

# Hospitalisation

Diabetes Service, Country Health SA  
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## Hospitalisation

Diabetes is estimated to affect 7.4% of the Australian population<sup>1</sup>, and is increasing annually by 0.8%.<sup>1</sup> People with diabetes have a higher utilisation of both primary and tertiary health services. Australian Institute of Health and Welfare data indicate that the proportion of people with diabetes as a diagnosis in hospital has been increasing.<sup>2</sup> People with diabetes also have longer lengths of hospital stay, being about 2 days longer than people without diabetes.<sup>3</sup>

Diabetes and hyperglycaemia has been shown in a number of observational studies to be associated with poorer outcomes and are markers of morbidity and mortality. Reasons for the increased morbidity and mortality may be related to poor immune response, delayed healing, inflammation and thrombosis associated with hyperglycaemia as well as a higher rate of co-morbid conditions in this patient group.<sup>4</sup>

Independent of diabetes, the relationship between hyperglycaemia and adverse hospital outcomes, in particular mortality, has been clearly demonstrated in many different hospital settings.

People with diabetes can be admitted to a Country Health SA Local Health Network (CHSA) hospital for a range of health problems. An admission may be related to an acute complication of diabetes (eg diabetic ketoacidosis, hyperosmolar hyperglycaemic state and severe hypoglycaemia), a chronic complication of diabetes (eg coronary artery disease, cerebrovascular accident, renal disease, or vascular problems) or completely unrelated to their diabetes.

Whatever the reason for admission to hospital, current research literature supports targeted glucose control in the hospital setting for improved clinical outcomes.<sup>5, 6</sup>

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## Admission

Patients with diabetes are frequently admitted to a hospital, usually for treatment of conditions other than the diabetes. The prevalence of diabetes rises with increasing age, as does the prevalence of other diseases; both factors increase the likelihood that a person admitted to a hospital will have diabetes.

Much of what was formerly done in hospital, including many surgical procedures, complex diagnostic testing, or treatment of community acquired infections, is now done in a clinic or at home or as a day procedure in hospital.

However, the presence of diabetes might precipitate admission of a patient who would otherwise be treated as an outpatient. Admissions may be:

### > Emergency

An emergency admission is defined as an unplanned, often urgent admission (often via the emergency department), which occurs when a patient is admitted at the earliest possible time; generally understood to include at least one overnight stay on short notice because of clinical need or because alternative care is not available.

The [SA Direct Admissions Guideline](#) has been developed to facilitate direct admission to hospital services when appropriate. This guideline provides a pathway for referral by General Practitioners (GPs), specialists and other public/private hospitals or health care providers to facilitate direct admission into an inpatient unit thereby avoiding or minimising time spent in the emergency department.

### > Elective

Patients requiring elective admission have been assessed by a medical practitioner or authorised delegate as needing admission for a medical/surgical condition, but for which admission can be delayed for at least 24 hours. These patients are placed on a booking list and treated according to the clinical urgency category assigned by the treating medical practitioner.

[SA Health Elective Surgery Policy Framework and Associated Procedural Guidelines](#) has been developed to provide a consistent, structured approach to support the provision of elective surgery within SA Health public hospitals.

The main goals for patients with diabetes needing hospitalisation are to:-

- > minimise disruption of the metabolic state and ensure adequate nutrition
- > prevent hyperglycaemia, dehydration, electrolyte abnormalities, diabetic ketoacidosis, and/or hyperglycaemia hyperosmolar state
- > prevent hypoglycaemia, achieve and maintain normal glycaemic levels and
- > assess patient educational needs and address deficiencies.

## Evidence

Hyperglycaemia (high blood glucose levels) in the hospital can reflect previously known but sub optimally controlled diabetes, previously undiagnosed diabetes or may be related to the conditions requiring hospital admission.

Management of elevated blood glucose levels in hospital has previously been considered secondary in importance to the condition that prompted admission. However, current research supports targeted glucose control in the hospital setting for improved clinical outcomes.

Hypoglycaemia (low blood glucose levels) should be avoided if at all possible. Although relatively brief and mild hypoglycaemia does not usually have clinically significant sequelae, hospitalised patients are particularly vulnerable to severe, prolonged hypoglycaemia since they may be unable to sense or respond to the early warning signs and symptoms of low blood glucose.<sup>7</sup>

Hypoglycaemia can be harmful, due to the effects of counter-regulatory hormones, especially catecholamines, which may possibly induce arrhythmias and other cardiac events. This is especially true in the elderly and those with pre-existing ischemic heart disease.<sup>5-7</sup>

Hypoglycaemia may occur due to acute issues affecting the renal function and reduced eGFR. Impaired renal competence can reduce the rate of insulin disposal, prolong the circulating half-life of insulin and reduce the dose requirement for insulin-treated patients. Thus the main determinant for use of insulin in renal impairment is to monitor glucose control and adjust the insulin dose and regimen as necessary.

## Assessment

### Assessment

The range of health care professionals varies based on the services provided by each hospital. The admission process relies on a core team consisting of a general practitioner, physician, nurse/midwife and, when appropriate, draws upon an extended team of diabetes educator, dietitian, podiatrist, physical and occupational therapists, pharmacists, psychiatrists, psychologists, dentists, and opticians.

Increasingly, hospital services are moving towards a 'virtual team' concept in which members are included as needed with assistance conducted at different locations on different days, and team communication is completed via telephone or electronically.

Admission assessment is not limited to, but includes questioning, observational, inspection and examination of:

- > history of complaint
- > vital signs
- > blood glucose levels
- > blood ketone level (if type 1 diabetes)
- > past medical history
- > allergies
- > medications (prescriptive and non-prescriptive including over the counter, supplements and illegal)
- > family history
- > values/beliefs
- > cognitive/perception
- > language
- > psychosocial
- > sleep/relaxation
- > pregnancy/sexual activity
- > employment
- > respiratory system

- > cardiovascular system
- > neurological system
- > gastrointestinal system
- > reproductive system
- > musculoskeletal system
- > renal system.

## **Diagnostics**

Pathology tests allow the multi-disciplinary team to differentiate between normal, variation to normal and abnormal findings to aid rapid assessment of the person with diabetes unstable and complex health care problems. Pathology tests are not limited to, but may include:

- > blood gases
- > c-reactive protein
- > haematology (complete blood examination)
- > biochemistry
- > c-peptide
- > diabetes type 1 antibodies
- > serum protein panel
- > urine specimen (urine multi culture and sensitivity)
- > urine albumin
- > renal function eg Creatinine, eGFR
- > iron studies
- > thyroid function
- > vitamin D
- > coeliac disease screen
- > lipid studies
- > cardiac troponin
- > CK-MB
- > hepatitis serology / HIV screen / syphilis screen / rubella virus screen
- > transfusion group and cross match.

