FOR STAFF
Healthcare Professionals involved in care of children and young people with Diabetes managed by insulin therapy.

PATIENTS
Children and young people with diabetes managed by insulin therapy.

This guideline is intended for use to support the self-management of Diabetes whilst an inpatient for children and young people up to the age of 18 years.

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Abbreviations

AHSN- Wessex Academic Health Science Network
CGM- Continuous Glucose Monitoring
CYP- Children and Young People
DKA- Diabetic Ketoacidosis
FGS- Flash Glucose Scanning
NICE- The National Institute for Health and Care Excellence
NMC- Nursing and Midwifery Council
RPS- Royal Pharmaceutical Society

Definitions

**Self-management of diabetes** is the process of deciding on and administering an insulin dose in response to self measured glucose values.

**Self-administration** is the taking of medication (injected or oral) as prescribed by a doctor.

**Child**: A person until their 18\(^{th}\) birthday.
Introduction

This guideline aims to improve the safety of children and young people (CYP) with diabetes treated with insulin therapy while in hospital. Patients and their family or carers have considerable experience in managing their diabetes. Paediatric patients are likely to be accompanied, for some or all of their admission, by a parent or carer who is competent in the management of their diabetes. Support structures should be in place to ensure that management is properly monitored.

Self-management refers to a patient or their carer who monitors their blood glucose, decides on the insulin dose and then administers that dose. Self-administration refers to the patient or carer who delivers their own insulin or other medication, but may or may not be self-managing.

Background

Patient safety incidents involving insulin in hospital are frequent and cause considerable distress to patients and families, as well as being causes of morbidity and mortality\(^1\). CYP with diabetes and their families are educated and supported to self-manage their condition, but this autonomy is often removed from them when they are admitted to hospital. This is usually due to safety concerns regarding the misuse of insulin, but evidence suggests it is more likely to lead to poorer control and an increased risk of hypo and hyperglycaemia\(^2\).

The National Patient Safety Agency recommends “People with diabetes to be allowed to self-manage their diabetes during hospital admission wherever possible” and “that systems should be put in place enabling hospital inpatients to self-administer insulin (where feasible and safe), to reduce the harm associated with incorrectly timing insulin administration with food, and deaths and severe harm caused by errors.”\(^3\)

NICE quality standards require that “People with diabetes admitted to hospital are cared for by appropriately trained staff, provided with access to a specialist diabetes team, and given the choice of self-monitoring and managing their own insulin.”\(^4\)

Diabetes UK advocates better support in hospitals for people to take ownership of their diabetes. Their document “Making hospitals safe for people with diabetes”\(^5\) made the following recommendations

- All patients with a diagnosis of diabetes should be supported to self-manage their diabetes where appropriate. Hospitals should have systems and training in place that supports this.
- All patients with a diagnosis of diabetes should benefit from a care plan – developed in collaboration between healthcare professionals and the patient – that is activated on admission to hospital.
- Diabetes inpatient teams should work with catering staff to make sure mealtimes and meal quantities are appropriate for people with a diagnosis of diabetes.
- All hospital menus should have carbohydrate content available.
- All patients with diabetes should have easy access to appropriate snacks and drinks throughout their inpatient stay.
The Joint British Diabetes Societies for Inpatient Care Group has written comprehensive guidance for self-management of diabetes in hospital by adult patients. This states that “The aim of the document is to improve the safety of the in-hospital management of diabetes. Diabetes care is very individualised, especially if that person is using insulin. It follows that the person with the greatest expertise in managing diabetes is commonly the individual themselves. Allowing patients to self-manage their diabetes in hospital should significantly improve patient safety. The correct support structures need to be provided to ensure this is properly monitored, but this must be done without creating unnecessary bureaucracy.”

The objectives of self-management are defined as:

- Allow patients who are able and willing to continue to self-administer and/or adjust insulin doses while in hospital.
- Improve patient safety and reduce insulin errors for inpatients with diabetes.
- Optimise the timing of insulin in relation to meals. Reduce the length of stay and re-admission rates by avoiding treatment errors.
- Identify and rectify gaps in patient knowledge, thereby increasing independence and decision making on discharge.
- Identify patients with difficulties in administration of insulin (e.g. poor eyesight or dexterity).

There has been no previous guidance for paediatric patients.

