Executive summary

Diabetes is a significant public health challenge in NSW. Inadequate management of diabetes can increase the risk of complications including heart disease, stroke, kidney disease, peripheral vascular disease, retinopathy and neuropathy and can lead to frequent hospitalisations and prolonged lengths of stay. People in hospital with diabetes stay longer than those without diabetes resulting in an increased risk of adverse health outcomes. This can impact on overall experience and quality of life and incur additional healthcare costs.

In 2016, the NSW Ministry of Health introduced the Leading Better Value Care (LBVC) initiative to improve the health status of people in NSW. This initiative moved the focus of healthcare from volume to value. The statewide program to improve *Inpatient management of diabetes mellitus (IMDM)* has been included in the LBVC program for 2017-18. This will align care in NSW to the Institute of Health Improvement (IHI) Triple Aim* of improving patient and provider experience, population health outcomes, and system efficiency and effectiveness.

This document outlines the monitoring and evaluation plan for the LBVC initiative to improve in-hospital management of diabetes mellitus for patients who require subcutaneous insulin within NSW hospitals.

The program will be implemented across NSW local health districts (LHDs) in the 2017-18 financial year. It will promote the delivery of best practice in hospital care for people with diabetes to improve patient experience, outcomes and system efficiency. Best practice includes early identification of abnormal blood glucose levels, appropriate risk stratification and management, blood glucose monitoring, multidisciplinary involvement where required, and self-management support including transfer of care to facilitate longer term diabetes management.

The LBVC program provides an opportunity to align measurement systems to improve monitoring of program implementation and to support the achievement of program milestones. This alignment aims to ensure that NSW Health works together to monitor implementation through roadmaps, progresses towards the achievement of outcomes with service level agreements, and understands the overall impact of the program on the NSW health system.

This monitoring and evaluation plan is a guide to assess the extent that the program has achieved system changes and intended outcomes as outlined by the program objectives and program logic. It will assess sustainability and aims to provide useful information to guide future investment decisions related to the in-hospital management of people with diabetes mellitus.

ACI will lead the data collection, analyses and feedback process for the formative and summative evaluation components in collaboration with state-wide data custodians, local health districts implementation teams, other pillars and the Ministry.

* The IHI Triple Aim is a framework developed by the Institute for Healthcare Improvement that describes an approach to optimising health system performance.

Contents

Acknowledgements	ii
Abbreviations	iv
Glossary of evaluation terms	v
Executive summary	viii
Introduction	1
Diabetes mellitus in New South Wales	1
Improving inpatient management of diabetes mellitus	1
Document outline	2
Background	2
Leading Better Value Care	2
Inpatient management for diabetes mellitus program overview	3
The monitoring and evaluation plan	4
Purpose	4
Scope and timing	4
Measurement alignment	4
Methods	5
Patient cohort	6
Limitations and risks	7
Program logic	7
Assumptions within the program logic	9
Key evaluation questions	9
Data and analysis matrixes	11
Governance	20
Communication and reporting plan	20
Audience and stakeholders	20
Codes of behaviour and ethics	20
References	21
Appendices	22
Evaluation of programs in ACI checklist	22

Tables and figures

Tables

Table 1 LBVC monitoring and evaluation cycle	vii
Table 2 Patient cohort for the IMDM program	6
Table 3: Key evaluation questions	9
Table 4 Data and analysis matrix: Roadmaps	11
Table 5 Data and analysis matrix: SLA monitoring	13
Table 6 Data analysis matrix: 1st year quarterly reporting	14
Table 7 Data and analysis matrix: Evaluation.....	15

Figures

Figure 1: Triple aim of LBVC	2
Figure 2: Monitoring and evaluation approach for LBVC programs	5
Figure 3 Macro, meso, micro approach.....	5
Figure 4 Program logic for Inpatient Management of Diabetes Mellitus	8

Introduction

Diabetes mellitus in New South Wales

Diabetes is a major public health challenge in New South Wales (NSW) and across Australia. It is a chronic condition characterised by insufficient insulin production, or use, and high levels of glucose in the blood. Poorly managed diabetes can increase the risk of a range of complications and comorbidities including heart disease, stroke, kidney disease, peripheral vascular disease, retinopathy, neuropathy and lower limb amputation². People with diabetes who are admitted to hospital have an increased risk of hyperglycaemia and/or hypoglycaemia due to acute illness and reduced oral intake. This increases the risk of infections and other complications, reduces patient experience and outcomes, and increases the length and cost of hospital stays³.

The prevalence of diabetes in Australia has tripled over the past 25 years. In 2014-15 an estimated 5% of Australians aged 18 years and over reported living with type 2 diabetes⁴. Rates are twice as high in lower socioeconomic groups (8%) compared with those in higher groups (3%). Aboriginal and/or Torres Strait Islander Australians are almost four times more likely to have diabetes than non-Aboriginal Australians⁵. In NSW in 2014-15 diabetes was a factor in over 200,000 or 11% of hospitalisations, costing \$1.4 billion. Between 2012-13 and 2014-15, people with diabetes stayed in hospital an average of two days longer than people without diabetes, contributing to an average increase in costs of 8% per annum⁶.

Improving inpatient management of diabetes mellitus

In response to the challenges associated with the inpatient management of diabetes, the Agency for Clinical Innovation (ACI) NSW Diabetes Taskforce commissioned the SAX Institute to define best practice strategies for in-hospital care of people with diabetes requiring insulin. Following this review, the Taskforce nominated five key recommendations that now guide one of the NSW Leading Better Value Care (LBVC) programs: *Inpatient management of diabetes mellitus (IMDM)*.

