Country Health SA Local Health Network

# Protocol (Clinical)

## Title: Insulin Titration Service – Stabilisation of diabetes in the community setting

**Protocol developed by:** CHSALHN Diabetes Service

**Protocol Sponsor:** CHSALHN, Executive Director of Medical Services

**Approved by:** CHSALHN, Clinical Governance Committee on: 05/07/2017

**Next review due**: 05/07/2020


**Summary**

This protocol outlines responsibilities and actions required by specialist physicians, general practitioners, endocrinologist and credentialled diabetes educators in the management and titration of insulin in adults with type 1 diabetes, type 2 diabetes and gestational diabetes.

The management and titration of insulin in children and those patients using continuous subcutaneous insulin infusion (insulin pump) is not addressed.


**Policy/Procedure reference**

This protocol supports the Controlled Substances Act 1984, SA Health Directive: High Risk Medicines Management, SA Health Directive: Patients' Own Medications, CHSALHN Diabetes Service Plan and Diabetes Inpatient Model of Care.


**Keywords**

Clinical, Protocol, CHSA, Nursing, Midwifery, Safety, Blood Glucose, Insulin, Injectables, Injections, Dose Adjustment, Titration, Communication, Consumer Participation, Standards.


**Document history**

Is this a new CHSA Protocol? **Y**

Does this protocol *amend or update* an existing protocol? **N**

**Applies to**

This procedure applies to all specialist physician, general practitioner, endocrinologist, credentialled diabetes educators, diabetes educators and CHSA Diabetes Service staff.

**Objective file number**

A980551
2017-08949

### Version control and change history

| Version | Date | Amendment | Amended by: |
|---|---|---|---|
| 1.0 | November 2016 | Original version | Collette Hooper<br>Nurse Practitioner<br>Diabetes Service |
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# Protocol | Insulin Titration Service – Stabilisation of diabetes in the community setting

## 1. Purpose

This clinical protocol supports clinical decision making by describing the best practice evidence based process for the management and titration of insulin in adults with type 1 diabetes, type 2 diabetes and gestational diabetes in the community setting.

The protocol will assist specialist physicians, general practitioners, endocrinologist, credentialled diabetes educators and diabetes educators to determine appropriate health care for the management of patients using insulin. The protocol also provides approved medication records for the ongoing clinical and educational services provided by the CHSA Diabetes Service.

The patient's doctor and consulting credentialled diabetes educator will be responsible for:

- explaining management and titration of insulin
- prescribing alternative therapy or arrangements if the Insulin Titration Service is contraindicated.

The management and titration of insulin in children and those patients using continuous subcutaneous insulin infusion (insulin pump) is not addressed and specialist consultation is required.

This guide is not a complete or definitive resource but is designed to be used in conjunction with SA Health and SA Government regulatory documents regarding scope of practice, competencies and professional development frameworks.

## 2. Areas of responsibility

2.1 **CHSA Executive** is responsible to ensure that all hospital managers and staff are aware of the CHSALHN Insulin Titration Service and their responsibilities in relation to leading, supporting and sustaining the protocol.

2.2 **Directors of Nursing and Midwifery and Managers** are responsible for ensuring that the charts are made known to all staff who are required to use it and that its use is part of clinical orientation.

2.3 **All Credentialled Diabetes Educators and Diabetes Educator employees** are responsible for following the process identified in this protocol.

2.4 **All Specialist Physicians, General Practitioner and Endocrinologist** are responsible for following the process identified in this protocol.

## 3. Insulin therapy

After considering the individual's particular circumstances and available social and other support, physiology, medicine regimen, mental health, health capability and safety the objectives of insulin therapy are to:

- achieve blood glucose levels in an acceptable range by replacing absent insulin secretion in type 1 diabetes (T1D) and supplementing insulin production in type 2 diabetes (T2D) and gestational diabetes mellitus (GDM)
- minimise episodes of hypoglycaemia and their severity
- approximate physiological insulin requirements
- maintain or improve quality of life and reduce progression and effects of long term complications by achieving appropriate metabolic control
- continue diet and activity management to maximise the effect of the insulin
- meet blood glucose targets.

Targets need to be individualised and may change over time depending on health status. Some people (eg the old and frail, children, or people with chronic renal failure) are at risk of adverse events such as hypoglycaemia and consequent trauma. In these cases blood glucose levels and HbA1c targets are generally set at a higher range. For evidenced based targets refer to recognised resources. Treatment should be intensified if diabetes control is not at target and is not improving or is worsening.