The Royal Pharmaceutical Society (RPS) recommends that organisations have a policy for self-administration of medicines and that written agreement from the patient is required prior to self-administration of medicines in hospital. They also state that patients should maintain responsibility for the administration of some or all of their medicines, during a stay in the healthcare setting, unless a risk assessment indicates otherwise.

RPS publishes advice on “The Safe and Secure Handling of Medicines” which states “safe and secure processes will be needed to ensure that the patient has controlled access to an adequate supply of the correct medicines, appropriately stored so that they are fit for use, and that the medicines cannot be subject to unauthorised removal e.g. by other patients.” and “When schemes of self-administration of medicines and/or “one-stop dispensing” are in operation on the ward, each patient involved in the scheme should have a lockable receptacle for medicines (e.g. drawer, individual cupboard) which is not readily portable.” Rowse reports that this has been interpreted differently in different organisations with some not allowing self-administration due to the lack of locked storage at the bedside and others allowing patients to store their own medicine out of sight. The storage regulations and the cost of purchasing suitable storage where cited as barriers to implementing self-administration of insulin. Storage at the bedside out of sight has been suggested as a suitable compromise between the benefits of keeping the insulin with the patient and reducing the risk of misuse by other patients. Wessex Academic Health Science Network (AHSN) has recommended the use of storage in a plastic box that is then kept inside the locker.

The Nursing and Midwifery Council (NMC) gives clear guidance that patients should be supported to self-administer medication where appropriate. This guidance states “Standard 5: The NMC welcomes and supports the self-administration of medicinal products and the administration of medication by carers wherever it is appropriate.”
Standard 6: To assess patients on a regular basis using local policies to ensure that the individual patient is still able to self-administer.\textsuperscript{11}

The standards detail three levels of suitability for patient self-administration \textsuperscript{11} (Table 1).

**Table 1 Patient assessment for self-administration suitability at three levels: NMC Standards for Medicines Management 2007 (updated 2010)\textsuperscript{11}**

<table>
<thead>
<tr>
<th>Level 1</th>
<th>The registrant is responsible for the safe storage of the medicinal products and the supervision of the administration process, ensuring the patient understands the medicinal product being administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>The registrant is responsible for the safe storage of the medicinal products. At administration time, the patient will ask the registrant to open the cabinet or locker. The patient will then self-administer the medication under the supervision of the registrant</td>
</tr>
<tr>
<td>Level 3</td>
<td>The patient accepts full responsibility for the storage and administration of the medicinal products. The registrant checks the patient’s suitability and compliance verbally. The level should be documented in the patient’s notes</td>
</tr>
</tbody>
</table>

The guidance reinforces that the nurse has responsibility for risk assessing (both initially and ongoing) patients administering their own medication, but states “Whilst the registrant has a duty of care towards all patients, the registrant is not liable if a patient makes a mistake self-administering as long as the assessment was completed as the local policy describes and appropriate actions were taken to prevent re-occurrence of the incident.\textsuperscript{11}”

Nursing staff often fear that they would be accountable and would risk losing their registration if a patient was to make a mistake administering their insulin or if someone else was to misuse it. This has been described as a barrier to implementing self-administration\textsuperscript{2}. Informing and supporting nurses to understand their accountability is vital in encouraging patient self-administration\textsuperscript{10}.

**What is the evidence for self-administration of insulin?**

**In Adults**
A survey of 1319 adult hospital inpatients with diabetes found self-administration of insulin was linked to higher treatment satisfaction\textsuperscript{12}.

A review article of inpatient diabetes care concluded that self-administration of insulin in hospital may improve glycaemic control and patient satisfaction\textsuperscript{13}.
In children
Qualitative studies have shown that CYP find lack of access to their insulin and support to self-administer in school setting impedes their diabetes management\textsuperscript{14,15}.

No studies were found evaluating self-administration of insulin or other medication in a hospital setting.

**What is the evidence for self-management of insulin?**

**In Adults**
Self-management of diabetes in the community has been shown to improve both glycaemic control\textsuperscript{16,17,18,19,20} and quality of life\textsuperscript{19,21,22}.

