

Diabetes Care for Age Related Residential Care Facilities in Hawke's Bay

(Revised edition 2023)



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Introduction

Diabetes is a common condition that can have a significant impact on the health and well-being of older people. Diabetes is generally only one of several chronic conditions which are increasing in older age and require greater provision of care. The well-being and quality of life sustained by patients with diabetes will be improved by well-planned, appropriate and comprehensive care. This requires a trained and competent workforce. Information, training and education as well as practical guidance is vital to help Age Related Residential Care (ARRC) facility staff to know what to do in the daily care of residents with diabetes and to help, support and manage diabetes related complications.

There is ample clinical evidence that good and practical management guidelines improve outcomes and quality of patient care. However, applying guidelines to the day-to-day medical and nursing care remains difficult despite best efforts by many committed health care professionals. The key is to come up with a set of guidelines that all health care workers could use based on researched best practice to provide a high standard of diabetes care. This in turn will decrease the need for hospital admissions and will empower nurses to make decisions based on a sound understanding of the disease, medications, blood glucose monitoring, and management of hypoglycaemia, hyperglycaemia and sick days.

It is important for health professionals to understand the characteristics, challenges and barriers related to older people with diabetes in residential care and to recognise the proper functioning of the facilities themselves. Good care requires a multi-disciplinary team approach.

The aims of this document are to:

- Maintain best possible quality of life and well-being without subjecting ARRC facility residents with diabetes to unnecessary and inappropriate interventions.
- Ensure adequate and structured care planning, with all residents with diabetes having an individualised and structured diabetes care plan.
- Provide support and education to all staff at ARRC facilities to facilitate and drive improvement in diabetes care.
- Have effective clinical governance and implementation strategies to allow attainment of these targets.

The recommendations and guidance will give consistency across the Hawke's Bay region ensuring the best possible care for older people with diabetes. Clinical governance for diabetes care in Hawke's Bay is undertaken by the Hawke's Bay District Health Board Clinical Council and the Health Hawke's Bay – Te Oranga Hawke's Bay Clinical Advisory and Governance (CAG) Committee.

Key message: diabetes in older people is distinct from diabetes in younger people and the approach to treatment should be different.

Any previous version of the publication, *Diabetes Care for Age Related Residential Care in Hawke's Bay*, is now superseded by this 2023 edition.

Health professionals' role in diabetes care

As a person with diabetes moves between providers of primary and secondary care; as well as from independent living to managed care, this transition requires communication and cooperation from all health professionals, while acknowledging the differences in their professional responsibilities.

The person's general practitioner is responsible for:

- The individual's medical care
- Referring the resident to diabetes nurse/specialist as required

The Age-Related Residential Care staff:

- Liaise with the resident's general practice staff
- Liaise with other health professionals/agencies, for example, physiotherapist, occupational therapist, dietitian etc
- Liaise with pharmacy staff
- Liaise with residents' families or next of kin

Annual diabetes reviews are completed in partnership with general practitioners - residents' care plans are updated at this time.

Suggested resources to support diabetes care

Each Age-Related Residential Care facility should have a number of resources to assist in the care of their residents with diabetes. These include, but are not limited to:

Written documentation

1. Facility policies and procedures
2. This document: 'Diabetes Care for Age Related Residential Care Facilities in Hawke's Bay', including the wall charts and Annual Review template
3. Cardiovascular disease risk assessment and management for primary care.¹

Optional resources include:

- bpac^{NZ} articles (www.bpac.org.nz)
 - *Monitoring diabetes in people over 75*. bpac^{NZ} Report. 2012.²
 - *Testing for CVD, diabetes and renal disease in elderly people*. Best Tests. 2012 March.³
- Waitemata District Health Board Residential Aged Care Integration Programme (RACIP) Guidelines⁴
located at <http://www.waitematadhb.govt.nz/health-professionals/aged-care/>
- Overseas documents including:
 - The International Diabetes Federation *Managing Older People with Type 2 Diabetes* Global Guideline 2017.⁵
 - *Good clinical practice guidelines for care home residents with diabetes*. A document prepared by a Task and Finish Group of Diabetes UK, January 2010, Professor Alan Sinclair (Working Group Chair) et.al.⁶

References and sources of further information (see Appendices 4, 5, 6, 7).

Equipment

Each ARRC facility that has residents with diabetes should have the following items of equipment available:

- Stethoscope
- Sphygmomanometer
- Blood glucose meter which is regularly standardised, blood glucose strips, 'one-use' finger prick devices, sharps disposal box (including quality assurance programme)
- Weighing scales and a height measure scale (stadiometer)
- Glucose tablets (to treat hypoglycaemia)
- Glucagon Hypo kit (check expiry date regularly)
- Ketone test strips
- 10g monofilament

Delivering effective diabetes care and staff education

Provision of appropriate education for health care assistants will be the responsibility of the ARRC management and trained nurses in the individual facilities. International literature on the management of diabetes in patients residing in long term care facilities stress the importance of providing adequate training and protocols to staff who may be operating without the presence of a practitioner for prolonged periods.

Aims are to:

- Engage ARRC management to adopt local guidelines
- Ensure a high quality of diabetes care in ARRCs
- Make available adequate training for nurses in ARRC
- Have all residents with diabetes engaged in a formal annual review
- Ensure adequate support from primary care practices and specialist nurses (as needed)

National Diabetes Knowledge Programme⁷

An online diabetes knowledge programme has been developed by the New Zealand Society for the Study of Diabetes (NZSSD) The content of this programme is aligned with the nationally endorsed National Diabetes Nursing Knowledge and Skills Framework 2018, The NZ National Integrated Knowledge, Skills and Career Framework for Diabetes Dietitians 2016, and the draft Podiatry Competency Framework for Integrated Diabetic Foot Care in New Zealand. This programme is intended for all health professionals involved in caring for people with diabetes along with their whānau/families

This fifteen-module learning tool is intended as a professional development activity, contributing fourteen hours to an individual's professional portfolio.

1. What Is Diabetes
2. Glycaemic Control: Non-Insulin Diabetes Therapy
3. Glycaemic Control: Insulin Therapy
4. Monitoring Glycaemic Control
5. Nutritional Plan and malnutrition
6. Promoting Self-Care of Diabetes, Healthy Lifestyle and Wellbeing
7. Hypoglycaemia
8. Hyperglycaemia and identification and treatment during concurrent illness
9. Steroid Induced Hyperglycaemia
10. Complications
11. Hypertension/Cardiovascular Disease
12. Diabetic Retinopathy
13. High Risk Foot, Neuropathy and Peripheral Arterial Disease
14. Nephropathy
15. Bariatric Surgery

Available from: www.nzssd.org.nz or www.nzno.org.nz

Annual health / diabetes review for all ARRC residents

It is the recommendation that every resident has an annual health review.⁸ The importance of diabetes means that every year, **every resident** (with or without diabetes) **will**:

Either

- Be screened for diabetes **if not already diagnosed**. Use either of the following methods:⁹
 - In symptomatic individual an HbA_{1c} ≥ 50 mmol/mol (and, if measured, a fasting blood glucose ≥ 7.0 mmol/L or a random glucose ≥ 11.1 mmol/L) is sufficient to establish the diagnosis of diabetes.
 - In asymptomatic individuals the same criteria apply but, to confirm the diagnosis of diabetes, a confirmatory test (preferably HbA_{1c}) is needed on a separate occasion.
 - Those with an HbA_{1c} of 41-49 mmol/mol are categorised as 'pre-diabetes'. Residents with values in this range should have a full cardiovascular risk assessment and appropriate management, with HbA_{1c} repeated after 6-12 months.