Recommendations

1. To develop and implement processes to support continuous improvement in inpatient diabetes care, such as local clinical audit cycles and a mechanism to benchmark key performance indicators across NSW.
2. Investment to enhance the capability and/or capacity of general ward staff in the care of patients with diabetes.
3. Timely and appropriate access to inpatient diabetes management teams for people with diabetes.
4. Implementation of procedures for safe transfers of care for people with diabetes within hospital wards and across settings. This may include criteria-led discharge.
5. Standardised identification and screening processes for patients with diabetes on presentation to hospital.

² Australian Institute of Health and Welfare. Burden of lower limb amputations due to diabetes in Australia, Australian burden of disease study 2011 series no. 10. Canberra: AIHW, 2017.

³ Lai J, Wong V. SAX institute. Evidence check: Inpatient Insulin Management Final Version 1. Sydney: SAX institute, 2017.

⁴ Australian Institute of Health and Welfare. How many Australians have diabetes? 2016 [internet]. Canberra: AIHW, [cited 2017 April 5, last updated 2016 Dec]. Available at: <http://www.aihw.gov.au/how-common-is-diabetes/>

⁵ Lai J, Wong V. 2017.

⁶ Agency for Clinical Innovation Health Economics and Evaluation Team Diabetes data report. NSW; ACI. 2016. Source: *Admitted Patient, Emergency Department Attendance & Deaths Register, NSW Ministry of Health Secure Analytics for Population Health Research and Intelligence. (Hospitalisations represent separations).*

Document outline

This document outlines the monitoring and evaluation (M&E) plan for the LBVC program aimed at improving inpatient management of diabetes mellitus. It has been developed in consultation with the ACI Acute Care team and clinicians from the NSW Diabetes Taskforce and the In-hospital Management Working Group.

The framework has been informed by key documents relevant to best practice care, meetings with the ACI diabetes project teams, collaborative program logic development, and workshops with ACI staff and clinicians. It includes:

- an overview of the NSW LBVC initiative
- an explanation of the IMDM program
- the purpose, focus, limitations, and design of the evaluation
- a program logic that illustrates how the model of care is expected to achieve the desired outcomes
- key evaluation questions and sub-questions
- the methods, data sources and analysis that will be conducted to answer the key questions
- the governance, codes of behaviour and ethical framework that underpin the evaluation
- identification of relevant audiences and communication of findings.

Evaluation planning has been undertaken between February and May 2017 to meet timeframes for LBVC. At the time of writing, the IMDM program continues to be refined. As such, this framework reflects current understanding of program design and implementation. Specific measures and tools may continue to be developed to support monitoring and evaluation. Accordingly, this framework will be reviewed and updated as necessary in order to reflect any changes over time.

Background

Leading Better Value Care

In late 2016, the NSW Ministry of Health introduced the statewide LBVC initiative. The objective of LBVC is to improve the NSW Health system performance against the Institute of Healthcare Improvement (IHI) Triple Aim of improving patient and provider experience, population health outcomes, and system efficiency and effectiveness.

The tranche one LBVC initiative comprises of eight clinical programs in the 2017-18 financial year, including the IMDM program. Figure 1 shows the Triple Aim as denoted in LBVC.

Figure 1: Triple aim of LBVC



Leading Better Value Care initiatives will be implemented by each Local Health District (LHD) and incorporated into LHD roadmaps and service level agreements (SLAs) for the purpose of monitoring and informing local quality improvements. A comprehensive impact evaluation will be undertaken after programs have been implemented within each LHD. The purpose of the impact evaluation will be to assess the overall impact of each initiative and guide decision-making around the value (worth, merit and significance) of the LBVC initiative.

Inpatient management for diabetes mellitus program overview

The IMDM program aims to implement best practice care for adult patients with diabetes who require subcutaneous insulin administration in acute care settings. Best practice in hospital care for people with diabetes includes early and clear identification of abnormal blood glucose, appropriate risk stratification and management, blood glucose monitoring, multidisciplinary involvement, and self-management support including transfer of care to facilitate longer-term diabetes management⁷. Hospital systems and structures that can support delivery of best practice care include leadership, ongoing clinical education, a system of measurement and feedback and access to appropriate clinical expertise⁸.

The objectives of the program are to:

- provide advice and support for statewide standardised audit, review and feedback to underpin continuous improvement and benchmarking in the administration of insulin for people in hospital with diabetes
- increase identification of people with diabetes in hospital who require insulin
- increase clinical staff skill, knowledge and ability to provide best practice care to people with diabetes
- implement strategies to facilitate access to appropriately specialised diabetes care
- reduce insulin prescribing errors
- reduce hyperglycaemic and hypoglycaemic episodes and other adverse events related to suboptimal insulin management
- reduce complication rates for people with diabetes requiring insulin
- reduce mean hospital length of stay (LOS) for people with diabetes who require insulin
- improve the patient and carer experience of the in hospital management of diabetes.

The following strategies are under development to support LHDs across NSW in this achieving these objectives.

- A capability building strategy to support best practice management of people with diabetes who require insulin including implementation of a subcutaneous insulin chart.
- Development of a definition for best practice management of people in hospital with diabetes who require insulin. This includes early identification and screening processes, timely and appropriate access to specialist care, procedures for safe transfer of care and self-management support.
- Advice and support for local audits to support feedback, continuous improvement and benchmarking across NSW.