A review article of self-management in hospital concluded “Patients should be allowed to manage their diabetes in the hospital. Diabetes mellitus is a common and sometimes difficult to control medical issue in hospitalized patients. Oftentimes patients who have been controlling their diabetes well as an outpatient are not allowed to continue this management in the inpatient setting, which can lead to hypo- and hyperglycaemia. Involving the patient in his or her diabetes care, including self-management in select patients, may provide a safe and effective way of improving glycaemic control and patient satisfaction. This may particularly benefit the dosing and coordination of meal-time.\textsuperscript{23}”

**Insulin in children**
Studies have also shown that self-management of insulin by children and their families in the community leads to improved glycaemic control and quality of life\textsuperscript{24,25,26}.

There is no published literature evaluating self-management of insulin in hospital by children or their carers.

**What is the evidence of insulin errors in hospitals?**

The National Patient Safety Agency (NPSA) reviewed all incidents related to insulin in hospitals reported using the National Reporting and Learning System between Nov 2003 and Nov 2009. They found 16,600 incidents with 24% causing harm to patients. The majority (61%) were due to errors in insulin administration with the most frequent causes listed as wrong dose, omitted dose, delayed administration or wrong type of insulin\textsuperscript{1}.

The National Diabetes Inpatient Audits (NaDIA) consistently show incidents of severe hypoglycaemia (1 per 50 admissions) and DKA/HHS (1 per 200 admissions) during adult inpatient admissions and link this to medicine rounds and mealtimes not being coordinated\textsuperscript{27}.

An audit of adult inpatients across 36 wards showed that 50% of patients (17/34) were self-administering and had their insulin with them usually on the locker or table\textsuperscript{2}. In each case there was no documented risk assessment. There were no incidents of other patients misusing insulin.
There is no published data of insulin errors in children in hospital.

This literature review did not find any published reports of patients coming to harm from another patient’s insulin.

**What is the evidence for self-managing insulin pumps in hospital?**

**Pumps in adults**
A retrospective study of inpatient pump therapy looked at 136 inpatients over 5 years. The average glucose was the same if patients remained on pump therapy, but there was a reduction in hypo and hyperglycaemia. There were no reported site infections, mechanical pump failures or DKA. It is worth noting that inpatient pump therapy was supported by a range of protocols including medical review, patient agreement and use of a bedside flowchart\(^\text{28}\).

A retrospective chart review of 50 patients managed using inpatient pump therapy showed mean blood glucose, hypo and hyperglycaemic events were unchanged in those who remained on their pumps compared to those switched to an alternate regime. None of the patients developed DKA while on their pump\(^\text{29}\).

Noshese et al concluded that patients using pump therapy as outpatients should be candidates for continuing pump therapy in hospital, but that inexperience of clinical staff and the limited experience of the patient managing in hospital could lead to inconsistencies in care. The authors introduced a quality improvement initiative to ensure consistent safe care\(^\text{30}\).

Houlden et al summarise their guidance for staff on hospital management of adults using insulin pump therapy. Guidance includes when to discontinue pump therapy, DKA, hyperglycaemia, severe hypoglycaemia, infection site abscess/infection and surgery\(^\text{31}\).

A patient commentary reports mismanagement when taken off his pump as an inpatient and better glycaemic control when allowed to self-manage using his pump. The author advocates for patients to continue to self-manage using their pumps in hospital\(^\text{32}\).

**Pumps in children**
A review of patient experience of 401 children with T1DM admitted to hospital highlighted a lack of knowledge of insulin pumps amongst clinical staff as a significant theme\(^\text{33}\).
**RECOMMENDATIONS:**

**Principles of care**

**Recommendation 1 (Grade D)**
Parents and carers who are managing their child’s diabetes in the community should be supported to continue to manage this in the hospital setting. Support may be needed to help manage differences in blood glucose level and insulin requirements due to illness.

**Recommendation 2 (Good Practice Point)**
CYP who usually manage some or all of their self-management tasks should be supported to do so, as their clinical condition allows. Parents and carers, along with the diabetes team, can provide information regarding the patient’s competence to self-manage.

**Recommendation 3 (Grade D)**
A risk assessment should be undertaken on admission by the clinical team and documented in the clinical notes. This should be reviewed during the inpatient stay as the ability to self-manage may change during the admission.

**Recommendation 4 (Grade D)**
The diabetes specialist team should be involved if there is any disagreement between clinical staff and the patient or family’s view of ability to self-manage or any issues with diabetes management due to illness.

**Recommendation 5 (Grade D)**
Patients or family/carers who are able to self-monitor blood glucose should do this and should make the results available to hospital staff.