Medical imaging is not limited to, but may include:

- > chest x-ray
- > ultrasound
- > doppler studies.

## **HbA1c**

HbA1C or glycated haemoglobin is a clinical test used to estimate blood glucose control. It reflects mean blood glucose over the entire 120 day life span of the red blood cell, but it correlates best with mean blood glucose over the previous 8 to 12 weeks.

The admission HbA1c will identify glycaemic control prior to hospitalisation and assist in determining the best discharge therapy.

HbA1C values >48mmol/mol (>6.5%) in undiagnosed patients suggest that diabetes preceded the hospitalisation.<sup>6</sup>

Note: A range of issues may affect the true result of the Hba1c test (eg acute blood loss, haemolytic anaemia, transfusion, iron deficient anaemia and chronic renal disease. For further information, visit the [NGSP](#) website.

## Referrals

The range of health care professionals varies based on the services provided by each hospital.

A referral criteria is often available for the general practitioner, physician, nurse/midwife, diabetes educator, dietitian, podiatrist, physical and occupational therapists, pharmacists, psychiatrists, psychologists, dentists, and opticians.

Community resources can also benefit the diabetes patient and prepare them for discharge. Information can be provided on:

- > National Diabetes Services Scheme
- > Diabetes SA
- > Primary Care Services
- > Community Health Centres
- > Support Groups.

## Handover and Documentation (ISBAR)

ISBAR (Identify, Situation, Background, Assessment and Recommendation) is a mnemonic created to improve safety in the assessment and transfer of critical information pertaining to a patient.



## Recognition and Response to clinical deterioration

Glycaemic control is likely to become unstable in patients with diabetes because of the stress of the illness or procedure, the concomitant changes in dietary intake and physical activity, and the frequent interruption of the patient's usual oral hypoglycaemic agents and/or insulin therapy. Therapy initiated in hospital such as steroids may also exacerbate hyperglycaemia.

The [SA Health Recognising and Responding to Clinical Deterioration Guideline](#) describes processes to recognise and respond to clinically deteriorating patients. It is evidence based, individualised to patient preference and consistent across South Australian health services. Effective recognition and response to clinical deterioration is an essential component of safe, high quality health care.

## Advanced Care Directives

The Advance Care Directives Act 2013 empowers adults to make legal arrangements for their health care, end of life, preferred living arrangements and other personal matters, and/or appoint one or more Substitute Decision Makers to make decisions on their behalf when they are unable to do so themselves.

The [SA Health Advance Care Directives Policy Directive](#) underpins the application of advance care directives, including in the provision of health care and medical treatment and resolving disputes.

## Glycaemic Targets

Glycaemic control is likely to become unstable in patients with diabetes because of the stress of the illness or procedure, the concomitant changes in dietary intake and physical activity, and the frequent interruption of the patient's usual anti diabetes medication and/or insulin therapy.

In 2012, the Australian Diabetes Society (ADS) published [Guidelines for routine glucose control in hospital](#). This document provides guidance for hospitals but does not provide specific protocols for management of hyperglycaemia or hypoglycaemia.

The adverse outcomes due to inpatient hyperglycaemia include:

- > infection
- > mortality and
- > longer length of stay.

It is important to note that the relationship between hyperglycaemia and mortality in the general wards is much stronger among those with newly discovered hyperglycaemia than among those with known diabetes.

The Australian Diabetes Society recommendations and practice points are that:

- > most patients in general hospital wards with hyperglycaemia should be treated to achieve and maintain glucose levels less than 10mmol/L
- > hypoglycaemia must be avoided. It would be prudent to avoid treatment which lowers the glucose below 5mmol/L
- > to achieve tight glucose control safely, frequent glucose monitoring is recommended.
- > for the majority of critically ill patients in the Intensive Care Unit setting, intravenous (IV) insulin infusion should be used to control hyperglycaemia, with a starting target no higher than 10mmol/L.

## Blood Glucose and Ketone Monitoring

Capillary blood glucose monitoring is used to guide the management of diabetes. Safety standards are established as per the CHSA control quality of blood glucose meters.

Glucose measures differ significantly between plasma and whole blood and if used inappropriately, can lead to misinterpretation. Most commercially available capillary blood glucose meters introduce a correction factor for low or high haemoglobin concentrations, hypoperfusion, and interfering substances such as maltose (contained in immunoglobulins).<sup>3,4</sup> Any glucose result that does not correlate with the patient's status should be confirmed through conventional laboratory sampling of plasma glucose or I-stat Point of Care testing.

For further information on blood glucose and ketone monitoring in a hospital setting, refer to section '*Monitoring blood glucose and ketones*'.

Training and accreditation for point of care testing operators including glucose meters, HbA1c and urinary albumin can be accessed free of charge. For further information refer to the [iCCnet](#) website.

### Blood Glucose Monitoring

The Blood Glucose Level (BGL) target range for inpatients in general wards is 5–10mmol/L. The frequency of blood glucose monitoring is recommended as:

- > on admission, all patients with diabetes who are not on intravenous (IV) insulin are

recommended to have their blood glucose levels tested QID (within 30 minutes pre-meal and 2100 hours)

- > stable patients (eg BGLs between 5 and 10mmol/L) who are not at risk of hypoglycaemia can have their BGL frequency decreased to BD if deemed appropriate by the medical practitioner
- > the frequency for monitoring BGL needs to be assessed regularly and any changes documented
- > patients not known to have diabetes, but who are at risk of hyperglycaemia (eg total parental nutrition (TPN), high dose corticosteroids) should have a daily blood glucose measurement prior to lunch if eating or at 1200 hours
- > if a patient is experiencing low blood glucose levels (hypoglycaemia) then the BGL should be tested QID and 0200 or more frequently as per the CHSA *Hypoglycaemia Management Protocol*.

**The medical practitioner should be notified if the BGL is less than 4mmol/L, greater than 15mmol/L on 2 consecutive readings or any BGL greater than 20mmol/L.<sup>4</sup>**

There will be circumstances in which the target BGL range may need to be modified. The target BGL range can be modified on the CHSA Blood Glucose Monitoring Chart (MR59H) by the appropriate medical practitioner.

### Ketone Monitoring

Blood ketones are a sign of severe insulin deficiency and pending diabetic ketoacidosis (DKA) in type 1 diabetes.