It needs to be kept in mind that HbA_{1c} alone may be insufficient in older individuals (>80 years) or patients with uraemia, infection, iron deficiency anaemia, recent blood transfusions or genetic variants of haemoglobin which may affect the usefulness of assessing a patient's HbA_{1c}.

Or

- As part of their health review, those residents with diabetes have an 'Annual Diabetes Review' in the format recommended.
- The Annual Diabetes Review will be carried out at the residence or at the GP's office, depending on the usual practice of the ARRC facility and the requirements of the resident.
- An Annual Diabetes Review should be done soon after a resident is newly admitted to the facility, irrespective of whether the 'annual' review is due or not, as most people's health status changes considerably when they go into care. It is also an opportunity to establish baselines against which to assess changes when the next review takes place.

Resident's Care Plan

- Every resident has a care plan.** In the case of those with diabetes, it is important that those at risk from acute diabetes related complications (see section later in this resource) are identified. They include those with the following risk factors:
 - Advanced age
 - Other illnesses or conditions in addition to diabetes
 - Being prescribed five or more medicines
 - Chronic renal problems
 - Poor nutrition

Guidelines

- Residents with diabetes need to enjoy a varied diet with no unwarranted limitations.
- Eating a balanced diet together with taking any prescribed medication and monitoring blood glucose as appropriate, will benefit health.
- Residents with diabetes can eat a regular diet according to the recommendations below. The rest home menu for all residents should be based on encouraging foods which are high fibre, low saturated fat, moderate sugar and moderate salt.
- Malnutrition is an important part of managing diabetes. Older people in residential care may be more likely to be underweight rather than overweight, and the prevalence of malnutrition and under-nutrition is high. A higher fat diet including a range of higher fat foods including oils, margarines, cheese, butter, full fat milk and cream are recommended for residents who are struggling to maintain a healthy weight or have poor appetite.
- Both protein and calcium requirements for this group are higher than for younger adults. Both dairy products and meat (and alternatives) need to be encouraged and these items should not be limited.
- The ARRC facility menu will be audited by a dietitian who will ensure that it meets the dietary guidelines for this population group, and that a variety of suitable food items are included.
- Residents with Type 1 and Type 2 diabetes may require different dietary management. Please consult a dietitian for individual dietary advice as required.

Recommendations for ARRC staff

- Ensure meals and snacks are regular. If resident has a loss of appetite or nausea, encourage the 'little and often' approach where small snacks are encouraged regularly
- Sugar may be added to a meal (on top of cereal) up to a maximum of two tablespoons per day. This should be taken as part of a mixed meal, not added to tea, coffee or drinks taken between meals.
- Encourage a range of healthy cereals to suit the taste preferences of most residents e.g. porridge, muesli, All Bran, Special K and Weet-Bix. Combining with dairy such as milk, yoghurt and cream helps slow the uptake of carbohydrates.
- Normal jams and honey (up to one teaspoon) can be offered at breakfast, lunch or dinner with wholemeal, fruit bread or toast.
- Encourage between-meal snacks which contain bran, oats or fruit as appropriate. Sandwiches

made with wholemeal/wholegrain bread, fruit, plain cakes, muffins and scones are all suitable.

Discourage icing on cakes.

- Consider yoghurt and custard as alternatives to cream
- Normal desserts, including ice-cream may be offered. Most desserts are suitable. For any extra sweet dessert e.g. Pavlova and jelly, give only a half portion and serve with fruit, custard or yoghurt as appropriate.
- Natural fruit juice may be offered as part of a meal.
- Encourage plenty of fruit and vegetables.

Nutritional Care of Residents

If a resident experiences weight loss, please refer to your appropriate ARRC facility policy, or in the absence of one, the HBDHB Rest Home Nutritional Care Decision Tree 2011 (Appendix 2).

Nutritional status of the resident can be accessed by a number of tools, including the Mini Nutritional Assessment (MNA), Malnutrition Universal Screening Tool (MUST) or Interai.

Momentum-interai

Momentum-interai is a software programme used by Hawke's Bay DHB and ARRC facilities, as a patient management software system.

Within this system, there are caps which are triggered to highlight areas of concern. One of these is a nutrition cap. This is triggered by a low BMI but does not trigger weight loss hence significant weight loss needs to be monitored as well.

High Energy High Protein (HEHP) action plan (See Appendix 2)

HEHP action plan is compiled by a New Zealand Registered Dietitian. It has been created for 'frail older people' and is applicable to any residents with diabetes who becomes frail.

MNA

The MNA is a validated nutrition screening and assessment tool that can identify patients aged 65 and above who are malnourished or at risk of malnutrition.

More information is available at: <http://www.mna-elderly.com>

MUST

'MUST' is a five-step screening tool to identify adults, who are malnourished, at risk of malnutrition, (under-nutrition), or obese. It also includes management guidelines which can be used to develop a care plan. More information is available at: <http://www.bapen.org.uk/pdfs/must/must-full.pdf>

Diabetes care – physical activity recommendations in ARRC facility

Many improved health and well-being outcomes have been shown to occur with regular physical activity. Most physical activity can be adjusted to accommodate older people with a range of abilities and health problems, including those living in residential care facilities.¹⁰

An example of this is the Otago Exercise Programme. By providing this programme, residents can improve their:

- Balance
- Muscle strength
- General fitness
- General well-being

Residents should be encouraged to do the prescribed exercises **three times each week**. These exercises can be divided up, so exercises do not all have to be done at the same time. Between each set of exercises residents should take three deep breaths or more. They may feel a little stiff when they first start to exercise which is quite normal.

Safety considerations

Residents should:

- Never exercise holding on to an object which may move, for example a chair.
- Always use the side of something stable like a bench or solid table unless otherwise instructed.
- It is preferable to do exercise a little time after a meal, rather than immediately prior a main meal when blood glucose levels are likely to be low.

The appropriate staff member must contact:

- The instructor before a resident starts exercising again, if illness has stopped the resident from maintaining the exercise programme.
- The resident's GP if while exercising he/she experiences dizziness, chest pain or shortness of breath (unable to speak because of shortness of breath).

Residents can improve their general fitness simply by being more active in their day-to-day life. Some examples of activities to build into a resident's day include:

- Walk instead of driving to the shops
- Walk to talk to a neighbour face-to-face instead of phoning
- Take the stairs rather than the lift or escalator
- Get off the bus a block early and walk to destination
- When visitors and family arrive, go for a walk with them before having a cup of tea
- Garden when the weather permits
- Stand to fold washing

Walking is an excellent way to enhance general fitness. Residents should be encouraged to wear comfortable shoes and clothing, start with a warm-up (marching on the spot for two minutes) and finish with a warm-down (marching on the spot for two minutes). The above has been adapted from the Otago Exercise Programme. Further examples of exercises may be in Appendix 3.

Mental Health and Wellbeing

Depression is more common in people with long-term conditions and in older people with complex health problems may go unnoticed.

The adverse effects of medicines, painful neuropathy and foot ulcers can all contribute to depression.

The risk of dementia increases with age.

Anything that affects mental wellbeing can affect a person's ability to look after themselves and manage their diabetes cares.

Simple tests are available from the person's GP to assess for depression and dementia. Early identification of these conditions can help to limit their effect in the longer term.

Blood glucose monitoring guidance

Capillary blood glucose testing frequency

The frequency of routine capillary blood glucose monitoring for each resident with diabetes is set out in the Age-Related Residential Care with Diabetes Annual Review and Plan (Appendix 1).