**Recommendation 6 (Grade D)**
Patients or family/carers who are able to self-administer insulin should do so and this should be documented on the prescription chart.

**Recommendation 7 (Grade D)**
Facilities should be available for the safe storage of insulin in the ward environment that is accessible to patients and their family/carers.

**Self-Management**

**Recommendation 8 (Good Practice Point)**
All CYP with diabetes admitted to hospital should have a documented discussion and risk assessment of their and their family’s ability to self-manage.
CYP and their parents and carers who are managing their diabetes successfully in the community should be assumed to be competent to continue to do so, unless the clinical situation prevents this. The clinical team should discuss the patient and family’s wishes and the circumstances in which self-management may not be possible. Parents and carers are usually an accurate guide to their child’s ability to self-manage. This should be adapted based on the child’s experience, ability and age. For example a younger child may be able to administer their own insulin, but would need support to check the dose dialled up is accurate and would not be able to make dose adjustment decisions. This discussion should be documented in the clinical notes.

Exclusion criteria
- Patients and families who would prefer the healthcare team to manage their diabetes during admission
- Patients at risk of self-harm should not self-manage. Their family may be able to self-manage. The patient may be able to perform self-management tasks such as blood glucose management or insulin administration with supervision.
- Patients admitted due to poor glycaemic control until assessed by the diabetes specialist team. Their family may be able to self-manage. The patient may be able to perform self-management tasks such as blood glucose management or insulin administration with supervision.

Temporary exclusion criteria
- Patients who are too clinically unwell. Their family may be able to self-manage but may need extra support due to the differences in glycaemic control due to illness.
- Following anaesthesia or while patient-controlled analgesia is in progress. Their family may be able to self-manage but may need extra support due to the differences in glycaemic control due to illness.
- If family members/carers are not able to be with the patient during the whole admission, care may need to managed by the healthcare team in their absence.

Caution Criteria
- Patients with illnesses or receiving treatments that might impact on diabetes control outside of their experience (eg steroid treatment).
- Safeguarding concerns.

Recommendation 9 (Good Practice Point)
The risk assessment and any discussions should be documented in the clinical notes.

Recommendation 10 (Grade D)
Reassessment should take place regularly throughout admissions and particularly if:
- The patient becomes more unwell. They may no longer be able to self-manage. The family’s ability to self-manage may be affected by emotional wellbeing and the differences in glycaemic control due to illness.
- Following anaesthesia or while patient-controlled analgesia is in progress.
- If their condition improves (they may become able to self-manage)
If a diabetes self-management incident occurs.

**Recommendation 11 (Grade D)**
Staff should be aware of their responsibilities to provide safe and effective care. Wherever possible patients and families should be involved in decisions about their clinical care. If there is doubt about a patient and family’s ability to self-manage, the diabetes specialist team should be involved.

**Nursing staff should:**
- Discuss, negotiate and agree the option for self-management with the patient and family, keeping in mind that the patient and family will usually have more experience of managing their condition than the ward nurse.
- Document this discussion in the nursing notes and complete any additional proformas used within their Trust.
- Explain the patients and family’s responsibilities including safe and secure storage of insulin, disposal of sharps and sharing information about blood glucose results and insulin doses.
- Ensuring glucose results and insulin and other medication doses are documented.
- Communicating the self-management decision to the rest of the clinical team, especially at nursing handover and on transfer to other wards/clinical teams.
- Identifying gaps in patient and family’s education and liaising with the diabetes team.

**Medical staff should:**
- Be aware that the patient and family are self-managing diabetes
- Respect the patient and family’s view when discussing diabetes management
- Discuss with patient and family if treatment changes are needed. Inform the nursing staff of any change to treatment.

**Pharmacy staff should:**
- Supply each patient with their own insulin and the appropriate delivery device to allow self-management
- Respond promptly to medication supply requests to ensure doses are not missed.
- Advise on safe storage of insulin that is accessible to the patient and family in a timely manner.

**Elective Admissions**

**Recommendation 12 (Grade D)**
Elective admissions should be planned in conjunction with the patient and family and the diabetes specialist team in advance. This planning should include whether the patient and their family wish to self-manage; the circumstances when self-management may not be possible; the local process for administration of the self-management process if appropriate (eg self-agreement forms) and the circumstances in which the diabetes specialist team need to be involved.
Education

Recommendation 13 (Grade D)
If during self-management of diabetes, the clinical team identifies educational needs then the patient and their family should be referred to the diabetes specialist team.