Ketone monitoring is used to avoid DKA by detecting insulin deficiency early and guiding insulin replacement. Ketones can be measured in 2 ways.

1. beta-hydroxybutyrate ( $\beta$ -OHB) in capillary blood (eg greater accuracy)
2. acetoacetic acid in urine (less sensitive but recommended if blood ketone tests unavailable).

In a hospital setting ketone testing is required for **all** patients on insulin if they are:

- > fasting
- > unwell, or
- > when a BGL is greater than 15mmol/L.

Blood ketones can be tested with Optium™ Ketone Blood  $\beta$ -Ketone Test Strips. The test strips are designed to quantitatively measure blood  $\beta$ -Ketone (Beta-Hydroxybutyrate) in fresh capillary whole blood from the fingertip.

**The medical practitioner should be notified if the blood ketones are >1.0mmol/L or urine ketones are small or above. The person is at risk of diabetic ketoacidosis without appropriate insulin therapy.**

The CHSA *Blood Glucose Monitoring Chart (MR59H)* has been developed to be used in CHSA hospitals and is to be used in conjunction with the CHSA *Blood Glucose Monitoring Chart Clinical Practice Guideline*.

### Hyperglycaemia Management

Treatment of hyperglycaemia in hospitalised patients depends upon the type of diabetes, the patient's current blood glucose concentrations, prior treatment, the clinically assessed severity of illness, and the expected energy (caloric) intake during the acute episode.<sup>5,6</sup>

At the time of admission, the blood glucose should be measured and the result documented. In addition, blood glucose monitoring should be continued so that appropriate action may be taken. The frequency of measurement depends upon the patients' status, the results of earlier measurements, and the steps taken as a result of those measurements.

In most clinical situations in the hospital, insulin therapy is the preferred method of glycaemic control.<sup>4</sup>

### **Intravenous Insulin Infusion**

There are little data showing that IV insulin is superior to subcutaneous insulin. However, preference over basal bolus insulin may be given because changes of IV insulin infusion dose/s have a more immediate effect compared with subcutaneous therapy.

IV insulin infusions are typically used in the High Dependency Unit, rather than in the general medical wards of CHSA hospitals.

The safe implementation of IV insulin infusion protocols requires hourly monitoring of blood glucose.

With appropriate resources available, IV insulin infusions may be indicated for patients with:

- > diabetic ketoacidosis (DKA)
- > hyperosmolar hyperglycaemic state (HHS)
- > surgical management of type 1 and 2 diabetes
- > type 1 diabetes - patient not eating/fasting.

Careful consideration for use with:

- > hyperglycaemia on admission
- > persistent hyperglycaemia during hospitalisation.

The CHSA *Diabetic Ketoacidosis Management in Adults with Type 1 Diabetes; Clinical Protocol* has been developed to be used in conjunction with the CHSA *Intravenous Actrapid Insulin Infusion DKA/Type 1 Protocol (MR-INF-A)*.

The CHSA *Hyperglycaemic Hyperosmolar State Management in Adults with Type 2 Diabetes, Clinical Protocol* has been developed to be used in conjunction with the CHSA *Intravenous Actrapid Insulin Infusion HHS/Type 2 Protocol (MR-INF-B)*.

Within CHSA, the IV infusion protocols and clinical practice guidelines have not been approved for:

- > peri-partum management of diabetes (refer to [SA Health Perinatal Practice Guidelines](#))
- > paediatric patients (consultation with a specialised paediatric metropolitan service is required).

In patients who are not eating, a concomitant glucose infusion is necessary to prevent the development of ketone and provide some energy, reduce protein loss, and decrease the risk of hypoglycaemia; some combine insulin and glucose in a single infusion, while others give these via separate infusions for more flexible control.

### **Transitioning from intravenous insulin infusion to subcutaneous therapy**

IV insulin (Actrapid) has a half-life of only 7 minutes with a duration of only 1 hour. When a patient is to transition from IV insulin infusion to subcutaneous therapy, precautions

should be taken to prevent hyperglycaemia. These precautions include:

- > patients **must not** have their IV insulin infusion discontinued until 4 hours after commencement of basal (glargine) subcutaneous insulin
- > IV insulin adjustments can continue following the commencement of basal insulin based on blood glucose levels as this ensures adequate insulin coverage during transition.

### Switching from IV to the Basal Bolus Insulin protocol

Prior to the transition to basal bolus insulin, the total daily dose (TTD) of insulin must be calculated.

The TTD is the amount of insulin required via infusion over the last 6 hours multiplied by 4 (estimated total insulin requirement over 24 hours). The TTD is then divided:

- > 50% of the TDD is allocated to the basal insulin requirement
- > 50% (given in three divided bolus doses with main meals) is allocated as meal related insulin.

The allocated basal insulin requirement (eg glargine) must be administered no less than 4 hours before the IV infusion is discontinued.

### Switching from IV to pre-mixed insulin

If pre-mixed insulin (twice/day) is chosen, 2/3 TDD is given at breakfast and 1/3 is given with the evening meal.<sup>8</sup>

### Basal Bolus Insulin

Outside of critical care units, subcutaneous insulin that delivers basal, meal time, and correctional components is recommended for patients.

The Basal Bolus Insulin (BBI) regimen is a combination of long acting insulin and rapid acting insulin injections and most closely matches how the body normally releases insulin. BBI offers flexibility in that it accommodates variable ward routines and meal-times and surgical or fasting procedures.<sup>9, 10</sup>

The CHSA *Basal Bolus Insulin Protocol and Dosing Chart: Adult (MR62)* has been developed to be used in CHSA hospitals and is to be used in conjunction with the CHSA *Basal Bolus Insulin (BBI) User Guideline*. It is recommended for use in the following situations:

- > inpatients with anticipated or current hyperglycaemia (eg more than one **BGL>10mmol/L within a 24 hour period**)
- > stopping an IV insulin infusion
- > instead of using a subcutaneous sliding scale insulin regime.

**The CHSA BBI Protocol and Dosing Chart (MR62) is not recommended for:**

- > use in Diabetic Ketoacidosis (DKA) or Hyperosmolar Hyperglycaemic State (HHS) **IV insulin infusion is required for these conditions**
- > use in paediatrics
- > patients who have stable blood glucose on their usual treatment (oral and/or insulin)
- > patients if expected discharge within 48 hours.

### Basal insulin

Basal insulin (also known as background insulin) is used for cellular glucose uptake and

to achieve blood glucose levels within target levels when the person is asleep or during the day between meals.

Basal insulin makes up about 50% of the insulin needed in 24 hours (TDD) and is commonly given once a day at night time (eg 9:00pm). However, depending on the long acting insulin used, it can also be given at other times or split into two injections at morning and night.