Suggested frequencies are:

- | | |
|--|--------------------------------|
| <input type="checkbox"/> No routine testing | 6-mthly HbA _{1c} only |
| <input type="checkbox"/> Test before breakfast and before bed ONE day per week | Plus 6-mthly HbA _{1c} |
| <input type="checkbox"/> Test before breakfast test TWO consecutive mornings per week | Plus 6-mthly HbA _{1c} |
| <input type="checkbox"/> Test before each meal on TWO days a week | Plus 6-mthly HbA _{1c} |
| <input type="checkbox"/> Test before each meal AND two hours after a meal ONE day per week | Plus 6-mthly HbA _{1c} |

However, the resident's general practitioner may choose an alternative routine frequency. If a resident has a HbA_{1c} below or above the recommended range, the HbA_{1c} should be repeated after 3 months.

Blood glucose monitoring should always be undertaken if a resident with diabetes has:

- A change in behaviour or cognitive function
- Signs/symptoms of hypoglycaemia
- A change of insulin or tablet dose (excepting Metformin, Vildagliptin, Dulaglutide and Empagliflozin if not also on insulin or sulphonylurea)
- Infection
- Pyrexia
- Exacerbation of another illness

Tests are done for useful information. If the information is not useful, or not used, the test should NOT be done.

The above information has been summarised into a wall chart (Appendix 4).

We have recommended six monthly routine HbA_{1c} assessments where possible included with other required testing. This recommendation is also consistent with the American Diabetes Association Standards (2021).¹¹ The American Geriatrics Society (2013)¹² suggest annual assessment only for those with stable HbA_{1c} over several years, otherwise a minimum of six monthly assessments; therefore a decreasing HbA_{1c} trend would also indicate six monthly assessments.

No resident with diabetes should have a fasting glucose, if on treatment, of less than 6 mmol/L and levels of glucose of <5 mmol/L should be avoided.

Request medicine review by general practitioner when resident taking medicine for the treatment of diabetes, has a regular fasting blood glucose <6 mmol/L.

HbA_{1c} test

The HbA_{1c} test (also called glycated haemoglobin level) is a laboratory blood test which measures a person's average blood glucose over the previous three months and gives an indication of his/her longer-term blood glucose control.¹³

Measurement of HbA_{1c} remains the most useful tool for monitoring glycaemic control. Clinicians skills are required to interpret HbA_{1c} levels in the presence of many conditions that may interfere with HbA_{1c} levels.

It is helpful if an older person with diabetes has a documented target HbA_{1c} range outlined in his/her Diabetes Annual Review and Plan.

A target HbA_{1c} will be based on the following individual considerations:

- Current medicine regimen (on insulin or sulphonylurea)
Hypoglycaemia risk (previous hypoglycaemic episodes)
- Comorbidities (kidney failure and other diseases that make a hypoglycaemia more likely)
- Life expectancy (less stringent in persons with limited life expectancy, see below)

All HbA_{1c} results should be copied through to the ARRC facility so that the Registered Nurse or clinical lead can monitor results and ensure the resident's HbA_{1c} sits within this ideal range.

If the resident's HbA_{1c} results sit outside the target HbA_{1c} range, a documented discussion between the resident's doctor, the ARRC Registered Nurse or clinical lead, and the resident (including family/whanau if applicable) should occur so that strategies can be implemented to achieve an HbA_{1c} within the target range, in order to minimise complications.

A proposed HbA_{1c} range for older persons, particularly those living within an ARRC setting, is between 55 - 69mmol/mol.

- **HbA_{1c} ≤ 53 mmol/mol consider a medicine review due to possible over-medication and risk for hypoglycaemia**
- **Between 70 - 86mmol/mol indicates the blood glucose levels are high.**
- **87mmol/mol or higher indicates the blood glucose levels may be associated with acute complications.**

Symptomatic mild and severe hypoglycaemia is associated with increased risk of cardiovascular events, all cause hospitalisation, and all-cause mortality.⁸

Prevention of hypoglycaemia should take priority over attainment of glycaemic targets because the risks of hypoglycaemia are magnified in this patient group.¹⁴

In older people with cognitive impairment, strategies should be used to strictly prevent hypoglycaemia, which include the choice of anti-hyperglycaemic therapy and less stringent HbA_{1c} target.¹⁴

If the resident is on insulin and/or taking a sulphonylurea agent (e.g. gliclazide or glipizide) and his/her HbA_{1c} level is <48mmol/mol this almost certainly indicates that he/she is experiencing multiple episodes of hypoglycaemia.

Having HbA_{1c} levels this low is not safe for a resident on insulin and/or taking a sulphonylurea.^{5,7}

For the treatment of hypoglycaemia please familiarise yourself with the HYPO wall chart

Capillary blood glucose testing technique

1. Gather all necessary equipment prior to testing.
2. Obtain the resident's consent for the procedure to occur.
3. Maintain the resident's privacy.
4. Before testing, wash the resident's hands in warm water to ensure they are clean. (There is no need to use soap; do not use an alcohol swab).
5. Caregiver performs hand hygiene before putting on gloves
6. The test strip is placed into the glucose meter and rested on a dry surface.
7. Check the lancet depth setting on the finger prick device – using a low depth reduces pain and minimises scarring.
8. A disposable lancet is placed against the side of the resident's finger, not the tip or pad, and a puncture is made. Never use a limb affected by stroke or similar.
9. To avoid excessive tissue fluid, it is not encouraged to squeeze at the fingertip; rather 'milk' down the finger if blood flow encouragement is required.
10. Wait the required time for the meter to show a reading.
11. While waiting for a reading, apply a clean paper towel to the test site.
12. Read the meter result while sharing this result with the resident.
13. Dispose of used equipment in the correct manner. The used lancet must be disposed of in a sharps container.
14. Remove gloves; perform hand hygiene
15. Wipe the machine (following manufacturer's instructions)
16. Return equipment to the correct location.
17. Record the result and test time, and report to the Registered Nurse.

Please note:

- CareSens N and CareSens dual meters have a defined temperature range of 10-40°C. For accurate results, please ensure you test within this range.¹⁵
- Replace the lid of the vial after removing a test strip. If the vial is left open for longer than ten minutes, the strips may become susceptible to humidity and blood glucose readings will be affected.¹⁵

Wrong test strips: please ensure that you are using the correct strip with your meter. CareSens N and N POP meters use CareSens N test strips. CareSens Dual meters use CareSens pro strips. Do not use another brand of test strips with CareSens meters.¹⁵

If test strips or meters do not work, please see Quality Control section.

Infection Control

Blood glucose monitoring and insulin administration involves exposure to body fluids therefore there are infection and safety risks associated with these activities. Effective infection prevention strategies must be used to minimise these risks.⁶

Insulin administration

- The risk of needle stick injury is significant whenever administering insulin.
- Insulin pen devices should only be used where the patient is able to self-inject and recap their insulin pen needle.
- In all other instances, single-use insulin syringes should be used to draw up and administer insulin.
- Insulin administration equipment (pen, needles, and syringes) should never be used for more than one person.¹⁶

Sharing of insulin pens and insulin cartridges may result in the transmission of hepatitis viruses, HIV or other blood-borne pathogens.^{16,17}

Blood Glucose Testing

- In all instances of blood glucose testing these risks must be assessed with the benefit of obtaining a blood glucose level.
- If there is no benefit to the person from obtaining a blood glucose level i.e. changes in management; the need for carrying out the blood glucose monitoring should be reconsidered.

Finger Prick Devices

- Restrict use of finger prick blood sampling devices to individual people.^{17,18}
- Select single-use lancets that permanently retract upon puncture to minimise needle stick injuries.¹⁶⁻¹⁸
- Dispose of used lancets or single use lancing devices into an approved sharps container at the point of use.
- Store unused and used diabetes equipment and supplies separately.