Medication and Storage

Recommendation 14 (Grade D)
The patient’s own medications can be used for self-administration if the patient has consented to use of their own medications in hospital; the expiry date has not been passed; insulin pens/vials/cartridges have not been open for more than 4 weeks and insulin products have patient identification labels.

Recommendation 15 (Good Practice Point)
The Trust should provide safe, secure storage for insulin. Lack of suitable storage should not be a reason for not allowing self-administration.

Options for safe storage include lockable storage to which the patient or family is able to hold the key, use of combination locks or storage out of sight within the patient’s belongings.

If the ward is unable to provide locked storage then patients and their families should be made aware the potential risks of leaving insulin, medication, syringes, pen devices or blood glucose monitoring equipment with sight or reach of other patients and visitors. The patients should not be nursed in the same area as patients at risk of self-harm, who have safeguarding concerns or who are acutely confused.

Insulin Administration

Recommendation 15 (Grade D)
Insulin should be prescribed as per local policy. The registered nurse should confirm that the patient or family have self-administered insulin and the time and dose taken. This should be documented on the prescription chart.

Recommendation 16 (Grade D)
Disagreements about management should be discussed between the patient/family, nursing and medical staff. If an agreement cannot be reached, then the diabetes specialist team should be involved.

Recommendation 17 (Grade D)
All discrepancies or errors should be documented in the nursing and medical notes including any action taken. If the patient or family makes an undisputed error in management, then the ability to self-manage should be reassessed. All drug errors should be reported using the usual incident reporting system.
Blood Glucose Testing

Recommendation 18 (Grade D)
Patients and families who are self-managing diabetes should test their own blood glucose using their own equipment wherever possible. Patients and families must agree to test regularly to allow clinical staff to assess the level of control. If there is a disagreement about the frequency of testing required, then the specialist diabetes team should be involved. Patients and families must make the results available to clinical staff and this must be recorded in the patient’s records.

Patients who use self-monitoring equipment not stocked by the hospital pharmacy will be required to supply their own equipment.

Recommendation 19 (Grade D)
Hospitals that have quality-control policies that mandate the use of hospital provided glucose meters should develop policies and practice that support self-management including the supply of suitable glucose monitor readily accessible to the patient and their family.

Recommendation 20 (Good Practice Point)
The patient can use continuous glucose monitoring (CGM) or Flash Glucose Scanning (FGS) to monitor their interstitial glucose if the patient/family and the clinical team agree this is appropriate.

Hypo and Hyperglycaemia

Recommendation 21 (Grade D)
If the patient becomes hypoglycaemic (blood glucose below 3.9mmol/L) treat as per inpatient hypoglycaemia guideline. Involve the diabetes specialist team to review the patient’s management.

Recommendation 22 (Grade D)
If the patient becomes hyperglycaemic (blood glucose level above 14mmol/L) clinically assess the patient and check blood ketones. If the patient is well, they and their family should be supported to self-manage in conjunction with the clinical team. If they are unwell, inform medical staff promptly. Refer to local guidelines for hyperglycaemia and sick day rules.
Diet

Recommendation 23 (Grade D)
Patients should be encouraged to eat a normal diet, make their own food choices and adjust their insulin based on their intake. Patients do not need to follow a restricted diet and should not be stopped from choosing food from the “normal” menu. Hospitals must ensure that insulin can be taken prior to or with a meal. The carbohydrate content of meals should be available to patients, families and ward staff.

Insulin Pumps

Recommendation 24 (Good Practice Point)
Patients using insulin pumps and their families undergo detailed training in their use by the diabetes specialist team. The patient and family should be supported to continue to use the pump if well enough to do so. If the patient is not able to self-manage independently then a competent parent or carer will need to remain in hospital with them at all times, or an alternative form of insulin treatment should be considered. The diabetes specialist team should advise on an alternative regime of subcutaneous insulin.

Pump therapy should never be stopped without prior or immediate substitution with another source of rapid acting insulin. Insulin pumps should be stored safely if discontinued until the patient is ready to restart pump treatment and the location documented. Insulin pumps should only be adjusted by the patient and family or the diabetes specialist team.