## 4. Management of insulin and titration in the community setting

The management of insulin in the community setting is an intensive process of concurrent assessment, insulin initiation, insulin adjustment, education and skills development. Australian Diabetes Educator Association (ADEA) Credentialled Diabetes Educators (CDE) integrates diabetes self-management education with clinical assessment as part of a therapeutic intervention to promote physical, social and psychological wellbeing.

CDEs work with individuals and families to encourage them to take an active part in the management of their condition, including understanding of insulin action and the subsequent need to self-adjust their insulin requirements as needed. CDEs work closely with specialist physicians, general practitioners and endocrinologists to support the best outcome for each person with diabetes.

The role of the CDE in the education and titration of insulin for the person with diabetes requires;

- completion a thorough clinical assessment
- provision of diabetes self-management education and evaluation of knowledge and skills
- provision of planned individualised initiation and adjustment according to medical referral for insulin therapy
- provision of education in a timely manner

- provision of instruction on blood glucose targets and timing
- provision of instruction on blood ketone targets and timing (*in T1D*)
- review of and/or provision of a sick day action plan and hypo action plan
- ensuring correct self blood glucose monitoring technique and quality control
- ensuring correct insulin administration technique and quality control
- minimising the risk of hypoglycaemia, hyperglycaemia and diabetic ketoacidosis (*in T1D*)
- minimising the risk of emergency presentation and hospital admission.

### Role of the Credentialled Diabetes Educator

CDEs who offer an insulin titration service should observe the following guidelines:

- must practice within a defined multidisciplinary team (eg specialist physician, general practitioner, endocrinologist and dietitian)
- must discuss appropriate 'out of hours' access for patient support (eg 24 hour medical access)
- must have written authority from the prescriber to titrate insulin (Authorisation to Titrate Insulin)
- must be fully conversant with the practice of insulin titration and if they don't have specific training and experience should not undertake this task until appropriate professional development is sought
- must identify the patient, the situation, the clinical background and undertake an assessment of the compliance with diabetes management, summarise the assessment, the discussion and what was recommended (ISBAR) in the patient's case notes
- must communicate medication changes to the prescriber during the adjustment phase and notify them of the outcome as soon as possible after completion
- must discuss any diversion from the authorisation (eg reduction in dose) with the prescriber.

## 5. Precautions to be taken when adjusting insulin

A CDE has a duty of care to act in a professional manner within the appropriate guidelines, and within the limitations of his/her knowledge, experience and scope of practice. Prior to titrating insulin dose, the CDE should assess:

- level of support at home
- level of activity (eg mobility increasing/decreasing)
- eating patterns (eg carbohydrate type and load, appetite waning/returning)
- blood glucose/ketone monitoring technique and consumables used (eg meter, strips, limitations)
- blood glucose/ketone monitoring targets
- blood glucose level and monitoring patterns

- blood ketone level and monitoring pattern (in T1D)
- current medications (oral hypoglycaemic agents, other medications (prescribed and non-prescribed)
- insulin injection technique and consumables used (eg device, needle length)
- insulin:carbohydrate ratio/s, insulin sensitivity factor/s and correctional doses used
- recent changes to the dose of diabetes medications (eg oral hypoglycaemic agents and/or insulin)
- other factors that influence insulin response (eg intercurrent illness, infection, state of the injection site)
- risk of hypoglycaemia (eg hypoglycaemia unawareness, severe hypoglycaemia)
- risk of hyperglycaemia (eg and development of diabetic ketoacidosis (in T1D ) and hyperosmolar hyperglycaemic state (in T2D).

### Contraindications

Patients deemed inappropriate for the titration and stabilisation service include those who with:

- impaired communication
- limited language skills
- altered level of consciousness (eg confusion, poor historian).

If the Insulin Titration Service is contraindicated, it is the responsibility of the referring doctor to prescribe alternative therapy or arrangements.

## 6. Referral process

There a two pathways for a specialist physician, general practitioner or endocrinologist to refer to the CHSA Insulin Titration Service.

The first is a direct referral where by the specialist physician, general practitioner or endocrinologist uses the Authorisation to Titrate Insulin order along with the Diabetes Education Referral form as part of the local referral pathway. This referral can also be part of an inpatient discharge plan. A CDE can provide a titration service on receipt of both the Diabetes Education Referral form and the Authorisation to Titrate Insulin order.

The second pathway can be triggered by a CDE as part of the insulin education assessment process. Following referral for diabetes education the patient can be assessed for suitability for the insulin titration service. If the patient provides verbal consent, the CDE can then forward the Authorisation to Titrate Insulin order to the referring specialist physician, general practitioner or endocrinologist for consideration.