**Finger prick devices should NEVER be used for more than one person
A finger prick device used on multiple people is unsafe and an infection risk.**

Point of care (POC) blood glucose meters

- POC blood glucose meters should be dedicated to each individual person and not shared.^{20,21}
- A dedicated meter for emergency situations may be considered.
- Where a dedicated POC meter for an individual person is not possible, the meter must be properly cleaned and disinfected after every use.¹⁶
- The owner's manual for the CareSens N meters advises using a soft cloth or tissue to wipe the meter exterior. If necessary, use an alcohol wipe. Do not use organic solvents such as benzene, acetone or household or industrial cleaners.¹⁵
- Do not insert anything into the port that receives the test strips. If specific directions are not provided by the manufacturer, the device should not be shared.
- Alcohol can degrade plastic over time, so should not be used on equipment without manufacturer's instruction.¹⁹

Additional steps to minimise the risk of infection:

- Wear gloves during finger prick glucose monitoring, administration of insulin and any other procedure that involves potential exposure to blood or body fluids.^{17,18,20}
- Perform hand hygiene (i.e. hand-washing with soap and water or using an alcohol-based hand rub) immediately before donning and after removal of gloves and before touching other medical supplies intended for use.^{17,18,21}
- Change gloves and perform hand hygiene after each person's test or insulin administration, and after touching potentially blood-contaminated objects, surfaces or finger prick wounds before touching other people or clean surfaces.^{17,18,21}
- Where practicable, maintain supplies and equipment such as finger prick devices and the POC glucose meter within an individual person's rooms.²¹
- Any trays or carts used to deliver medications or supplies to individual people should remain outside the rooms.²¹
- Unused supplies and medications taken to a person's bedside during finger prick monitoring or insulin administration should not be used for another resident.²¹

Quality Control

Internal Quality Control

Built-in quality checks occur prior to every test and error messages are displayed to inform the user of quality issues.

It is recommended that a quality control check is performed on a blood glucose meter:¹⁵

- If the meter has been dropped (also confirm that the battery is still in place)
- When the cap has been left off the pottle of test strips (strips should then be disposed of and a new pack used)
- When the test strip pottle has been exposed to extreme heat, humidity or cold (strips should then be disposed of and a new pack used). Error message 'Er1' will appear on the meter if the meter senses that there is a fault with the test strip.
- A minimum of once a month. Control solutions are available from Pharmaco Healthcare, or a community pharmacy, to perform this test.
- When a patient is exhibiting symptoms that do not correspond to the test results. Retest and if meter reading still appears to be incorrect, check the meter with CareSens N control solution. According to facility policy

Facility policy on the frequency of quality control checks may be dependent on:

- Turn-over of strips. Check the expiry date on the test strip bottle every month.
- Number of staff accessing strips
- What clinical action is being taken according to the results

External Quality Control

- External quality control is not recommended by the manufacturer of CareSens N.
- Pharmaco is able to provide a replacement meter for any meter that appears to be functioning incorrectly.

CareSens N meters are all plasma equivalent calibrated meters, meaning there is no need to do a manual calibration as the meter does it automatically.¹⁵

What risk of contamination to the strips is there?

Should your strip become contaminated, wet, or damaged, your CareSens N meter will show an 'Er1' message on the screen, which means the meter is identifying the strip as used.

Additionally, if there is poor contact between the electronic sensors on the strip and the meter contacts, the error message will show.

Education and Competency

It is the responsibility of each ARRC facility to provide appropriate training to the healthcare assistants' caregivers on the following aspects of diabetes care:

- Blood glucose monitoring techniques
- When to communicate to the facility Registered Nurse
- What should be communicated to the facility Registered Nurse

Staff annual competency review is according to the individual ARRC facility policy.

A competency assessment on blood sugar level (BSL) and insulin administration for each staff member (registered nurse, enrolled nurse and healthcare assistant) should be undertaken annually.

Educational resources on the CareSens N meters can be found:

- CareSens website: <http://pharmacodiabetes.co.nz/helpful-videos/>
- Goodfellow Education Module Toolkit <http://www.goodfellowunit.org/courses/changes-funded-diabetes-blood-glucose-meters-and-test-strips-toolkit>
- Medsafe website:
<http://www.medsafe.govt.nz/profs/puarticles/june2013monitorbloodglucose.htm>

Administering diabetes medicines

Key message: simplified treatment regimens are preferred and better tolerated.

Simplification of patient's medicine regimen

Consider simplifying diabetes management in patients who:

- Are frail or who have end stage chronic disease. Usual HbA1c targets may no longer be appropriate, aim for an HbA1c target of 70 or a fasting blood glucose target of 8-10mmol/L.
- Experience severe hypoglycaemia on their current regime
- Have high hypoglycaemia risk due to inconsistent eating, cognitive dysfunction or anorexia
- Are on insulin and would like to reduce number of injections or blood glucose monitoring
- Are on medications which are not providing clear symptomatic or comfort benefits.

Please discuss this with the patient's GP and recommend input from Diabetes CNS and/or Clinical Pharmacist Facilitator at the GP practice (if available).

Insulin

Key message: the use of long-acting basal analogue insulin is associated with a lower frequency of hypoglycaemia than conventional insulins in this age group.

Insulin Injections

Insulin is injected through the skin into the fatty tissue known as the subcutaneous layer (where there are fewer nerve cells and so it is less painful). The abdomen is the most common injection site. The buttocks and thighs are also used by some people, the arms less commonly so. It is essential to give each injection in a slightly different spot, within the chosen site, to prevent tissue damage.

An insulin syringe should be disposed of after one use. Insulin is measured in (international) units and insulin syringes are unique for use with insulin and are identified by having orange caps or packaging. Insulin syringes come in different sizes (30 unit, 50 unit and 100 unit). Insulin syringes **should not be re-capped but dropped directly into an approved sharps disposal container**. A free sharps container is now available for every person on insulin – this is supplied by the resident's retail pharmacy (supplied to the pharmacy by the Hawkes Bay DHB).

Self-Administration of Insulin

If the resident is administering their own insulin with a 'pen' but asking someone else to change the needle, the manufacturer recommends a new needle every time. If a new needle is not used for each insulin dose, it is recommended to replace the needle at least every 2-3 injections. ***If the resident is not administering their own insulin, insulin should be administered via insulin syringe.***

Insulin 'pens' (Novo Nordisk/Eli Lilly/Sanofi Aventis) should only be used when individuals are giving their own injections.

Pen needles: 4 or 5mm are the best choice (there is generally no evidence that longer needles need to be used).

Insulin pumps are becoming increasingly popular but are still only used by people with Type 1 Diabetes mellitus in New Zealand.

When administering insulin:

- Inspect insulin before use - cloudy insulin should be 'mixed' (by rolling the vial) before use and should have no large particles in it; clear insulin should never look cloudy
- Do not wipe the injection site with an alcohol wipe, just ensure the site is clean
- 10mL insulin vials are vacuum packed, so inject air into syringe to draw insulin out
- Inject at a 90 degree angle
- When the injection is given using a needle of 5mm or less, leave the needle in situ for 10 seconds to avoid leakage from the site

DO NOT mix insulins in the same syringe or use the same injection site unless advised by Diabetes CNS or Endocrinologist

Guide for Insulin Storage

Insulin in use should be stored at a steady room temperature (avoiding too hot or too cold temperatures) - cold insulin stings when injected.

Once a vial is in use, the recommended shelf life is one month and when first dose is administered that date should be written on the vial. Extra supplies of insulin should be stored in the fridge (but not next to the ice box). For the shelf life of insulin stored in the fridge see the expiry date on the box or vial. Never freeze insulin - any insulin found frozen should be thrown away. Never expose to direct heat or light.

Many facilities have guidelines for insulin administration, depending on the company they belong to. These relate to who can administer insulin and the training involved, as well as how the insulin is stored and administered. It is advantageous to both the residents and staff that the latter be standardised.