Recommendation 25 (Grade D)
If the patient is unwell with hyperglycaemia then local hyperglycaemia or sick day rules policy (including replacing the insulin and re-siting the pod or cannula) should be followed. If the patient develops DKA or hyperglycaemia is not improving, then pump therapy should be discontinued.

Recommendation 26 (Grade D)
All patients on insulin pump therapy should be reviewed by the diabetes specialist team during their admission.

Other medications

Recommendation 27 (Grade D)
Oral diabetes medications may be self-administered by patients and families in line with Trust local policies.

Appendix A: Sample Insulin Prescription Chart
### Drug Prescription and Administration Card

**for ADMINISTRATION OF VARIABLE SUBCUTANEOUS DOESES OF INSULIN**

<table>
<thead>
<tr>
<th>Affix patient label or complete</th>
<th>SCH Hospital Number</th>
<th>Surname</th>
<th>Forename</th>
<th>D.O.B.</th>
<th>Sex</th>
<th>Post Code</th>
<th>NHS Number</th>
</tr>
</thead>
</table>

**Drug Allergies or Adverse Drug Reactions**

- Yes-see main drug card: No
- Signature: Bleep: Date:

**Prescription for long acting basal insulin (e.g. glargine, detemir or isophane)**

<table>
<thead>
<tr>
<th>Prescription</th>
<th>Administration Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin type</td>
<td>Device</td>
</tr>
<tr>
<td>Signature</td>
<td>Print name &amp; Contact no.</td>
</tr>
<tr>
<td>Insulin type</td>
<td>Device</td>
</tr>
<tr>
<td>Signature</td>
<td>Print name &amp; Contact no.</td>
</tr>
<tr>
<td>Insulin type</td>
<td>Device</td>
</tr>
<tr>
<td>Signature</td>
<td>Print name &amp; Contact no.</td>
</tr>
</tbody>
</table>

**Prescription for short acting bolus insulin doses e.g. NovoRapid (insulin aspart) or Humalog (insulin lispro)**

- **Instructions to prescriber**
  - Indicate the type of insulin (e.g. NovoRapid, Humalog) and which device is to be used (Circle the correct device)
  - Prescribe the insulin as number of units per prescribed number of grams of carbohydrate
  - Indicate the maximum single dose of insulin that should be given as a bolus
  - Indicate the frequency that the bolus insulin is to be administered (usually three times a day)
  - Cross-reference on the main drug chart (eg NovoRapid: See chart) but DO NOT write doses or record administration on main drug chart.

**Subcutaneous fast acting insulin at a dose calculated from the carbohydrate intake as indicated below**

<table>
<thead>
<tr>
<th>Date</th>
<th>Insulin type</th>
<th>Insulin device (circle correct device)</th>
<th>Dose</th>
<th>Maximum single dose in units</th>
<th>Time of day (please circle and then use 24 hour clock)</th>
<th>Prescribers signature</th>
<th>Print name &amp; contact no</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3mL cartridge Pre-filled pen Vial</td>
<td>1 unit per ... Gram of carbohydrate</td>
<td>Units</td>
<td>Breakfast Lunch Evening Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3mL cartridge Pre-filled pen Vial</td>
<td>1 unit per ... Gram of carbohydrate</td>
<td>Units</td>
<td>Breakfast Lunch Evening Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3mL cartridge Pre-filled pen Vial</td>
<td>1 unit per ... Gram of carbohydrate</td>
<td>Units</td>
<td>Breakfast Lunch Evening Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3mL cartridge Pre-filled pen Vial</td>
<td>1 unit per ... Gram of carbohydrate</td>
<td>Units</td>
<td>Breakfast Lunch Evening Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Correction doses of insulin for use when the blood glucose levels exceed a desired level**

<table>
<thead>
<tr>
<th>Aim to reduce pre-meal blood glucose values as below, by giving a substaneous correction bolus of the fast acting insulin</th>
<th>Reduce blood glucose to ... mmol/l, by giving ... Units of ... insulin for each ... mmol/l, reduction</th>
<th>Time of day (eg 00:00-08:00)</th>
<th>Prescribers signature</th>
<th>Print name &amp; contact no</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Time of day (eg 00:00-08:00)</td>
<td>Prescribers signature</td>
<td>Print name &amp; contact no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time of day (eg 00:00-08:00)</td>
<td>Prescribers signature</td>
<td>Print name &amp; contact no</td>
</tr>
</tbody>
</table>