⁷ Lai J, Wong V. 2017.

⁸ Lai J, Wong V. 2017.

The monitoring and evaluation plan

Purpose

Program evaluation is an essential feature of the NSW Government and is outlined in the NSW Government Program Evaluation Guidelines. Comprehensive evaluation provides an evidence base for program improvement and can contribute to informed decision making. Results of robust evaluations can contribute to appropriate investment strategies and future policy and program directions to improve outcomes for the people of NSW.

The implementation of the IMDM program will be accompanied by several monitoring activities to guide its progress and identify areas for improvement. Once the program has had sufficient time to settle, an impact evaluation will be undertaken to determine the overall effect of the program, including intended and unintended outcomes.

The purpose of this plan is to guide monitoring and evaluation (M&E) and:

- provide insight into the implementation of the program across NSW, including the key enablers and barriers to adoption (monitoring)
- determine if outcomes have been met (impact)
- assess the impact of the IMDM program in terms of its impact on the NSW health system (impact)
- define data sources and collection methods, both existing and required, to assess the program across the IHI Triple Aim including expected and unexpected outcomes, experience of care, efficiencies and effectiveness.

Scope and timing

Implementation of the IMDM program will occur throughout the 2017-18 financial year in two six-month phases: July to December 2017 and January to June 2018. Outcomes and impacts are expected to be incrementally realised from July 2017 at phase one sites and December 2017 at phase two sites. The availability of administrative data for the periods required will affect the timing of the evaluation.

Measurement alignment

This M&E plan will inform data requirements and collection systems. This is consistent with the Ministry's LBVC measurement alignment framework, which focusses on creating shared priorities across the NSW healthcare system.

There are three measurement levels aligned to guide the IMDM program from implementation milestones through to achievement of the end of program outcomes (Figure 2).

These three levels include:

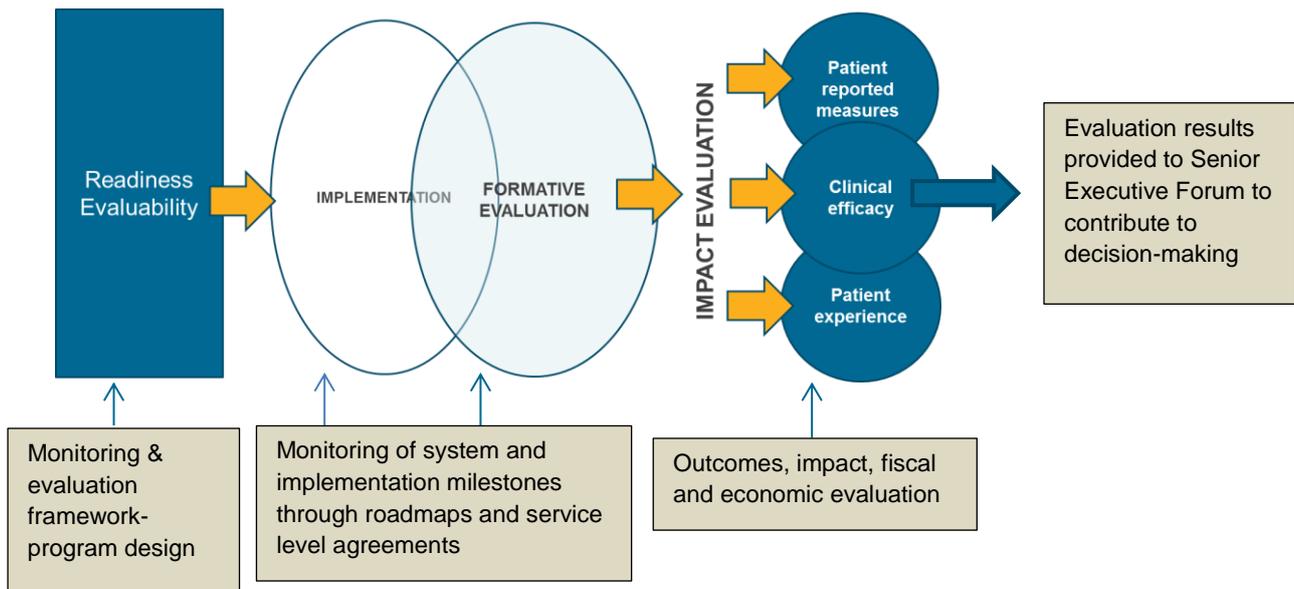
- program/project roadmaps
- service level agreements
- impact evaluation conducted by the NSW Health Pillars including the ACI and Clinical Excellence Commission (CEC).

A fourth level of data reporting has been established for the first year of LBVC programs. This is a set of quarterly indicators to show that the program is progressing and will be reported to ACI to track. After 12 months, ACI will use the results from the quarterly reporting data to assess outcomes achieved and apply these to a formative economic/fiscal analysis.

Measurement alignment within the M&E plan will enable:

- oversight of program delivery against anticipated milestones to identify and manage unexpected deviations (monitoring via roadmaps and service level agreements).
- a clear structure and methodology for the statewide end of program impact evaluation to guide investment, disinvestment and future improvements.
- a consistent source of data collection that is integrated to avoid variation and duplication.