Non-insulin agents

Metformin

- Metformin is considered to be first line treatment for type 2 diabetes mellitus in most patients^{11,21}.
- The most important adverse effect is lactic acidosis due to the high fatality rate²².
- Impaired renal function can increase the risk of lactic acidosis. Metformin can be used in patients with stable renal function provided a dose reduction occurs.
- Metformin should be taken with or just after food, or a meal.

Mechanism of action:

Metformin is derived from galegine, a component of *Gealega officinalis* which has been used in natural medicine for centuries. The mechanism of action is complex and not completely understood however involves reducing hepatic glucose production, and enhancing hepatic insulin sensitivity.²³

Monitoring²²

Lactic acidosis is a condition of high lactate and a pH below seven. Risk factors for the development of lactic acidosis in patients taking metformin include:

- Renal impairment
- Acute kidney injury for example due to dehydration. NOTE: Do not give Metformin if patient is vomiting or has diarrhoea.
- Poorly controlled diabetes
- Acute tissue hypoxia - for example in sepsis.

Symptoms of lactic acidosis are generally non-specific and include malaise, myalgia, muscle cramps, respiratory distress, nausea, vomiting and abdominal pain.

Contact the GP if the older person experiences symptoms suggestive of lactic acidosis or acute kidney injury.

B12 absorption can be reduced in patients who are taking metformin. Consider a B12 level on admission and if the patient experiences neuropathy while on metformin. Commence treatment if B12 is <250pmol/L – 3 monthly B12 injection is generally sufficient

Using Metformin Safely in Patients with Renal Impairment²²

Metformin is not metabolized and is entirely cleared by renal excretion. Since metformin metabolism is entirely dependent on renal function, a dose reduction is required in patients with stable renal impairment. Renal function should be measured at least twice a year in patients with renal impairment taking metformin.²² Metformin is contraindicated in patients with renal failure (creatinine clearance <15mL/minute).

Maximum recommended doses of metformin in renal impairment²²

Renal function (creatinine clearance *)	Maximum daily metformin dose
15-30 mL/min	500 mg
30-60 mL/min	1000 mg
60-120 mL/min	2000 mg

*Cockcroft-gault equation should be used. If the patient has a BMI >25kg/m² adjusted body weight should be used. See <https://www.mdcalc.com/creatinine-clearance-cockcroft-gault-equation>

Dosage and availability:

Presentations of Metformin currently available ²⁴⁻²⁶		
Metformin 500mg	Metformin 850mg	Various combination products with Vildagliptin or Empagliflozin

Patients should be initiated on 500mg daily increasing by 500mg per week to their maximum tolerated dose or as their renal function allows. Starting low helps reduce the risk of adverse effects such as nausea diarrhoea²¹ Due to the minimal benefit of 3000 mg over 2000 mg of metformin it is recommended to not exceed 2000mg/day

What side effects might you notice?²⁴

Side Effects	Recommended action
Severe vomiting or diarrhoea	Do not administer and inform resident's GP
Weakness, headache, changes in taste, change of appetite, stomach upset, farting, indigestion	Tell resident's GP if troublesome

SGLT2 inhibitors (empagliflozin, dapagliflozin)

- Empagliflozin is the only funded SGLT2 inhibitor available in New Zealand (under special authority)
- Weight loss is a common effect of SGLT2 inhibitors which needs to be considered in elderly patients who are frail or whom weight loss is a problem.
- SGLT2 inhibitors are not recommended to be initiated in patients over 85 due to an increased risk in adverse effects

Mechanism of action:

Approximately 180g of glucose is excreted into the urine daily although this is almost entirely reabsorbed. The Sodium glucose cotransporter-2 in the proximal tubule is responsible for the majority of this reuptake. SGLT2 inhibitors prevent this glucose reabsorption causing it to be excreted in the urine²⁷. Empagliflozin also reduce cardiovascular mortality and renal disease progression independently of glycaemic control.

Monitoring:

Due to the potential for hypotension and volume depletion with SGLT2 inhibitors it is recommended to review a patient's antihypertensive therapy especially diuretics prior to initiating or increasing the dose of SGLT2 inhibitors^{11,21}.

SGLT2 inhibitors also increase the risk for genitourinary infections such as UTI and vaginal candidiasis, this can be troublesome enough to warrant discontinuation.²⁸ Rarely this can involve Fournier's gangrene. If patients experience significant pain, fevers or redness above expected for a mild infection should prompt consideration for an acute referral to secondary care.²¹

SGLT2 inhibitors have been associated with causing cases of diabetic ketoacidosis (DKA) potentially through changes to metabolism leading to increased ketone body production²⁹. SGLT-2 inhibitor induced DKA can occur with normal blood glucose levels. The risk of DKA is increased in patients who have a reduced calorie intake, low carbohydrate diets, current infection, dehydrated or postoperatively²⁹. If a patient taking empagliflozin experiences any signs or symptoms of DKA should be tested for blood ketones **even if blood glucose levels are normal**.²⁶ Signs and symptoms include:

- Difficulty breathing, nausea, vomiting, anorexia, excessive thirst, abdominal pain, confusion, fatigue, deep gasping breathing, coma

Treatment should always be withheld in patients who are unwell as per their sick day management plan or for 2 days prior to elective procedures^{11,21,26}.

Using Empagliflozin Safely in Patients with Renal Impairment

Approximately half of the dose of empagliflozin is excreted unchanged by the kidneys. Dose adjustment is not required however its use is contraindicated in patients with an eGFR below 30mL/min/1.73m². Renal function should be monitored prior to initiation and at least annually during treatment, if patient is also prescribed an ACEi/ARB or diuretic consider more frequent monitoring.

Dosage and availability:

Empagliflozin is available as a stand-alone tablet or as a combination tablet with metformin.

Presentations of empagliflozin currently available ^{26,30}		
Empagliflozin 10mg	Empagliflozin 5mg + Metformin 500mg	Empagliflozin 5mg + Metformin 1000mg
Empagliflozin 25mg	Empagliflozin 12.5mg + Metformin 500mg	Empagliflozin 12.5mg + Metformin 1000mg

Empagliflozin is usually initiated at 10mg daily and can be increased to 25mg daily after several weeks if tolerated and required for glycaemic control. Note that the combination products are given twice daily. If the patient is already taking insulin or sulfonylureas, the dose of insulin and/or sulfonylurea may need to be reduced to prevent hypoglycaemia.

What side effects you might notice?

Side effects	Recommended action
Symptoms of diabetic ketoacidosis	Do not administer and inform resident's GP immediately
Urine or genital infection	Inform resident's GP

GLP-1 Agonists (Dulaglutide, Exenatide)

- Dulaglutide is the only funded GLP-1 agonist available (under special authority).
- GLP-1 Agonists can cause GI effects such as nausea and vomiting however, these are generally transient which resolve with ongoing treatment.
- There is little experience in using Dulaglutide in patients with end stage renal disease. And the patient population studied had a minimum BMI of 23kg/m² due to the effects on weight loss caution would be required in patients of low BMI.³¹
- Dulaglutide is a subcutaneous injection that is given ONCE weekly ideally on the same day each week.
- GLP-1 agonists are contraindicated in patients taking a DPPIV inhibitor (Vildagliptin)

Mechanism of action:

GLP-1 agonists work on the GLP-1 receptor which controls the meal-related hyperglycaemic effects by stimulating insulin release while decreasing glucagon secretion and inhibiting gastric emptying and food intake^{32,33}. GLP-1 agonists also reduce cardiovascular mortality and renal disease progression independently of glycaemic control. Study is ongoing to identify fully the mechanisms by which this occurs.

Monitoring:

Gastrointestinal side effects are very common when initiating GLP-1 agonists. However these are usually transient and will reduce with continued treatment^{21,32}.

Due to the gastrointestinal side effects it is recommended to temporarily discontinue treatment in GI illness as per the patient's sick day management plan²¹.