**Ward:**

**Weight (kg):**

**Date:**

---

**Authors:** ACDC Guideline Development Group A Timmis, SM Ng, A Soni, E Williams, JC Agwu, J Drew, C Moudiotis, N Wright, P Regan

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Appendix B: Search strategies

Self-Administration


<table>
<thead>
<tr>
<th>Search Terms</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Exp Self Administration/</td>
<td>10906</td>
</tr>
<tr>
<td>2 Child*.mp or Child Health/ or Child, Institutionalized/ or Child/ or Child Health Service/ or Child, Hospitalized</td>
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<td>3 Child/or Pediatrics/ or paediatric.mp or Adolescent/</td>
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<td>5 Exp Insulin</td>
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<td>6 Medication.mp or Medication Adherence/ or Medication Therapy Management/ or Self Medication/</td>
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<tr>
<td>7 1 and 4 and 6</td>
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<td>8 1 and 4 and 5 and 6</td>
<td>23</td>
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<tr>
<td>9 1 and 2 and 6</td>
<td>143</td>
</tr>
<tr>
<td>10 1 and 2 and 5</td>
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<tr>
<td>11 1 and 3 and 5</td>
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Dose adjustment

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<tbody>
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<td>1316834</td>
</tr>
<tr>
<td>2 Patient.mp or Patients/</td>
<td>2531494</td>
</tr>
<tr>
<td>3 Adjustment.mp</td>
<td>173627</td>
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<tr>
<td>4 1 and 2 and 3</td>
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<td>5 Self.mp</td>
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<tr>
<td>6 4 and 5</td>
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Self-monitoring

<table>
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<td>3 adjustment</td>
<td>173627</td>
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<tr>
<td>4 1 and 2 and 3</td>
<td>2795</td>
</tr>
<tr>
<td>5 Self.mp</td>
<td>763691</td>
</tr>
<tr>
<td>6 4 and 5</td>
<td>205</td>
</tr>
</tbody>
</table>
Insulin errors

PubMed
- (insulin) AND medication error) AND hospital (170)
- 21 selected

Management of CSII/pumps in hospital

1. (inpatient) AND self-management) AND (pump AND therapy) – 13 articles
2. (inpatient) AND self-management) AND continuous sub-cutaneous insulin infusion – 8 articles.

First searched term contained all the relevant articles found in the second search term.
Table 2: Grades of evidence for recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Grade of recommendation</th>
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<tbody>
<tr>
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<tr>
<td>2</td>
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<td>D</td>
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<tr>
<td>27</td>
<td>D</td>
</tr>
</tbody>
</table>
LEVELS OF EVIDENCE

1++  High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+   Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-   Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++  High quality systematic reviews of case control or cohort or studies
     High quality case control or cohort studies with a very low risk of confounding or bias and a high probability
     that the relationship is causal
2+   Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate
     probability that the relationship is causal
2-   Case control or cohort studies with a high risk of confounding or bias and a significant risk that the
     relationship is not causal
3    Non-analytic studies, e.g. case reports, case series
4    Expert opinion

GRADES OF RECOMMENDATIONS

A  At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target
    population; or
    A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population,
    and demonstrating overall consistency of results

B  A body of evidence including studies rated as 2++, directly applicable to the target population, and
    demonstrating overall consistency of results; or
    Extrapolated evidence from studies rated as 1++ or 1+

C  A body of evidence including studies rated as 2+, directly applicable to the target population and
    demonstrating overall consistency of results; or
    Extrapolated evidence from studies rated as 2++

D  Evidence level 3 or 4; or
    Extrapolated evidence from studies rated as 2+

Good practice points

☑ Recommended best practice based on the clinical experience of the guideline development group
References

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Asthा Soni - Sheffield Children’s Hospital NHS Foundation Trust
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Akila Ahmed - Paediatric Pharmacist - Sandwell and West Birmingham Hospitals NHS Trust
Anne Martyn - Paediatric Matron - Countess of Chester Hospital NHS Foundation Trust
Jennifer Simpson - Paediatric Diabetes Dietician - Sheffield Children’s Hospital NHS Foundation Trust

Young Person and Parent representation
ACDC would like to acknowledge the kind and helpful contribution of Victoria Wright Secretary, on behalf of ‘The Lancelots’ - Southport, Formby & Ormskirk Children’s Diabetic Club and Parent support group which are affiliated to Diabetes UK and is a registered charity

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