Figure 2: Monitoring and evaluation approach for LBVC programs



Methods

Monitoring and evaluation of IMDM program will take a macro, meso, micro approach (Figure 3). consistent with the LBVC measurement alignment framework. The impact evaluation, including data collection and analysis and presentation of findings, will be the responsibility of relevant Pillars.

Figure 3 Macro, meso, micro approach



The evaluation will involve mixed methods. A pre post-implementation design will test for changes due to the program. The evaluation will be conducted in two stages. Stage one will involve a statewide quantitative administrative data analysis to identify state and LHD pre and post implementation changes. Stage two will use this data to develop a matrix and methodology to select a representative sample of LHDs. Qualitative data will be collected from this sample to provide context and complement the quantitative results.

Data sources for the evaluation will include:

- administrative patient data
- roadmap and service level agreement reports and supporting data
- standardised clinical process mapping
- patient reported outcomes
- patient experience questionnaires (in collaboration with BHI)
- staff focus groups, interviews and/or questionnaires
- patient focus groups, interviews and/or questionnaires.

Patient cohort

The patient cohort for the IMDM program is acute admitted patients aged 16 years and over with diabetes requiring subcutaneous insulin management.

International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10 AM) codes for this cohort are shown in Table 2.

Table 2 Patient cohort for the IMDM program

Code	Description
E10, O24.0	Type 1 diabetes
E11, O24.1	Type 2 diabetes
O24.4	Gestational diabetes
E13	Diabetes, other
E10.1, E11.0, E11.1, E12.0, E12.1, E13.0, E13.1, E14.0, E14.1	Diabetes, acute complication
E10.2, E10.3, E10.4, E10.5, E10.6, E10.7, E11.2, E11.3, E11.4, E11.5, E11.6, E11.7, E12.2, E12.3, E12.4, E12.5, E12.6, E12.7, E13.2, E13.3, E13.4, E13.5, E13.6, E13.7, E14.2, E14.3, E14.4, E14.5, E14.6, E14.7	Diabetes, chronic complication
E14, O24.3, O24.9	Diabetes, unspecified

Limitations and risks

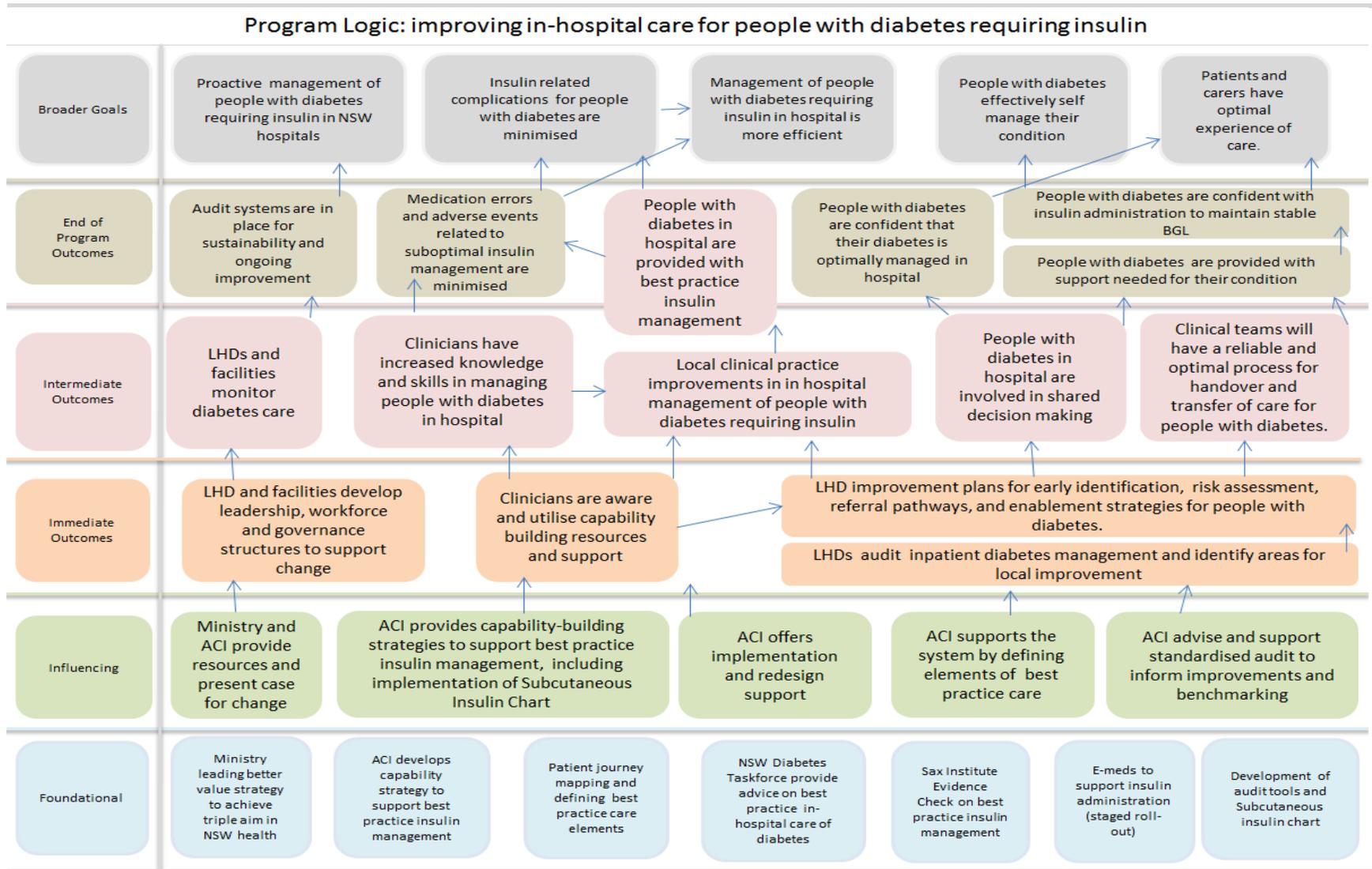
There are several limitations and potential risks to the M&E of the IMDM program. These are noted below and will be monitored, and where necessary, addressed, throughout the evaluation.