When the patient is fasting, basal insulin is still required and is essential in patients with type 1 diabetes.

### Bolus insulin

Bolus insulin makes up about at 50% of the insulin needed in 24 hours (TDD) and is commonly split between the main meals (eg breakfast, lunch and dinner). Adjustment of doses allows a person greater flexibility in the amount of carbohydrates they eat.

Rapid acting bolus insulin with meals is administered immediately before a patient eats to keep the blood glucose levels in target after the meal. A credentialled diabetes educator or medical practitioner may suggest that the patient take their insulin during a meal (eg if hypoglycaemia needs to be prevented) or after a meal (eg if nauseated or unsure that they will eat their meal in its entirety).

When a patient is fasting, the 'meal-related' rapid acting bolus insulin is withheld.

### Correctional insulin

Correctional insulin is rapid acting insulin prescribed to treat hyperglycaemia.

Correctional insulin is given **in addition to the 'meal related' rapid acting bolus insulin** or independent of the 'meal related' rapid acting bolus insulin if the patient is fasting.

This correctional dose may be prescribed as per the following example:

CORRECTIONAL RAPID INSULIN			GIVE THIS DOSE EVEN IF FASTING						
Only needed if BGL > 10 mmol/L. If a correctional dose is required, use the same type of rapid insulin as above. This dose can be combined with the above rapid insulin dose for administration.									
BGL (mmol/L)	Extra insulin	DATE							
<10	none	Name: .....	B'fast						
10.1 - 15	3 units	Sign: .....	Lunch						
>15	6 units	Date: / / .. Desig: .....	Tea						

A correctional rapid acting insulin bolus for hyperglycaemia is an additional insulin dose at mealtime to treat hyperglycaemia. In illness and stress situations, such as hospitalisation, generally more insulin is required.

Monitoring blood glucose levels QID (before meals and before bed) and adjusting the basal and 'meal related' bolus doses on a daily basis is an essential part of the CHSA Basal Bolus Insulin Protocol. When adjusting doses, the prescriber must take into consideration the correctional insulin administered in the previous 24 hours and adjust future dose orders accordingly.

### Pre mixed insulin

Premixed insulin are prepared mixtures of rapid acting insulin and intermediate acting basal insulin at a prescribed ratio:

- > 30% rapid acting insulin with 70% intermediate acting basal insulin
- > 25% rapid acting insulin with 75% intermediate acting basal insulin and,
- > 50% rapid acting insulin with 50% intermediate acting basal insulin.

Pre-mixed insulins can be used in stable patients if they are eating regular amounts of carbohydrate and their BGLs are within target. Otherwise, insulin therapy in hospitalised patients should otherwise consist of a basal insulin, bolus (meal related) and correctional insulin.<sup>8</sup>

### Continuous subcutaneous insulin infusion – Insulin pump

The aim of Continuous Subcutaneous Insulin Infusion (CSII) is to mimic normal endogenous insulin production. The principles of CSII are not dissimilar to the principles involved in basal bolus insulin therapy.

Rapid acting insulin is infused 24 hours a day by a device called an insulin pump. The pump is connected by tubing to a catheter which is inserted into the subcutaneous (fat) layer of the skin. The tubing, catheter and site need to be replaced every 3 days.

Basal insulin in the form of long acting insulin is not required. Basal requirements are programmed for each hour or at a temporary rate and bolus insulin doses can be administered when ingesting carbohydrates at meals/snacks, or periodically, to correct hyperglycaemia.

The use of the CSII is contra-indicated in situations where the patient's safety may be compromised by their physical illness or mental state.

Absolute contra-indications for CSII using an insulin pump during an admission are:

- > patients with an impaired level of consciousness
- > patients with critical illness requiring intensive care
- > patients with major psychiatric disturbance
- > diabetic ketoacidosis (DKA)
- > patients refusing or unwilling to participate in self-care
- > patients unable to demonstrate a basic level of competency in the operation of their insulin pump to alter settings (e.g. basal rate/s, target BGL, advanced programming of carbohydrate:insulin ratio/s and insulin sensitivity factor/s) or re-site when required.
- > lack of infusion sets, spare batteries and other equipment required to maintain patient on CSII therapy
- > extensive skin infections or inflammation
- > concerns regarding technical malfunction of the pump
- > numerous radiological procedures (eg the pump should be suspended and disconnected prior to the patient entering a CT or MRI scanner)
- > patient undergoing lengthy or complicated surgery, or serious medical illness likely to be accompanied by significant metabolic disturbance
- > any other medical circumstance deemed unsuitable by the supervising medical officer.<sup>6</sup>

If the patient presents with any contraindication, the CSII must be discontinued and the device managed according to the hospital's policy for storage of patient valuables. The patient should be placed on an IV insulin infusion or basal bolus insulin therapy during their hospitalisation.

The CHSA *Inpatient CSII (Insulin Pump) Record Sheet* and *Patient Self-Management of Insulin Pump Consent form* has been developed to be used in CHSA hospitals and is to

be used in conjunction with the CHSA *Insulin Continuous Subcutaneous Insulin Infusion (CSII) Insulin Pumps in the Inpatient Setting Clinical Practice Guideline*.

### Sliding scale insulin

The widespread use of the 'sliding scale' insulin administration for hospitalised patients began during the era of urine glucose testing and it increased after the introduction of capillary blood glucose testing in the last two to three decades.

There is little data to support its benefit and some evidence of potential harm when the 'sliding scale' is applied in a rote fashion, that is, when all patients receive the same orders and, importantly, when the sole form of insulin administered is rapid-acting insulin every 4-6 hours without underlying provision of basal insulin or consideration of carbohydrate intake.

**SSI is now strongly discouraged in hospitalised patients as the sole method of insulin treatment.**<sup>5,6</sup>

### Oral hypoglycaemic agents (OHA)

Oral hypoglycaemic agents which are started or increased during hospitalisation generally do not act quickly enough to control hyperglycaemia.

Inpatients who are achieving target BGLs, are eating regularly and in whom there are no contraindications (eg patient is not acutely sick or renal impairment) may continue to use oral hypoglycaemic agents.<sup>5,6</sup>

### Diabetic Ketoacidosis (DKA)

Diabetic Ketoacidosis (DKA) is a life-threatening complication of diabetes mellitus, usually type 1 diabetes, and needs to be treated as **a medical emergency**.

DKA is associated with a significant morbidity and mortality and must be diagnosed promptly and managed intensively. DKA is a complex disordered metabolic state characterised by ketonaemia, hyperglycaemia, metabolic acidosis and dehydration.