When used alone or in combination with metformin there is a very low chance of hypoglycaemia, however when combined with insulin and/or sulfonylurea treatment the risk of hypoglycaemia is increased.

Dosage and availability:

Dulaglutide is provided as single dose pens which are injected once weekly by subcutaneous injection.³²

Presentations of Dulaglutide ³²
1.5mg/0.5mL pre-filled pen

Dulaglutide is initiated at a dose of 1.5mg ONCE weekly with no dose adjustment required.

Dulaglutide is administered subcutaneously into the abdomen, thigh or upper arm. Ideally the dose is administered on the same day each week, however you may change the day of the week as long as the last dose was administered **at least 3 days prior**. If patients are also on insulin, it can be administered in the same area (stomach) but not right next to each other.

What side effects you might notice?

Side effects	Recommended action
Severe stomach pain, nausea (signs of pancreatitis)	Do not administer and inform resident's GP
Headache, dizziness, diarrhoea, anorexia, mild nausea	Tell resident's GP if troublesome

DPPIV inhibitors (vildagliptin, sitagliptin, saxagliptin)

- Vildagliptin is the only funded DPPIV inhibitor available in New Zealand and is appropriate as a second line agent in most elderly patients who would not benefit or are contraindicated for treatment with an SGLT2 inhibitor or GLP-1 receptor agonist
- It is generally well tolerated however there is a small risk of pancreatitis
- Vildagliptin can be used in patients with stable renal function, but the dose **MUST** be reduced.
- Vildagliptin alone can be taken with or without food however combination products **must** be taken with a meal
- DPPIV inhibitors are contraindicated in patients taking a GLP-1 agonist (Dulaglutide)

Mechanism of action:

DPPIV inhibitors act on the incretin system by preventing dipeptidylpeptidase-4 (DPPIV) from breaking down glucagon-like peptide 1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP). GLP-1 is released in response to food, stimulating insulin release and inhibiting glucagon secretion. Because GLP-1 is only released in response to eating there is a much lower risk for hypoglycaemia when compared to sulphonylureas.

Monitoring:

Vildagliptin is generally well tolerated in most patients however there is a small risk of hepatitis and pancreatitis. LFTs should be monitored at baseline and then three monthly for the first year of treatment. Consider discontinuing if unexplained elevations of ALT or AST (>2.5 Upper limit of normal)²¹

Using Vildagliptin Safely in Patients with Renal Impairment:

Vildagliptin is mainly metabolised in the kidneys to inactive metabolites. Because of the involvement of the kidneys on the metabolism and elimination of vildagliptin it is recommended the dose is reduced in patients with a CrCl <50mL/min to 50mg daily.

Dosage and availability:

Vildagliptin is available as a stand-alone tablet or as a combination tablet with metformin.

Presentations of vildagliptin currently available ^{25,34}		
Vildagliptin 50mg	Vildagliptin 50mg+ Metformin 850mg	Vildagliptin 50mg + Metformin 1000mg

Vildagliptin is usually initiated at 50mg daily and can be increased to 50mg BD if needed. If the patient is already taking insulin or sulfonylureas, the dose of insulin and/or sulfonylurea may need to be reduced to prevent hypoglycaemia.

What side effects you might notice?

Side effects	Recommended action
Severe stomach pain, nausea (signs of pancreatitis)	Do not administer and inform resident's GP
Headache, dizziness, diarrhoea, back pain.	Tell resident's GP if troublesome

Sulfonylureas (glipizide, gliclazide)

- Historically sulfonylureas have been used as second line agents however with the release of safer medications this is no longer the case. Sulfonylureas can be used as a 3rd line agent cautiously in the elderly due to hypoglycaemia
- Patients on sulfonylureas will be required to monitor blood glucose levels regularly due to their risk of hypoglycaemia. Refer to appendix 10 for guidance on frequency of blood glucose monitoring
- Doses are typically reduced, or treatment is stopped in patients with declining renal function. If sulfonylurea is to be used in renal impairment Glipizide is preferred.
- All sulfonylureas are recommended to be taken with food. Meals should not be skipped if the patient has taken their dose.

Mechanism of action:

Sulfonylureas promote insulin release from the pancreatic beta cells. Due to their effects on insulin release, there is a much higher risk of hypoglycaemia with sulfonylureas when compared to other oral agents.

Monitoring:

Be wary of 'hypos' in the older person who are on sulfonylureas (glipizide or gliclazide). Gliclazide and glipizide are short acting sulfonylureas. The longer acting glibenclamide, especially in older patients, is associated with a greater risk of hypoglycaemia; therefore, serious consideration should be given to changing from glibenclamide to another sulfonylurea (if needed).

Sulfonylurea-induced hypoglycaemia may persist for many hours and must always be treated in hospital; people at increased risk of hypoglycaemia are those with chronic hepatic or renal impairment, those who are malnourished or with reduced oral intake or the older person (risk increases exponentially with age)

The risk of hypoglycaemia associated with sulfonylureas should be discussed with the patient, especially when concomitant glucose-lowering drugs are prescribed. While other oral agents are less likely to cause hypoglycaemia as standalone therapy. The dose of sulfonylurea should always be reviewed when other anti-hyperglycaemics are started or increased.

Using Sulfonylureas Safely in Patients with Renal or Hepatic Impairment:

The risk of hypoglycaemia is increased in patients with renal impairment or hepatic impairment. In patients who have severe hepatic impairment consideration should be given to reducing the dose or discontinuing the sulfonylurea. In patients with mild to moderate renal impairment glipizide is preferred however caution is still advised due to the risk of hypoglycaemia. Patients with both renal **and** hepatic impairment should not receive sulfonylureas.^{35,36}

Dosage and availability:

There are three sulfonylureas currently available in New Zealand.

Presentation ^{35,36}	Initial dose	Titration	Maximum dose
Glipizide 5mg	2.5mg once to twice daily	Double dose every one to two weeks if blood glucose not at target and no postprandial hypoglycaemia	20mg BD
Gliclazide 80mg	40mg once to twice daily		160mg BD
Glibenclamide 5mg	No longer recommended		

All sulfonylureas **must** be administered with food. If the resident has a reduced oral intake discuss with the resident's GP if it is appropriate to temporarily stop or reduce the dose of sulfonylurea.

What side effects you might notice?³⁵

Side effects	Recommended action
Skin rash, itching	inform resident's GP
Stomach upset, diarrhoea, constipation, nausea	Tell resident's GP if troublesome

Pioglitazone

- What line agent is this/availability
- Key ADR requiring management or monitoring
- Is renal/hepatic impairment an issue
- When to take the drug

Mechanism of action:

Thiazolidinediones such as pioglitazone reduce insulin resistance and gluconeogenesis by activating PPAR-g and PPAR-a receptors. There is a very low risk of hypoglycaemia with Pioglitazone.

Monitoring:

Patients taking pioglitazone have an increased risk of bone fractures, especially women³⁷; osteoporosis screening is required on long term therapy.

Pioglitazone can cause oedema, it is not recommended for treatment in patients with oedematous conditions such as heart failure and renal impairment.^{21,37}

The incidence of heart failure is increased when pioglitazone is combined with insulin especially in patients with predisposing factors e.g. previous myocardial infarction. Patients who take pioglitazone should be closely monitored for signs of heart failure; treatment should be discontinued if any deterioration in cardiac status occurs.

Available epidemiological data suggest an association between pioglitazone and bladder cancer, though there is insufficient evidence to conclude that this is a causal effect, and it is unlikely that pioglitazone induces cancer.

Using Pioglitazone safely in Patients with Hepatic Impairment

Pioglitazone is not recommended in patients with hepatic impairment, liver function should be assessed prior to initiation and periodically thereafter.