- The evaluand is the statewide IMDM program. It is out of the LBVC scope to evaluate individual sites.
- More than one year of data post-implementation may be required to measure the impact of changes, noting possible year on year fluctuations.
- The expected variability and breadth of responses to the program across LHDs will be difficult to capture in order to measure program fidelity and attribution. Where this is predominant, a design to capture outcomes by program will be undertaken, such as difference in difference analysis.
- The outcomes for people with diabetes may be influenced by a range of external confounding factors (such as lifestyle and socio-economic factors) that are out of scope of this evaluation.
- Standardised collection of clinical processes and other data measures within the data plan are under development and availability for evaluation is not assured.
- A comprehensive baseline across all variables is not currently available.
- Pre and post analysis has been defined as the major analytical method that will be used to track trends over time. This has been selected as it is considered the most robust method within the existing resourcing and time available. However, there are risks that if enough time points are not measured, seasonal and other variations will not be identified and may therefore impact on result translation. To reduce these threats, time points will be determined from baseline over several years.

Program logic

The program logic outlines how the IMDM program will work to achieve its intended outcomes. It provides a foundation to guide M&E and track progress over time. Figure 4 presents the program logic for improving in-hospital care for people with diabetes who require insulin.

Figure 4 Program logic for Inpatient Management of Diabetes Mellitus



Assumptions within the program logic

All programs (and program logics) include assumptions. These assumptions are tested during the evaluation to understand the potential facilitators and barriers to anticipated changes. The assumptions for the IMDM program include that:

- the SAX evidence review is representative of current diabetes management in NSW hospitals
- LHD executive, facility service managers and clinicians agree that there is a case for change and that improvements are required
- LHDs will identify clinical leaders and review workforce required to drive local practice changes
- governance processes will be established to support local accountability for improvements
- there are avoidable adverse events related to suboptimal insulin management.

Key evaluation questions

Evaluation questions are used to guide the focus of an evaluation. The key questions are determined based on the program logic and in particular the immediate, intermediate and end of program outcomes (Table 3). This M&E plan includes questions related to both monitoring and outcome measures.

Table 3: Key evaluation questions

Evaluation domain	Measurement alignment domain	Key evaluation question
Appropriateness	Implementation fidelity	To what extent was the program implemented as intended?
Effectiveness	Improving experience of care	What LHD clinical processes changed and to what extent did this improve in hospital care for people with diabetes requiring insulin?
		What were the facilitators and constraints to the program being embedded?
		To what extent has the program had an impact on the experience of people with diabetes who require insulin in hospital?

Evaluation domain	Measurement alignment domain	Key evaluation question
		To what extent does the workforce feel knowledgeable and confident to apply best practice management for people with diabetes who require insulin in hospital?
Impact	Improving healthcare of the public	To what extent has the program reduced the adverse outcomes associated with poor glycaemic control?
		To what extent has the program impacted the outcomes of people with diabetes in hospital who require insulin?
Sustainability	Providing efficient and appropriate care	To what extent has the program impacted the efficiency of managing people with diabetes who require insulin in hospital?
		To what extent has the program been implemented statewide and is further investment required?
Access and reach	Improving healthcare of the public	Did the program reach its intended cohort?
		For whom did the program work and in what context?

Data and analysis matrixes

The following data matrixes outlines the data sources, collection and analysis methods that will be used to answer the key evaluation questions.

Table 4 Data and analysis matrix: Roadmaps

Key evaluation question (KEQ)	Indicator	Method	Data source	Analysis	Responsibility and comments
To what extent was the program implemented as intended?	Number and location of sites implementing compared by LHD Number of sites within LHD with ACI partnership audit Audit completed Executive sponsor and governance established Improvement plan in place Staff education reach and uptake - # eligible staff completing training Awareness and adoption of subcutaneous insulin chart	Descriptive analysis reported through roadmaps	LHD/Facility reporting mechanism	Descriptive reports	Roadmaps

Key evaluation question (KEQ)	Indicator	Method	Data source	Analysis	Responsibility and comments
What LHD clinical processes changed and to what extent did this improve in hospital care for people with diabetes who require insulin?	<p>Access to appropriately skilled staff in diabetes care</p> <p>Identification/screening systems</p> <p>Patient referral pathway in place</p> <p>Compliance with subcutaneous insulin chart</p>	Audit of records	Audit	Needs assessment prepared from audit results – used to establish local improvement plans	ACI responsible for data collection through Audit
To what extent does the workforce feel knowledgeable and confident to apply best practice management for people with diabetes requiring insulin in hospital?	<p>Knowledge and attitude change</p> <p>Practice changes resulting from knowledge and attitude change</p> <p>Uptake and usage of education/training initiatives developed</p>	Reported through Roadmaps	LHD/Facility reporting mechanism	Assessment of correlation/association between staff feedback on knowledge and capacity changes, and the transfer to practice.	Roadmaps
What were the facilitators and constraints to the program being embedded?	Identification of enablers and barriers to implementation	Semi-structured interviews	LHD/Facility reporting mechanism	Assessment of enablers and barriers to implementation to contribute to program improvement at a local level and potentially statewide	ACI responsible for data collection and analysis