This results from absolute or relative insulin deficiency accompanied by an increase in counter-regulatory hormones (glucagon, epinephrine, cortisol, growth hormone). In addition to the significant metabolic and electrolyte derangements, patients may have additional medical or surgical co-morbidities, which may have triggered DKA (eg sepsis, which must be diagnosed and appropriately managed).

In all cases of DKA, consultation with an emergency physician or endocrinologist is required. In severe cases or if patient deteriorates (as per CHSA protocol) transfer to an appropriate regional or metropolitan hospital is required.

The biochemical criteria for diagnosis of DKA are:

- > hyperglycaemia (BG >11mmol/L) or known diabetes
- > venous pH<7.3 or bicarbonate ( $\text{HCO}_3^-$  <15mmol/L Bicarbonate ( $\text{HCO}_3^-$ ))
- > ketonaemia (eg blood ketones  $\geq$  3mmol/L) or and ketonuria (eg urine ketones  $\geq$  2+ on dipsticks).

The goals of treatment of DKA are:

- > restoration of circulatory volume
- > clearance of ketones
- > correction of electrolyte losses (mainly potassium)

- > normalisation of blood glucose
- > prevention of hypokalaemia, hypoglycaemia, other potential complications (eg cerebral oedema) and arterial or venous thrombosis.

Successful treatment of DKA requires:

- > admission to a hospital equipped to manage DKA
- > availability of point of care testing.
- > frequent monitoring
- > fluid replacement and insulin to correct dehydration, acidosis and hyperglycaemia
- > replacement of electrolyte losses
- > careful investigation to ascertain the cause.

The CHSA *Diabetic Ketoacidosis Management in Adults with Type 1 Diabetes; Clinical Protocol* has been developed to be used in conjunction with the CHSA *Intravenous Actrapid Insulin Infusion DKA/Type 1 Protocol (MR-INF-A)*.

## Hyperglycaemia Hyperosmolar State (HHS)

The Hyperglycaemic Hyperosmolar State (HHS) is **a medical emergency**.

HHS is associated with a significant morbidity and much higher mortality than DKA and must be diagnosed promptly and managed intensively.

In addition to the significant metabolic derangements due to the hyperglycaemia and dehydration, patients often have additional medical or surgical co-morbidities which may have triggered HHS (eg sepsis or ischaemia). These comorbidities must be diagnosed and appropriately managed.

In all cases of HHS, consultation with an emergency physician or endocrinologist is required. In severe cases or if patient deteriorates (as per CHSA protocol) transfer to an appropriate regional or metropolitan hospital is required.

The biochemical criteria for diagnosis of HHS are:

- > hypovolaemia
- > marked hyperglycaemia (>30mmol/L without significant hyperketonaemia (<3.0mmol/L) or acidosis (pH>7.3, bicarbonate >15mmol/L)
- > osmolality >320mosmol/Kg.

The goals of treatment of HHS:

- > normalise the osmolality
- > replace fluid and correct dehydration without causing fluid overload
- > replace electrolyte losses, mainly potassium
- > normalise blood glucose
- > prevention arterial or venous thrombosis and other potential complications (eg cerebral oedema/central pontine myelinolysis, foot ulceration).

Successful treatment requires:

- > admission to a hospital equipped to manage HHS
- > availability of point of care testing.
- > frequent monitoring
- > fluid replacement and insulin to correct dehydration and hyperglycaemia
- > replacement of electrolyte losses

> careful investigation to ascertain the cause.

The CHSA *Hyperglycaemic Hyperosmolar State Management in Adults with Type 2 Diabetes, Clinical Protocol* has been developed to be used in conjunction with the CHSA *Intravenous Actrapid Insulin Infusion HHS/Type 2 Protocol (MR-INF-B)*.

For further information on hyperglycaemia, DKA and HHS, refer to section '*Hypoglycaemia and Hyperglycaemia*'.

## Hypoglycaemia Management

Hypoglycaemia occurs when the blood glucose level falls below 4mmol/L irrespective of symptoms.

The blood glucose level at which a person might have sign and symptoms of hypoglycaemia can differ according to the age, duration of diabetes and whether there are any associated medical conditions such as liver disease or cerebrovascular disease present. Some people do not have any symptoms.

Hypoglycaemia can also be identified on the basis of physiology using the terminology mild, moderate or severe (Table 1).

<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
Capable of self-treating	Unable to recognise the hypo but able to self-treat when prompted	Not capable of self-treatment
Tremors, palpitation, sweating, hunger, fatigue	Headache, mood changes, low attentiveness	Conscious or unconscious Seizure
<b>Adrenergic</b>	<b>Neuroglycopenic</b>	<b>Neuroglycopenic</b>

**Table 1. Hypoglycaemia defined on the basis of physiology**

Hypoglycaemia is a risk for people who are taking glucose lowering medicines or insulin and the possible causes in a hospital setting are:

- > missing a meal or snack (no carbohydrate)
- > inadequate carbohydrate intake
- > delaying a meal (or enteral feeding)
- > over-administration of insulin or oral hypoglycaemic agents
- > vomiting and/or diarrhoea
- > altered renal function.

Hypoglycaemia must be treated promptly. The CHSA protocol for the treatment of patients with hypoglycaemia is to be used for all patients with diabetes who have a BGL less than 4mmol/L irrespective of symptoms. If a patient complains of symptoms and the BGL is greater than 4mmol/L treat with a small carbohydrate snack.<sup>5,6</sup>

The CHSA protocol is to be followed in the paediatric setting, and consultation with the paediatric service should be considered once patient is stabilised. The protocol is not appropriate for neonates, infants and children presenting with hypoglycaemia from other causes. Seek medical advice as to what treatment is required for patients without known diabetes.

## Hypoglycaemia 'Hypo' Kit

A 'hypo kit' should be available in the inpatient setting for prompt treatment of hypoglycaemia. The CHSA 'hypo kit' contains:

- 1 bottle of Carbotest (75g per 300mL)
- 1 disposable cup (60mL)
- 2 packet of sweet biscuits (2 biscuits per pack = 15gm carbohydrate)



## Glucagon (GlucaGen®)

Glucagon is used to treat severe hypoglycaemia whereby a patient is unable to swallow safely. Glucagon is a hormone that increases glucose levels in the blood. It does this by releasing glucose from stored carbohydrate (glycogen) in the liver into the blood. This means that glucagon will only work to increase blood glucose if there are stores of glycogen in the liver.