## 7. Procedure

**Prior to any titration of insulin, appropriate authorisation MUST BE completed and signed by the referring specialist physician, general practitioner or endocrinologist.**

- **Approved documents for use**:
  - CHSA Authorisation to titrate insulin dose (CHSA Diabetes Service) form
  - CHSA Diabetes Service blood glucose and insulin titration record form
  - ADEA Checklist for Education of Initiation of Injectable Therapies available at http://www.adea.com.au/wp-content/uploads/2009/10/Injection-Technique-Checklist.pdf
  - CHSA Diabetes Service insulin education factsheets.

The authorisation is only valid for the period of time indicated on the referral. A review date must be documented.

- **Patient education**

Before the commencement or titration of insulin, the patient must be assessed in regard to knowledge and skills of insulin self administration and blood glucose monitoring. See ADEA Checklist for Education of Initiation of Injectable Therapies at http://www.adea.com.au/wp-content/uploads/2009/10/Injection-Technique-Checklist.pdf

- **Patient assessment**

Before titration of insulin dose(s) the CDE will ascertain:

- the patterns in blood glucose levels over the preceding week
- whether carbohydrate intake has changed (eg diminished/increased or delayed, alcohol intake or any nausea or vomiting)
- level of blood ketone (in T1D)
- whether usual physical activity levels has changed
- if there has been a missed insulin dose, a mistaken increase or reduced insulin dose or previous dose adjustments
- if there are problems with injecting technique/sites (eg lipoatrophy)
- whether patient is tolerating/taking other oral hypoglycaemic medications and or incretins
- other prescribed medications directly impacting on blood glucose levels (eg corticosteroids)
- other issues (eg gastroparesis, over the counter medicines or illicit drugs, stress, anxiety, pregnancy, menses)
- if an illness or infection is present (refer immediately to prescriber).

### Guidelines for initiating and titrating basal (background) insulin

Adjust the dose either weekly or twice weekly (as outlined in the Authorisation to titrate insulin dose (CHSA Diabetes Service) order), to reach the target fasting blood glucose, using the schedule below. Unless otherwise stated, target pre-prandial blood glucose 4-6mmol/L.

In high risk patients (*eg cardiovascular disease, hypo unawareness, older, frail, or other co morbidities*) or those with long standing diabetes, the target will be higher than 6-8mmols/L. In women who are planning a pregnancy or who are pregnant, the target will be in accordance to the Australian Diabetes in Pregnancy Society and South Australian Perinatal Guidelines. The referring specialist physician, general practitioner or endocrinologist will adjust the insulin schedule accordingly.

**Table 1: Guidelines for initiating and adjusting basal (background) insulin**

<table>
<tr><td>Step 1</td><td>FOR GESTATIONAL DIABETES - COMMENCE 4 units isophane insulin nocte.<br>FOR TYPE 1 DIABETES – COMMENCE 0.5 to 1.0 units/kg glargine nocte. Higher doses are needed in patients with mild - moderate ketones. Discuss with diabetes specialist.<br>FOR TYPE 2 DIABETES - COMMENCE 10 units glargine or isophane insulin nocte (or mane). CONTINUE oral diabetes medication/s (at the same dosage, but no greater than the maximum recommended dose)<br>> If evening blood glucose level is high, commence 10 units morning insulin.<br>> If both morning and pre-evening meal blood glucose levels are high, and the person is on isophane insulin, consider twice daily dose.</td></tr>
<tr><td>Step 2</td><td>ADJUST insulin every week or twice weekly to achieve target using fasting blood glucose for nocte insulin or pre evening meal blood glucose for morning dose.<br>Baseline algorithm below.<br><table><tr><th>Mean fasting blood glucose or pre evening meal blood glucose for morning dose (mmol/L)</th><th>Adjustment to insulin dose*</th></tr><tr><td>> 10</td><td>Increase by 4 units</td></tr><tr><td>8-10</td><td>Increase by 2-4 units</td></tr><tr><td>6-8</td><td>No change or increase by 2 units</td></tr><tr><td>4-6</td><td>No change or decrease by 2 units</td></tr><tr><td>< 4 or if severe hypoglycaemia is reported</td><td>Decrease by 2-4 units</td></tr></table>* Prescriber may adjust algorithm for high risk patients or those with long standing diabetes</td></tr>
<tr><td>Step 3</td><td>CHECK overall blood glucose control by measuring HbA1c 3-6 monthly.</td></tr>
<tr><td>Step 4</td><td>If fasting and evening blood glucose are on target but HbA1c is not, look for hidden ‘hypers’ – blood glucose peaks that occur during the day, often before lunch or after dinner.<br>Options to correct hidden ‘hypers’ include:<br>> changing preceding meal size or carbohydrate composition<br>> increasing activity after meals<br>> adding additional medication/s (if T2D)<br>> adding a meal-time rapid acting insulin (if T2D or GDM).</td></tr>
</table>

### Guidelines for initiating and titrating bolus (pre meal) insulin

1 unit of rapid-acting insulin generally covers 15 grams of carbohydrate and is a suitable insulin:carbohydrate ratio to commence.