Table 5 Data and analysis matrix: SLA monitoring

Key evaluation question and progress	Indicator	Method	Data source	Analysis	Responsibility and comments
To what extent does the workforce feel knowledgeable and confident to apply best practice management for people with diabetes requiring insulin in hospital?	# of staff completing education modules in inpatient diabetes care	Reported through SLA	LHD/Facility reporting mechanism	Descriptive	Service level agreements
What LHD clinical processes changed and to what extent did this improve in hospital care for people with diabetes requiring insulin?	The total # of services that participate in clinical audit and % of admissions audited	Reported through SLA	LHD/Facility reporting mechanism Admitted Patient Data Collection	Descriptive	Roadmaps

Table 6 Data analysis matrix: 1st year quarterly reporting

Key evaluation question and progress	Indicator	Method	Data source	Analysis	Responsibility and comments
To what extent was the program implemented as intended?	% patients screened for diabetes at admission	Reported through quarterly monitoring 12 month assessment of progress Economic/fiscal analysis of results	LHD/Facility reporting mechanism	Descriptive to indicate program progression towards longer term outcomes	ACI responsible for data collection and analysis
	% patients with shared care plan			Analysis of benefits realised after 12 months.	
	% of patients with known diabetes and continuing blood glucose testing			Benefits realised will be applied to economic/fiscal analysis through separations, beddays, NWAUs avoided	
	Utilisation (separations, beddays, NWAUs)			Economic/fiscal benefits applied to BaU to determine indicative benefits	
	% patients avoiding hypoglycaemia				
	Reduction in adverse incidents/adverse complications				

Table 7 Data and analysis matrix: Evaluation

Key evaluation question	Measure	Method	Data source	Analysis	Responsibility and comments
To what extent has the program had an impact on the experience of people with diabetes requiring insulin in hospital?	Patient experience of care	BHI patient survey – linked data by cohort for baseline, increased sample size of cohort where needed for time points. Patient focus groups/ interviews as required – potential for deviant case sampling in relation to patient survey results	BHI patient survey Primary data	Pre and post comparisons	ACI will work collaboratively with BHI to collect and analyse data
To what extent has the program reduced the adverse outcomes associated with poor glycaemic control?	Change in complication rates compared with matched ICD-10-AM without diabetes	Comparison of patient cohort complications compared to same cohort without diabetes	Admitted Patient Data Collection	Matched cohort analysis	Data collection and analysis is the responsibility of ACI
To what extent has the program impacted the outcomes of people with diabetes in hospital requiring insulin?	% patients avoiding hypoglycaemia Reduction in adverse incidence/common complications Mean BGL levels No. of hypo/ hyperglycaemic episodes	Pre and post comparisons	To be defined – not yet available	Pre and post comparisons from baseline (some measures are included as indicators in first year quarterly reporting) to impact	Data collection and analysis is the responsibility of ACI

Key evaluation question	Measure	Method	Data source	Analysis	Responsibility and comments
	<p>Hyperglycaemic and hypoglycaemic episodes</p> <p>Rapid response calls related to hypo/hyperglycaemia</p> <p>% of patients avoiding hypoglycaemia</p> <p>Patient reported outcome measure information system PROMIS-29</p>	<p>Change in disease health status and quality of life across disease stages</p>	To be defined	<p>Identification of changes over time using quantum of results for sample (this may not be available until adequate sample size data available</p>	Data collection and analysis is the responsibility of ACI
	Insulin prescribing errors	Trended over time	IIMS	Access to IIMS to be negotiated	IIMS available to CEC – analysis responsibility of ACI
To what extent has the program impacted the efficiency of managing	Mean LOS compared with matched ICD-10-AM codes without diabetes	Counterfactual comparison Economic comparison of	Admitted Patient Data Collection	Comparison of cohort with matched cohort for utilisation	Data collection and analysis is the responsibility of ACI

Key evaluation question	Measure	Method	Data source	Analysis	Responsibility and comments
people with diabetes requiring insulin in hospital?	<p>NWAU per separation</p> <p>NWAU for cohort</p> <p>Patient complexity compared to non diabetes patients</p> <p>Unplanned re-admissions</p> <p>Economic comparison of BaU base case with post implementation results (fiscal and utilisation)</p> <p>Summative economic evaluation (comparative economic analysis of pre and post implementation utilisation and fiscal results)</p> <p>NSW Return on Investment for project</p>	<p>BaU base case with post implementation results (fiscal and utilisation)</p> <p>Summative economic evaluation (comparative economic analysis of pre and post implementation utilisation and fiscal results)</p> <p>NSW Return on Investment for project</p>		<p>Pre-implementation Business as Usual base case to be used to as baseline for comparative economic analysis with post implementation results.</p> <p>Summative assessment of net impact through comparison of quantifiable costs and benefits of the base case with the quantifiable costs and benefits of implementation of the model of care</p> <p>The summative evaluation including economic analysis identifying return on investment, net present value and utilisation analysis results will inform decisions regarding ongoing investment</p> <p>Measurement data to</p>	