All individuals who are at significant risk of severe hypoglycaemia (eg past history of severe hypoglycaemia or hypoglycaemia unaware/impaired) should be prescribed a GlucaGen Hypo kit for use during an admission.

The GlucaGen Hypo Kit and IV Glucose are stored on the emergency trolley.

[CHSA Standing Drug Orders](#) can be accessed on the CHSA WIKI.

Hypoglycaemia can reoccur and is dependent on the severity and duration of episode. Increased blood glucose monitoring for the next 24 hours may be needed and the hypo kit must be replenished and ready for use.

After an episode of hypoglycaemia the next dose of medication may also need to be modified and this should be discussed with the appropriate health professional. Similarly, discussions with the medical officer should determine the cause of the hypoglycaemic event and wherever possible, strategies to preventing further episodes.

After a severe episode of hypoglycaemia, the person should not drive until clearance has been given by the treating doctor.

For further information go to [Clinical Resources for Emergency Departments](#) on the CHSA WIKI, and [The Australian Resuscitation Guidelines](#).

Within the community setting, people with diabetes should have a hypoglycaemia action plan which clearly steps out their self-management and a 'hypo kit' available to use at all times.

For further information on hypoglycaemia, refer to section '*Hypoglycaemia and Hyperglycaemia*'.

## Peri-operative Management

Optimal blood glucose levels prior, during and after surgery will assist with wound healing, reduce the risk of post-operative complications and shorten hospitalisation period. Surgery tends to cause an increase in blood glucose levels.<sup>11</sup> Therefore, an increase in oral hypoglycaemic doses or insulin may be required for an extended period (eg while the person is under stress and relatively inactive post-operatively).

This section provides some guidance on the basic principles of peri-operative guidelines.

**For more detail including flowcharts and guidelines go to the Australian Diabetes Society Diabetes Management Guidelines 2012 available on the [Australian Diabetes Society website](#).**

To use terminology consistent with the ADS guidelines, the definitions for minor and major surgery are:

- > minor surgery: day only procedure surgery (eg eating later that day)
- > major surgery: requiring at an overnight stay (eg prolonged fasting).

The CHSA *Peri-Operative Diabetes Management Guide* has been developed as a quick reference to assist practitioners to find specific information in the ADS Peri-Operative Guidelines on adjustments to oral hypoglycaemic agents and/or insulin for patients with diabetes undergoing elective surgery/procedures.

### General principles

- > ADS guidelines recommend postponing elective surgery if glycaemic control is poor (HbA1c  $\geq$  75mmol/mol or  $\geq$  9%).<sup>6</sup>
- > the target for blood glucose is 5-10mmol/L in the peri-operative and post-operative period.
- > all patients treated with insulin should be managed in the same way irrespective of the type of diabetes. This is because people with long standing type 2 diabetes may develop ketosis during times of physiological stress (eg surgery) if they are sufficiently insulin deficient. Assuming all insulin treated patients are at risk of ketosis is recommended by ADS to ensure that patients at risk of ketosis are not missed.<sup>6</sup> People with type 1 diabetes are most at risk from ketosis. Notify medical practitioner if ketones are present in blood or urine
- > an IV insulin-glucose infusion is the optimal method for maintaining glycaemic control during the peri-operative period. Traditional 'sliding scale insulin' is ineffective and a 'basal-bolus' insulin regimen is preferable once the person has resumed eating. A 'correctional insulin regimen' that is reviewed daily may be used in addition to the basal bolus insulin regimen if the BGL exceeds the target<sup>6</sup>
- > metformin does not need to be withdrawn prior to minor surgery, but should be replaced with a insulin-glucose infusion for the first 24 hours following major surgery
- > hypoglycaemia should be avoided
- > the patient and/or their carer should be given clear written instructions concerning about the management of their diabetes (eg medication) pre and post-operatively and know who to contact should there be any concerns
- > patients must not drive themselves to hospital on the day of the procedure nor home on the day of discharge.

### Pre-operative care

It is important that an anaesthetist be consulted as part of the patient's pre-anaesthetic work-up or that the patient's management is discussed with the anaesthetist. Advice regarding insulin regimens can be obtained by contacting an endocrinologist if necessary (eg by phone if not available in person).<sup>11</sup>

#### Key principles

- > diabetes should be well controlled prior to elective surgery
- > avoid insulin deficiency

- > patients should be advised not to drive themselves to hospital on the day of the procedure
- > patients should be first on the morning list with the afternoon list avoided if possible
- > if a bowel preparation is required, hypoglycaemia is to be avoided. Rapid acting insulin and/or diabetes medications should be withheld and basal insulin dose/s reduced. Clear fluids should contain glucose, and diet drinks consumed if the BGL is elevated
- > the patient and/or their carer should be given clear written instructions about the management of their diabetes (eg medication adjustment) pre and post operatively and know who to contact should there be any concerns
- > in the event of hypoglycaemia, treatment must be given and after the patient is stabilised, contact with the medical officer should be made to determine strategies to preventing further episodes and if the surgical procedure pending is to proceed
- > patients with unstable diabetes should be admitted to hospital prior to surgical procedure and preparations (eg fasting, bowel).

The CHSA *Pre-Operative Checklist* has been developed to aid the pre-admission assessment of patients with diabetes undergoing elective surgery/procedures.

Management of diabetes will depend on whether the person is on diabetes medication and/or insulin and whether they are having minor or major surgery. The ADS Peri-Operative Guidelines for minor and major surgery can be accessed via the [Australian Diabetes Society](#) website.

The following CHSA educational resources and medication adjustment plans have been developed to inform patients with diabetes and/or their carers.

- > *insulin requiring – minor procedures (day only)*
- > *non-insulin requiring – minor procedures (day only)*
- > *insulin requiring – major procedure (overnight stay)*
- > *non- insulin requiring – major procedure (overnight stay).*

\* **ALL** people with diabetes should have their blood glucose level checked within 1 hour of commencement of anaesthetic.

Report to the anaesthetist if the level is <5mmol/L or >10mmol/L.

Refer to the ADS guidelines for use of IV insulin -glucose infusion in the pre and peri-operative timeframes.

### **Intra-operative care**

Monitor BGL hourly during surgery.<sup>11</sup>

### **Post-operative care**

- > check blood glucose hourly in the post-operative ward
- > restart usual oral hypoglycaemic agents and/or insulin when patients are able to tolerate solids, ensuring adequate carbohydrate intake as part of the meal
- > consider admission of day surgery patients' if BGLs become erratic post operatively or their oral intake is inadequate
- > consider ketone testing in insulin requiring patients who have unstable BGLs post operatively or who are acutely unwell
- > for patients who had abnormal renal function or have undergone major surgery, restart Metformin only if they are haemodynamically stable and renal function as assessed by

eGFR is appropriate for the dose of metformin being used.. If the patient has had only minor surgery, Metformin can be started with the next meal.