Adjust the dose either weekly or twice weekly, to reach the target blood glucose post prandial or prior to next main meal, using the schedule below. Unless otherwise stated, target pre-prandial and next main meal blood glucose is 4-6mmol/L.

In high risk patients (*eg cardiovascular disease, hypo unawareness, older, frail, or other co morbidities*) or those with long standing diabetes, the target will be higher than 6-8mmols/L. In women who are planning a pregnancy or who are pregnant, the target will be in accordance to the Australian Diabetes in Pregnancy Society and South Australian Perinatal Guidelines. The referring doctor will adjust the insulin schedule accordingly.

**Table 2: Guidelines for initiating and adjusting bolus (pre meal) insulin**

<table>
<tr><td>Step 1</td><td>FOR GESTATIONAL DIABETES - COMMENCE 4 units rapid acting insulin before meal/s. Monitor 2 hour post prandial blood glucose level and target mean 2 hour post meal as per ADIPS recommendations. Discuss with diabetes specialist. CONTINUE basal insulin at the current dose.<br>FOR TYPE 1 DIABETES – COMMENCE 4 units rapid acting insulin before meal/s. Monitor blood glucose pre meal and/or 2 hour post prandial as directed. Higher doses are needed in patients with mild - moderate ketones. Discuss with diabetes specialist. CONTINUE basal insulin at the current dose.<br>FOR TYPE 2 DIABETES - COMMENCE 4 units rapid acting insulin before meal/s. CONTINUE basal insulin at the current dose. Monitor blood glucose pre meal and/or 2 hour post prandial as directed. CONTINUE metformin, at the same dosage, but no greater than the maximum recommended dose). CONSIDER tapering sulphonylurea as glycaemic control improves.</td></tr>
<tr><td>Step 2</td><td>ADJUST rapid acting insulin every week or twice weekly according to medical order and pre/post meal blood glucose target. Baseline algorithm below.<br><table><tr><th>Mean pre meal (next meal) and/or 2 hour post prandial blood glucose (mmol/L)</th><th>Adjustment to insulin dose*</th></tr><tr><td>> 10</td><td>Increase by 2 units</td></tr><tr><td>8-10</td><td>Increase by 1-2 units</td></tr><tr><td>6-8</td><td>No change</td></tr><tr><td>4-6</td><td>No change or decrease by 2 units</td></tr><tr><td>< 4 on any day</td><td>Decrease by 2-4 units</td></tr></table>* Prescriber may adjust algorithm for high risk patients or those with long standing diabetes</td></tr>
<tr><td>Step 3</td><td>CHECK overall blood glucose control by measuring HbA1c 3-6 monthly.</td></tr>
<tr><td>Step 4</td><td>If fasting and evening blood glucose are on target but HbA1c is not, look for hidden ‘hypers’. Options to correct hidden ‘hypers’ include:<br>> changing preceding meal size or carbohydrate composition<br>> increasing activity after meals<br>> adding additional medication/s (if T2D)<br>> adding another meal-time rapid acting insulin (if T2D or GDM)<br>> adjusting relevant insulin as per order (T1D).</td></tr>
</table>

### Guidelines for initiating and titrating premixed insulin

Adjust the dose either weekly or twice weekly, to reach the target fasting blood glucose, using the schedule below. Unless otherwise stated, target pre-prandial and next main meal blood glucose is 4-6mmol/L.

In high risk patients (eg cardiovascular disease, hypo unawareness, older, frail, or other co morbidities) or those with long standing diabetes, the target will be higher than 6-8mmols/L. In women who are planning a pregnancy or who are pregnant, the target will be in accordance to the Australian Diabetes in Pregnancy Society and South Australian Perinatal Guidelines. The referring doctor will adjust the insulin schedule accordingly.