Key evaluation question	Measure	Method	Data source	Analysis	Responsibility and comments
				<p>assess extent of alignment with best practice/ideal patient pathway, verified with interview data.</p> <p>Degree that current systems support ongoing monitoring and improvement of best practice clinical care.</p>	
To what extent has the program been implemented statewide and is further investment required?	<p>Alignment with best practice</p> <p>Systems for data collection, feedback and ongoing improvement</p> <p>Governance</p> <p>Partnerships</p>	Semi-structured interviews from sample LHD, ACI and Ministry staff	<p>LHD clinicians, service managers and executives</p> <p>ACI staff</p> <p>Ministry staff</p>	<p>Measurement data to assess extent of alignment with best practice/ideal patient pathway, verified with interview data.</p> <p>Degree that current systems support ongoing monitoring and improvement of best practice clinical care.</p>	Data collection and analysis is the responsibility of ACI
Did the program reach its intended cohort?	<p>% of patients assessed for diabetes at admission</p> <p>% of patients with management plans as proportion of total patients with diabetes</p>	Identification of program reach	To be defined – not yet available	Trended over time to determine access and reach	Data collection and analysis is the responsibility of ACI

Key evaluation question	Measure	Method	Data source	Analysis	Responsibility and comments
	% of patients with known diabetes with appropriate blood glucose testing				
For whom did the program work and in what context?	Assessment of patient characteristics	Descriptive study	Admitted Patient Data Collection	Analysis of outcome by patient sub group	Data collection and analysis is the responsibility of ACI

Governance

Consistent with the *NSW Program Evaluation Guidelines* and the *ACI Framework: Understanding Program Evaluation*, the evaluation of the LBVC initiative for IMDM will be conducted by ACI Health Economics and Evaluation Team and include establishment of an Evaluation Steering Committee. The Steering Committee will comprise (at minimum) content area experts (clinicians) and evaluation expertise with representation from LHDs, the Endocrine Network and Diabetes Taskforce and independent experts. The Steering Committee will be responsible for ensuring that the evaluation is conducted in accordance with this M&E plan and to ensure findings are communicated to relevant stakeholders and audiences. A checklist against the *NSW Program Evaluation Guidelines* is attached at Appendix I and is to be used to guide the evaluation activities.

Communication and reporting plan

The dissemination of evaluation findings will be critical to inform future planning and investment decisions related to improving the outcomes and experience for people with diabetes. Communication of evaluation findings will be provided in an appropriate form to each audience and stakeholder group identified. Forums for feedback and discussion of results will be important for reflection and learning. The evaluation governance committee will define a comprehensive communication plan.

Audience and stakeholders

Key audiences and stakeholders include the following.

- The NSW Ministry Senior Executive Forum membership; NSW Health Executive and Chief Executives, including the LBVC leadership team: interest in overall impact and future investment or disinvestment decisions.
- The ACI Executive and Network Managers: to understand program effectiveness, impact and directions for this and future programs. To understand and explain factors affecting clinical variation.
- The ACI Endocrine Network and Diabetes Taskforce: to assess program effectiveness and provide feedback loop for ongoing improvement in the care of people with diabetes mellitus.
- LHD clinicians, service managers and executive: to understand factors affecting local performance and comparison with state and/or peer group equivalents, and to implement local quality improvement initiatives.
- People with diabetes in hospital and their carers: as partners in the care provided.

Codes of behaviour and ethics

This M&E plan comprises the delivery of human services and potentially confidential information. The evaluation will be conducted in an ethical manner and all individual records will be destroyed at the end of the evaluation.

The evaluation will be conducted in compliance with:

- *ACI Responsible governance, management and conduct of research: An ACI framework*⁹
- Australasian Evaluation Society (AES) Guidelines for the ethical conduct of evaluations¹⁰

⁹ Agency for Clinical Innovation. Responsible conduct management and conduct of research, an ACI framework. NSW: ACI, 2013. Available from: http://intranet.aci.health.nsw.gov.au/__data/assets/pdf_file/0009/491652/Research-Framework11.pdf

- National Health and Medical Research Council (NHMRC) *National Statement on Ethical Conduct of Human Research*¹¹.

References

1. Australian Institute of Health and Welfare. Burden of lower limb amputations due to diabetes in Australia, Australian burden of disease study 2011 series no. 10. Canberra: AIHW, 2017.
2. Lai J, Wong V. SAX institute. Evidence check: Inpatient Insulin Management Final Version 1. Sydney: SAX institute, 2017.
3. Australian Institute of Health and Welfare. How many Australians have diabetes? 2016 [internet]. Canberra: AIHW, [cited 2017 April 5, last updated 2016 Dec]. Available at: <http://www.aihw.gov.au/how-common-is-diabetes/>
4. Agency for Clinical Innovation Health Economics and Evaluation Team Diabetes data report. NSW; ACI. 2016. Source: *Admitted Patient, Emergency Department Attendance & Deaths Register, NSW Ministry of Health Secure Analytics for Population Health Research and Intelligence. (Hospitalisations represent separations)*.
5. Agency for Clinical Innovation. Responsible conduct management and conduct of research, an ACI framework. NSW: ACI, 2013. Available from: http://intranet.aci.health.nsw.gov.au/__data/assets/pdf_file/0009/491652/Research-Framework11.pdf
6. Australasian Evaluation Society. Guidelines for the ethical conduct of evaluations. NSW: AES, 2013. Available from: https://www.aes.asn.au/images/stories/files/membership/AES_Guidelines_web_v2.pdf
7. The National Health and Medical Research Council, the Australian Research Council and the Australian Vice-Chancellors' Committee. National statement on ethical conduct in human research. Canberra: Commonwealth of Australia: 2007 [updated May 2015; cited 2017 Mar 20]. Available from: https://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/e72_national_statement_may_2015_150514_a.pdf