Before discharge, the person should be advised that their diabetes medication dosages should return to pre-operative doses as they recover and become more active.

Recommence anticipated discharge regimen for at least 24 hours prior to discharge.

However, the admission HbA1c and the blood glucose results performed whilst hospitalised may identify suboptimal glycaemic control and changes to the diabetes medication used prior to admission. Changes to previously used diabetes medication and/or the commencement of new diabetes medication (eg oral hypoglycaemic agents, injectables and insulin) will require referral to the diabetes educator and follow up arrangements with the general practitioner.

The patients must not drive themselves home on the day of discharge.

## Radiological procedures

Staff performing the radiological procedure should be informed that the person has diabetes and of their current oral hypoglycaemic agents and/or insulin.<sup>11</sup>

Patients with diabetes who are fasting should undergo radiological procedures early in the morning. Oral hypoglycaemic agents can then be delayed until after the procedure.

If procedures are held later in the day ensure patients do not fast for more than 4 hours. Oral hypoglycaemic agents and/or insulin should be reduced during fasting period.

To access a protocol for patients with diabetes undergoing radiological procedures go to the [ADS Peri-Operative Guidelines 2012](#), Table 2 page 28.

## Precautionary measures

Insulin Pumps and Continuous Glucose Monitoring Devices (inclusive of sensor, transmitter, meter and remote controls) are designed to withstand common electromagnetic interference. They should however not be exposed to equipment or devices with strong magnetic fields.

For patients on insulin pumps or using a continuous glucose monitoring device undergoing X-rays, MRIs and CT Scans, these devices should be removed prior to entry into a room containing any of this equipment

Blood glucose monitoring equipment should be accessible for use by an accredited nurse.

Blood glucose should be checked before, during and after the procedure, if the person feels unwell or complains of hypoglycaemic symptoms.

Staff performing the radiological procedure should have a hypoglycaemia protocol, hypoglycaemia kit and blood glucose meter on the emergency trolley for treatment of hypoglycaemia.

All people with diabetes should bring the following to the radiological procedure as a precaution:

> quick acting carbohydrate (eg carbotest, full sugar soft drink, glucose tablets) - in case of a hypoglycaemic episode.

### **Intravenous radio-contrast and metformin**

> contrast-induced nephropathy may result in lactic acidosis especially in those who are taking Metformin

- > it is essential that all people on Metformin have their serum creatinine checked prior to the procedure. Metformin should be held in all patients with renal impairment.
- > serum creatinine should be checked before Metformin is restarted after the administration of radio-contrast
- > for people with normal renal function the risk of lactic acidosis following IV contrast administration is low.

## Medical Nutrition Therapy

The goals of medical nutrition therapy are to optimize glycaemic control, provide adequate energy (calories) to meet metabolic demands, and create a discharge plan for follow-up care.<sup>5, 12</sup>

Current nutrition recommendations advise individualisation based on treatment goals, physiological parameters, oral hypoglycaemic agents and/or insulin use. Consistent carbohydrate meal plans are preferred by many hospitals as they facilitate matching the rapid acting insulin dose to the amount of carbohydrate consumed.<sup>13</sup> However, because of the complexity of nutrition issues in the hospital, a registered dietitian, knowledgeable and skilled in medical nutrition therapy, should serve as an inpatient team member.

The dietitian is responsible for integrating information about the patient's clinical condition, meal planning, and lifestyle habits and for establishing treatment goals to determine a realistic plan for nutrition therapy.

### Enteral or parenteral nutrition

Patients with diabetes who are commenced on enteral or parenteral nutrition may need significant adjustments to the type, doses and/or timing of their diabetes treatment.

Insulin therapy is recommended as the most effective agent for patients receiving enteral or parenteral nutrition.

IV insulin infusion may be of benefit when patients are metabolically unstable or are receiving variable parenteral feeding.<sup>5</sup>

If parental nutrition is interrupted, most patients with type 2 diabetes can be followed with careful glucose monitoring and insulin administered if hyperglycaemia occurs. In patients with type 1 diabetes, hyperglycaemia can occur as well as ketosis if all insulin is withheld. Patients with type 1 diabetes require insulin when the parental nutrition is interrupted and the amount and type of insulin depend upon the anticipated duration of the interruption.

If enteral feeds are unexpectedly discontinued, hypoglycaemia may occur. An IV dextrose solution, providing a similar number of carbohydrate calories as was being administered via the enteral feeds, should be infused in order to prevent hypoglycaemia.

Monitor BGLs 4-6 hourly. With bolus enteral or parenteral nutrition perform blood glucose testing before each insulin bolus is given.<sup>5, 8</sup>

Remember to recommence an appropriate oral hypoglycaemic agents and/or insulin regimen when the feeds are ceased and regular oral intake resumes.

## Multi-morbidity

Multi-morbidity, or multiple comorbidity, or multiple chronic conditions, is common and greatly increases the complexity of managing disease in patients. A number of comorbidities are commonly associated with diabetes and may result in a hospital admission:

- > macrovascular disease (eg coronary artery disease, hypertension, hyperlipidaemia and cerebrovascular disease)
- > painful conditions (eg peripheral neuropathies and arthritis)
- > fractures
- > obstructive sleep apnoea or sleep deprivation
- > cancer
- > renal impairment
- > mental health issues (eg diabetes-related distress, depression and anxiety)
- > dental problems (eg periodontitis).

The guiding principle in patients with multi-morbidity should be individualisation of treatment. Key principles of caring for patients with diabetes include:

- > a target HbA1c of <64mmol/mol (<8%) is appropriate in persons with limited life expectancy or persons in whom the risks of hypoglycaemia outweigh the benefit of more aggressive targets. The risk of hypoglycaemia may be elevated in persons who have difficulty maintaining consistent dietary intake due to comorbidities or conditions that cause nausea or anorexia.
- > insulin therapy may not be preferable in patients with cognitive or visual impairments that increase the risk of medication error although in some cases there is no other choice.
- > therapeutic agents should be selected that have a lower risk for hypoglycaemia (eg metformin, DPP4 inhibitors if suitable.)
- > recommendations regarding home blood glucose monitoring for older patients with diabetes, and especially those with comorbidity, should be tailored to the patient, based upon medications and functional and cognitive abilities. The value of BGM in patients who are diet-treated or treated with oral hypoglycaemic agents that are not associated with hypoglycaemia may not be warranted.
- > electrolytes and renal function should be assessed within 1-2 weeks of initiation or dose adjustments of angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), or diuretics, due to the increased likelihood of adverse effects in patients with multi-morbidity.<sup>14</sup>

### **Glucocorticoids**

Hyperglycaemia is common amongst inpatients who are receiving glucocorticoids (incidence of 64-71%).<sup>6</sup>

Risk factors include;

- > pre-existing diabetes
- > higher HbA1c
- > increasing age
- > steroid dose
- > family history of diabetes.