**Table 3: Guidelines for initiating and adjusting bolus premixed insulin**

<table>
<tr><td>Step 1</td><td>FOR TYPE 2 DIABETES -<br><br>> If morning blood glucose level is high, commence 10 units premixed insulin before the evening meal.<br>> If evening blood glucose level is high, commence 10 units morning premixed insulin.<br>> If both morning and pre-evening meal blood glucose levels are high and the patient is on one daily dose, consider twice daily dose.<br>> CONTINUE METFORMIN at the same dosage, but no greater than the maximum recommended dose) CONSIDER tapering sulphonylurea as glycaemic control improves.</td></tr>
<tr><td rowspan="2">Step 2</td><td>ADJUST the evening meal premixed insulin gradually every week or twice weekly according to medical order and fasting blood glucose target. Baseline algorithm below.<br><br>Mean fasting blood glucose (mmol/L) — Adjustment to insulin dose*<br>> 10 — Increase by 4 units<br>8-10 — Increase by 2 units<br>6-8 — No change<br>4-6 — Decrease by 2 units<br>< 4 — Decrease by 4 units<br><br>* Prescriber may adjust algorithm for high risk patients or those with long standing diabetes</td></tr>
<tr><td>If a morning premixed insulin in given, ADJUST the morning premixed insulin dose gradually every week or twice weekly according to medical order and pre evening meal blood glucose target. Baseline algorithm below.<br><br>Mean pre evening meal blood glucose (mmol/L) — Adjustment to insulin dose*<br>> 10 — Increase by 4 units<br>8-10 — Increase by 2 units<br>6-8 — No change<br>4-6 — Decrease by 2 units<br>< 4 — Decrease by 4 units<br><br>* Prescriber may adjust algorithm for high risk patients or those with long standing diabetes</td></tr>
<tr><td>Step 3</td><td>CHECK overall blood glucose control by measuring HbA1c 3-6 monthly.</td></tr>
</table>

| | |
|---|---|
| **Step 4** | If fasting blood glucose and evening blood glucose are on target but HbA1c is not, look for hidden 'hypers' – blood glucose peaks that occur during the day, often before lunch.<br><br>Options to correct hidden 'hypers' include:<br>> changing preceding meal size or carbohydrate composition<br>> increasing activity after meals<br>> adding additional medication/s (*if T2D*)<br>> consider moving to a twice daily premixed insulin regimen. |

## 8. Documentation

Comprehensive and complete documentation should be undertaken after each contact with the patient.

CDE Documentation in the medical record should include:

- blood glucose measurements for the week preceding, using the Blood Glucose & Insulin Record Chart.
- blood ketone measurement (if T1D)
- the insulin dose adjustment advice to the patient
- any information from the patient that may have affected blood glucose levels.

## 9. Reporting to the prescriber

Communication to the prescribing specialist physician, general practitioner or endocrinologist must be provided at the end of the timeframe indicated on the authorisation or at any time during the titration period where the CDE has identified an issue or concern.

This report should include:

- current fasting and relevant pre-prandial blood glucose
- current insulin dose
- any difficulties or issues that have arisen that may contribute to problems in stabilisation.

Any communication with the prescriber is to be recorded in the medical record by the CDE.

In the circumstance that the prescriber is an endocrinologist, it is the responsibility of the endocrinologist to communicate the treatment plan including use or the Authorisation to titrate insulin dose (CHSA Diabetes Service) order to the specialist physician or general practitioner. All subsequent communications by the CDE are to be provided to both the prescribing endocrinologist and the general practitioner.

## 10. Evaluation

Evaluation will focus on:

- appropriate timing and effective of communication between referring specialist physician, general practitioner or endocrinologist
- improved health status of the patient with diabetes
- patient, specialist physician, general practitioner, endocrinologist, dietitian, CDE and DE satisfaction.

## 11. Acknowledgements

Barwon Health, Barwon Head, VIC

St John of God Hospital, Warrnambool, VIC

Wimmera Health Care Group, Horsham, VIC

## Attached / Linked Documents

| |
|---|
| ADEA Checklist for Education of Initiation of Injectable Therapies |
| CHSA Diabetes Service insulin education factsheets:<br>> Starting insulin in type 2 diabetes (December 2016)<br>> Insulin in type 1 diabetes - Basal bolus (June 2017)<br>> Insulin pump therapy in type 1 diabetes (December 2015) |

## References


| Document Name |
|---|
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## Consultation

| Version | Consultation |
|---|---|
| 1.0 | SA Health Metropolitan Diabetes Services, NP-Diabetes - Mt Gambier, CHSA Diabetes Specialist Nurse Network, CHSA Clinical Pharmacists, CHSA Director of Endocrinology, CHSA Drug & Therapeutics Committee. |
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