¹⁰ Australasian Evaluation Society. Guidelines for the ethical conduct of evaluations. NSW: AES, 2013. Available from: https://www.aes.asn.au/images/stories/files/membership/AES_Guidelines_web_v2.pdf

¹¹ The National Health and Medical Research Council, the Australian Research Council and the Australian Vice-Chancellors' Committee. National statement on ethical conduct in human research. Canberra: Commonwealth of Australia: 2007 [updated May 2015; cited 2017 Mar 20]. Available from: https://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/e72_national_statement_may_2015_150514_a.pdf

Appendices

Evaluation of programs in ACI checklist

Compliance with the NSW Government Program Evaluation Guidelines (January 2016)

This checklist is designed to assist people involved in evaluations in ACI ensure that evaluations are consistent with the NSW Government Program Evaluation Guidelines. A full copy of the Guidelines and the corresponding Toolkit can be accessed here:

<https://www.treasury.nsw.gov.au/projects-initiatives/centre-program-evaluation>

Definitions

Program evaluation builds evidence to contribute to decision making that can assist programs to operate at their optimal and to deliver good outcomes to end users.

In terms of evaluation in NSW, program refers to “A set of activities managed together over a sustained period of time that aim to achieve an outcome for a client or client group.” Program evaluation refers to “A rigorous, systematic and objective process to assess a program’s effectiveness, efficiency, appropriateness and sustainability.”

Principles (quick check)

The Guidelines take a principles based approach using nine principles that underpin best practice in program evaluation. These are noted below for quick assessment. The principles and associated activities form the remainder of this checklist under a series of focus areas.

Principle	Check (✓)
Evaluation has been built into the program design	
Evaluation is based on sound methods	
Resources and adequate time to evaluate is included in the program	
The right mix of expertise and independence has been used to develop and undertake the evaluation	
Proper governance and oversight has been established	
The evaluation design and conduct in its undertaking meets ethical standards	
Relevant stakeholders have informed and guided the evaluation	
Evaluation data has been used meaningfully	
The evaluation is transparent and open to scrutiny	

Planning evaluation

Assessment of key processes underpinning good practice	Check (✓)	Corresponding page # in guidelines
Has the subject of the evaluation been clearly defined?		11
Is there a clearly defined scope?		11
Is the purpose of the evaluation clear (ie what decisions will the evaluation be used to inform – continuing, expanding or discontinuing)?		11
Are key roles and responsibilities for the evaluation allocated (who will manage, who will commission, who will conduct, who will implement findings)?		11
Are key evaluation questions defined?		11
Is there an authorising environment for the evaluation (ie: authorisation to access data, interview end users/staff)?		15

Governance

Use governance processes to ensure oversight of evaluation design, implementation and reporting.

Assessment of key processes underpinning good practice	Check (✓)	Corresponding page # in guidelines
Is there a governance structure in place to oversight the evaluation?		11
Does the governance structure include staff with appropriate seniority and understanding of evaluation?		11
Does the governance structure include staff/stakeholders with expertise in the content area?		11
Does the governance structure include staff/stakeholders with expertise in evaluation methods?		11
Does the governance structure include processes to disseminate information?		11

Audience and stakeholders

Assessment of key processes underpinning good practice	Check (✓)	Corresponding page # in guidelines
Do stakeholders include program participants, senior decision makers, government and non-government staff involved in managing and delivering the program?		15
Has audience (those that will receive and use the evaluation findings) been identified (ie executive funders, Cabinet, Network)?		11
Has a stakeholder communication strategy been developed as part of the evaluation plan?		12
Are stakeholders involved in all aspects of the evaluation – planning, design, conducting and understanding of the results?		12

Undertaking the evaluation

Assessment of key processes underpinning good practice	Check (✓)	Corresponding page # in guidelines
Have good project management principles, practice and tools been established to manage the evaluation?		15
Have sound methods been established to answer each of the key evaluation questions and any sub questions?		11
Have data sources and analysis approaches been defined for each question/method?		11
Are data sources (both primary and secondary) valid and robust?		11
Has data been used meaningfully to report clear statements of findings for consideration?		11
Is the evaluation plan, conduct and findings (methods, assumptions and analyses) transparent and open to scrutiny?		12
Have the ethical implications of the evaluation activities been considered and addressed adequately where personal data and impacts on vulnerable groups is potential?		12
Are privacy safeguards in place for end users, staff and vulnerable populations?		12
Is ethics approval required and if so, sought prior to commencing data collection?		12

Using key findings

Assessment of key processes underpinning good practice	Check (✓)	Corresponding page # in guidelines
Is there a plan for communicating findings to decision makers, service providers and other stakeholders?		16
Is there a plan for how the key findings will be used?		16

The Health Economics and Evaluation Team can be contacted for further advice.

Further appendices will comprise instruments developed for data collection and will be attached in due course.