Dosage and availability:

Presentations of Pioglitazone currently available ³⁸		
Pioglitazone 15mg	Pioglitazone 30mg	Pioglitazone 45mg

Pioglitazone is initiated at 15mg daily, increasing monthly to a maximum of 45mg daily. However, the maximal effect of each dose increase can take 6-8 weeks. If the patient is already taking insulin or sulfonylureas, the dose of insulin and/or sulfonylurea may need to be reduced to prevent hypoglycaemia.

What side effects you might notice?

Side effects	Recommended action
Nausea, vomiting, abdominal pain, fatigue, dark urine, visual impairment	inform resident's GP
Weight gain, oedema, headache, dizziness	Tell resident's GP if troublesome

Acute diabetes complications

Acknowledgement: Content of this section has been sourced from: *Good clinical practice guidelines for care home residents with diabetes*, Diabetes UK, January 2010, and *Management of Diabetes in Long-term Care and Skilled Nursing Facilities: A Position Statement of the American Diabetes Association*. February 2016.³⁹

Sick Day Advice

Illness such as colds, flu, infections, vomiting or diarrhoea may create special problems for people with diabetes, as illness tends to worsen diabetes control.

When sick, fluids are lost from the body and must be replaced. Give at least one glass of fluid every hour, especially if there is diarrhoea or vomiting. If blood glucose is **less than 8mmol/L**, give fruit juice or flat fizzy drinks. If blood glucose is **higher than 8mmol/L**, give water, soda water or mineral water.

If the resident has a sore mouth or cannot chew, offer custard, fruit yoghurt, Milo, ice cream or jelly.

If the resident has diarrhoea, avoid dairy products. Give Oxo cubes or beef stock, chicken cubes or stock, or Vegemite/Marmite as a drink, soup with dry toast or bread.

Call the general practitioner if the resident has any of the following:

- Vomiting or diarrhoea persisting more than 12 hours
 - Persistent blood glucose levels >15mmol/L
 - Infection or fever
-
- Refer to Appendix 7: Managing Diabetes when the Resident is Sick Wall Chart
 - Refer to Appendix 5: Management of Hypoglycaemia in the conscious patient Wall Chart for further information and specific guidance.

Infections

People with diabetes are more prone to infections, especially if the blood glucose levels are at a higher than normal or ideal level. Nearly all infections will cause blood glucose levels to rise.

Infections in older people, if not dealt with promptly, can lead to serious complications which may necessitate admission to hospital.

Signs and symptoms of infection include:

- Temperature (>37.0 C). Be aware that in the older person the fever response is often blunted even in the presence of bacteraemia so do not rely solely on a temperature reading but look at clinical presentation and functional decline.
- Fatigue and chills
- Headache generalised aches
- Cough sputum production
- Nausea, vomiting or diarrhoea
- Frequency or burning on passing urine
- Swelling, redness, tenderness, rash
- Foul smelling and/or discharging skin wound
- Sore mouth, white patches in the mouth

However, in the older person signs and symptoms may not be obvious! A change in mobility or the onset of a confused state may indicate infection.

What to do?

- Urgent **referral to the GP** is necessary for the treatment of the infection
- Make sure the person does **not become dehydrated** by giving regular fluids
- If someone has **diarrhoea**, carers should be aware that they may be more prone to hypoglycaemia
- **Keep testing their blood glucose** to monitor improvement or deterioration

Medication considerations in illness	
Metformin	Stop if patient has gastrointestinal illness
Dulaglutide	
Acarbose	
Empagliflozin	Stop in any illness – check capillary ketones if nausea, vomiting or abdominal pain
Sulfonylureas	DO NOT STOP – discuss with GP for dose guidance
Vildagliptin	
Insulin	

Hypoglycaemia

Key messages:

- ☐ The risk of hypoglycaemia is the most important factor in determining glycaemic goals.
- ☐ The presenting symptoms of hypoglycaemia in older people can be primarily evident as confusion, delirium and dizziness (rather than as palpitations, sweating and tremors as in younger people).
- ☐ These symptoms, plus cognitive impairment, put some older people at increased risk because they cannot recognise and/or fail to communicate hypoglycaemia.
Additionally, carers may not recognise confusion, delirium and dizziness as being as a result of hypoglycaemia.

Generally, hypoglycaemia occurs when the blood glucose level is **less than 4 mmol/L**.

“Four is the floor”

Hypoglycaemia can happen in patients treated with **insulin and sulfonylureas** (gliclazide, glipizide). The experience of an episode of hypoglycaemia can range from it being unrecognised by the person to extreme discomfort whereby it can be frightening for the person and also their family, friends and carers.

- ☐ Severe hypoglycaemia is associated with **increased mortality**, especially in the older person. **Be aware! Symptoms can vary from person to person.** Symptoms of hypoglycaemia are called **‘warnings’** as the feelings can be evident before the blood glucose drops very low. However, in older people **chronic hypoglycaemia** can occur if blood glucose levels **repeatedly** drop to less than 4 mmol/L. Repeated and/or chronic hypoglycaemia leads to **loss of ‘warnings’** and patients are at increased risk from hypoglycaemia. If this is recognised, then the person may be able to **treat** the low blood glucose **before it gets any lower**.
- ☐ Some people may not get any symptoms at all, particularly if they have regular low blood glucose levels. Older people may also have **‘dampened down’ hypoglycaemia warnings** or none at all. For older people there are **added risk factors** which can lead to hypoglycaemia:
 - Advanced age
 - Other illnesses or conditions as well as diabetes
 - Being prescribed five or more medications

- Chronic renal problems
- Poor nutrition
- Acute illness

What can cause hypoglycaemia?

- Too much insulin or too much diabetes medication
- Delayed or missed meal
- Not enough food containing carbohydrates
- Unusual activities
- Acute illness (especially infections and diarrhoea)
- Sometimes there is no obvious cause

Risk factors

- Impaired renal function
- Slowed hormonal regulation
- Variable appetite and nutritional intake
- Polypharmacy
- Slowed intestinal absorption

Warning signs

- New onset confusion, irritability, anxiety or change in behaviour
- New weakness, trembling hands or shaking knees
- Feeling suddenly dizzy and lightheaded or new headache
- Fast pulse and palpitations (thumping heart)
- Pins and needles (tingling) of lips and tongue or feeling hungry
- Pale and sweaty skin (late sign!)
- Loss of consciousness

Avoidance of hypoglycaemia

- Be aware
- Set appropriate and realistic blood glucose targets in the older adult (in agreement with the patient's GP)
- Monitor blood glucose in accordance with the person's care plan
- Increase monitoring frequency during any intercurrent illness
- Learn and remember the warning signs
- Test blood glucose if in doubt or if you suspect hypoglycaemia
- Act rapidly and follow the flowchart (see Appendix 5). This will be in every care plan and at the wall of the nurses' station.

Immediate treatment

In the conscious patient:

Give either:

- Half a cup of fruit juice or
- Glucose tablets (10-15 grams) or
- Three large teaspoons of sugar dissolved in water

Retest in 10 minutes:

- If ≤ 4 mmol/L, give further dose of fruit juice, glucose or sugar
 - NOTIFY GP if capillary blood glucose level is not above 4 mmol/L within 30 minutes but continue with hypo treatment.
- If >4 mmol/L, give either:
 - Slice of bread, small pottle of yoghurt and two plain biscuits or
 - 1 glass of milk or
 - Meal if due within 15 minutes

Reminder: Hypoglycaemia less than 4 mmol/L may be asymptomatic but still requires treatment.

If the patient is unconscious:

Call the ambulance.

- Intravenous administration of 75-80mL 20% glucose or 150-160mL of 10% glucose (the volume will be determined by the clinical scenario). Once the patient regains consciousness, oral glucose should be administered, as above.
- If intravenous (IV) access cannot be rapidly established and the hypoglycaemia is induced by insulin, Glucagon 1mg should be given by intramuscular (IM), or subcutaneous (SC) injection.