### **Screening for hyperglycaemia**

The ADS guidelines recommend that prior to or upon the initiation of glucocorticoids, it is useful to exclude undiagnosed diabetes by measuring plasma glucose.<sup>11</sup>

Screening for the development of steroid-induced hyperglycaemia can also be done by

measuring the BGL using capillary blood in the afternoon. Reliance on fasting BGL is inadequate due to the glucose profile that is usually seen with glucocorticoids therapies (eg higher BGLs in the afternoon and evening with return to baseline at the fasting reading).

## Management

Insulin is the medication of choice for glucocorticoids induced hyperglycaemia. Doses will need to be adjusted daily. Intermediate acting insulin (eg Isophane) is frequently used due to its profile and it can be supplemented with rapid acting insulin analogue with meals.<sup>15</sup>

For those patients already treated with insulin for their diabetes there will likely be a need for increased insulin doses and this requires daily monitoring.

BGLs should be monitored at least 4 times per day and diabetes treatment intensified to keep BGL in target.

Remember to adjust diabetes treatment downwards as dose of steroid is reduced and ceased.<sup>15</sup>

## Palliative Care

Palliative care focuses on preventing and relieving suffering and on supporting the best possible quality of life for patients and their carer/s facing serious illness. The primary tenets of palliative care are;

- > symptom management
- > establishing goals of care that are in keeping with the patient's values and preferences
- > consistent and sustained communication between the patient and all those involved in his or her care
- > psychosocial, spiritual, and practical support both to patients and their carer/s
- > and coordination across sites of care.<sup>16</sup>

The aim of glycaemic control in patients in palliative care moves from preventing and managing long-term complications of diabetes to preserving quality of life.

Terminally ill patients often have multiple factors affecting their glycaemic control:

- > stress response to severe or sustained illness
- > organ failure
- > malignancy
- > chemotherapy
- > use of steroids
- > poor appetite/smaller meals/poor nutrition
- > dehydration
- > weight loss
- > difficulty taking medications (eg difficulty swallowing, nausea, stress).

Oral hypoglycaemic agents and/or insulin should be tailored to minimise the risks of hypoglycaemia and hyperglycaemia.

Although there is little evidence about optimal blood glucose range, it is generally agreed that a range of 6-11mmol/L is appropriate for most palliative care patients to optimise patient wellbeing and cognitive function.<sup>16</sup>

Insulin alone is a simpler option for patients and/or their carer/s than combinations of oral hypoglycaemic agents and insulin injections. Consideration of switching patients from combinations to insulin alone, once or twice daily is recommended.

For further information and resources for patients and/or their carer/s, visit the [Palliative Care](#) website.

## Self-Management

Diabetes self-management in the hospital may be appropriate for competent teens and adult patients who:

- > have a stable level of consciousness
- > reasonably stable daily insulin requirements
- > successfully conduct self-management of diabetes at home
- > have physical skills needed to successfully self-administer insulin
- > have physical skills needed to successfully perform self-monitoring of blood glucose
- > have physical skills needed to successfully perform self-monitoring of blood ketones (if type 1 diabetes)
- > have physical skills needed to successfully self-manage their continuous subcutaneous insulin infusion (insulin pump) (if type 1 diabetes)
- > have adequate oral intake
- > are proficient in carbohydrate counting
- > use multiple daily insulin injections or insulin pump therapy and
- > understand sick day management.

The patient and medical practitioner, in consultation with nursing staff, must agree that patient self-management is appropriate while hospitalised.

For further information on self-management, refer to section '*Diabetes Education Guide*'.

## Nursing Responsibilities

### Admission procedure

The nursing assessment indicates the reason for admission, and should be clear if diabetes is the reason for the admission or a co-morbidity.

Type of diabetes should be documented as either:

- > type 1
- > type 2
- > type 2 diabetes – insulin requiring.

### History and assessment

Confidentiality of information and the person's privacy must be maintained.

The interview process may be conducted formally or while admitting the person, during observations or ward orientation and may include:

- > relevant medical history, including hypoglycaemia unawareness, foot problem.
- > physical assessment
- > knowledge, skills and attitude assessment (eg diabetes, management, BGM, BKM, oral hypoglycaemic agents, insulin and injecting devices, hypoglycaemia, hyperglycaemia,

sick days and self-care action plans

- > ability to self-care
- > blood glucose target and frequency of blood glucose monitoring
- > oral hypoglycaemic agents and adjustments used for dietary intake (carbohydrate counting), physical activity and/or correction of hyperglycaemia
- > insulin doses and adjustments used for dietary intake (carbohydrate counting), physical activity and/or correction of hyperglycaemia
- > discharge plan with reference to assessment and HbA1c.

### Discharge planning

A planned discharge is vital. This should begin on admission to hospital. Appropriate information for long term care should be supplied to the person with diabetes and/or family/carer. This will assist the person and/or their family/carer to continue self-management after discharge.

Ensure the person is registered with the National Diabetes Services Scheme and has adequate supplies of:

- > syringes / pen needles / sharps container
- > monitoring equipment
- > medication management. If commencing insulin, refer to section '*Medications*'.
- > ensure a plan for access to supplies over public holidays and weekend breaks.

Ensure the person is aware of resources for ongoing supplies (eg Diabetes Australia, National Diabetes Services Scheme).

Ensure appropriate outpatient appointments have been made (eg doctor, dietitian, credentialled diabetes educator, podiatrist, ophthalmologist/optometrist).

Assess the ability of the person with diabetes and their family/carer to cope at home and within the community.

Is there a need for extra involvement of family or of community resources?

Are they aware of their long term medical needs, monitoring and liaison with their local doctor?

Ensure the person is aware of the role of their local doctor. The general practitioner is often the principal medical professional, in other instances there may be a 'shared-care' arrangement between specialist, general practitioner and credentialled diabetes educator.

Regular follow up visits are encouraged and offer a great opportunity for the general practitioner to get to know the person and explore the person's understanding, fears and concerns about diabetes.

Ensure the person and their family/carer is aware of where to seek assistance/advice for problems and emergency treatment.

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