NB: 1 unit of glucagon = 1 mg of glucagon.

Hyperglycaemia

Hyperglycaemia can lead to two significant complications: Diabetic Ketoacidosis and Hyperglycaemic Hyperosmolar State. (Appendix 6)

Diabetic ketoacidosis⁴⁰

In the short term, consistent high blood glucose levels can lead to a condition called diabetic ketoacidosis (DKA). Ketones develop when the blood glucose level is high and a lack of insulin is available to the body, which would normally allow glucose to enter the cells for energy. Because people with Type 2 diabetes may still be producing some insulin, these acidic by-products may not be created except in patients taking SGLT2 inhibitors such as empagliflozin.

Why does this happen?

This happens because of a lack of glucose entering the cells where it can be used as energy. The body begins to use stores of fat as an alternative source of energy, and this in turn produces an acidic by-product known as ketones.

How ketones affect the body

Ketones are very harmful, and the body will immediately try to get rid of them by excreting them in urine. Consequently, when ketones are present and blood glucose levels are rising, people often become increasingly thirsty as the body tries to flush them out.

If the level of ketones in the body continues to rise, ketoacidosis develops (ketoacidosis means acidity of the blood, due to an excess of ketones in the body). Their harmful effect becomes more apparent, and nausea or vomiting may start. In addition, the skin may become dry, eyesight blurred and breathing deep and rapid.

Unfortunately, because of vomiting, the body becomes even more dehydrated and less efficient at flushing out the ketones, allowing levels to rise even faster. As the level of ketones rise, it may be possible to smell them on the breath - often described as smelling like pear drops or nail varnish. Eventually, if untreated, the level of ketones will continue to rise and combined with high blood glucose levels, a coma will develop which can be fatal. However, at any of these intermediate stages, ketoacidosis can be treated and damage usually limited, obviously, the sooner, the better.

Who is at risk?

Any person with diabetes who relies on administering insulin (i.e. by injections or an insulin pump) could develop diabetic ketoacidosis. In exceptionally rare cases people controlling their diabetes with diet or tablets have been known to develop ketoacidosis when severely ill.

During illness

The high-risk time for developing ketoacidosis is when a person is unwell. Part of the body's response to illness and infection is to release more glucose into the bloodstream, and to stop insulin from working properly. This happens even if the person loses their appetite or goes off food altogether. During periods of illness, even if a person is not eating, insulin is still needed and it is important never to stop taking insulin. See 'Sick Day Advice' Wall Chart (Appendix 7).

Detecting ketones

Ketones are easily detected by a simple finger prick test. Test strips currently available are the Ketosens which are designed to be used with the CareSens Dual meter. People with diabetes should be tested for ketones if their blood glucose is high (usually over 15mmol/L) or if they have any symptoms of ketoacidosis. If high levels of ketones are discovered (capillary ketone level of 2.5mmol/L or above), and especially if their blood glucose levels are high, medical advice should be sought immediately.

Hyperglycaemic Hyperosmolar State (HHS)

Hyperglycaemic Hyperosmolar State is a potentially life-threatening emergency.

Hyperglycaemic Hyperosmolar State occurs in people with Type 2 diabetes who may be experiencing very high blood glucose levels (often over 40mmol/L). Hyperglycaemic Hyperosmolar State is a serious and often fatal consequence of **hyperglycaemia and dehydration**.

The mortality rate from HHS increases with age and osmolarity (marker of dehydration). It can develop gradually (over a course of weeks) through a combination of illness, dehydration and an inability to take normal diabetes medication due to the effect of illness.

Symptoms can include frequent urination and great thirst, nausea, dry skin and mucous membranes (mouth, lips, tongue), disorientation and, in later stages, drowsiness and a gradual loss of consciousness.

Hospital treatment for HHS involves replacing the lost fluid caused by high glucose levels and the administration of insulin through a vein, to bring the blood glucose down to an acceptable level.

HSS does not usually lead to the presence of ketones in the urine, as occurs in ketoacidosis. HSS mortality figures range from 10%–63% (can lead to stroke, myocardial infarction, renal dysfunction and neurological complications). Up to 50% of patients with HSS may not have been diagnosed with diabetes (hence diabetes screening at admission to care). HSS is ten times more common than DKA; it affects mainly older people with poor fluid and nutritional input.

Symptoms of hyperglycaemia in older people may include:

- Reduced sensation of thirst
- Unable to feed themselves (depend on carers to give fluid regularly)
- Increased renal glucose threshold – change in glucose handling of the kidney
- Symptoms of polydipsia (frequent passing of large amounts of urine) may be masked by other illnesses such as urinary incontinence

Common symptoms of hyperglycaemia (lethargy, confusion, restlessness, blurred vision, infections and impaired cognition) may be considered symptoms of old age.

Management of HHS

Prevention and early recognition are paramount.

- Ensure regular fluid intake in the older person (provide access to fluid)
- Encourage fluid intake especially in patients with diabetes
- Check tongue (mucous membranes) for dryness
- Watch for signs and symptoms of infections (see above)
- Watch for any significant change in behaviour and cognition in the older patients with diabetes (and report to nurse)
- Beware of signs of hyperglycaemia such as lethargy, confusion, restlessness, blurred vision, infections and impaired cognition
- Watch for new incontinence and or polyuria
- If in doubt, check blood glucose

Incontinence

Urinary incontinence is the inability to hold urine in the bladder and occurs when the muscles and nerves associated with the bladder are unable to hold or appropriately release urine. Women are twice as likely to experience incontinence as men. Incontinence in the older person is a sensitive issue and can be an embarrassment for both the sufferer and their carer as neither may find it easy to talk about this very personal problem, resulting in the help needed not being forthcoming.

Causes can include

- Hyperglycaemia (high blood glucose levels) can cause thirst and increase urination
- Urinary tract infections
- Physical changes in bladder muscles (e.g. after menopause)
- Enlarged prostate gland
- Damage to the nerves caused by conditions such as diabetic neuropathy

Different types of incontinence

- Stress incontinence - urine loss occurs when coughing, laughing or during exercise
- Urge incontinence - sudden need to pass urine
- Overactive bladder - the nerves send the wrong signals to the bladder causing urgency, frequency and incontinence
- Functional incontinence - difficulties in managing toilet needs associated with other physical or mental illnesses

Treatment options

- Different treatments and interventions are available, depending on the type of incontinence and can range from pelvic floor exercises to medication
- Weight loss (if appropriate) and improved diabetes control can help
- The person's GP should be made aware of problems with incontinence and what measures have been taken to resolve the problem

Long-term diabetes complications

Acknowledgement: Content of this page has been sourced from *Good clinical practice guidelines for care home residents with diabetes*. Diabetes UK. January 2010.⁶

Cardiovascular health

People with diabetes suffer a ten-fold increase in risk of stroke and cardiovascular conditions such as coronary heart disease.

Kidneys (diabetic nephropathy)

Kidney disease can happen to anyone, but it is more common in people with diabetes and people with high blood pressure. Kidney disease develops very slowly over many years and is most common in people who have had the condition for over 20 years. It follows therefore that older people in care homes may be more likely to have some level of kidney disease.

Included in the **Diabetes Annual Review** (also completed soon after the resident's admission to the home), are the following checks for kidney disease:

- A urine test for protein and albumin/creatinine ratio. Protein in the urine may be due to an infection, so this check is important
- A blood test which will measure the efficiency of the kidney function creatinine level, or eGFR and to check the levels of certain minerals (electrolytes) in the blood

Symptoms of kidney disease

When kidney disease first develops there are often no symptoms (signs) which is why screening and the annual review are so important. The first sign which may be noticed is ankle swelling. If kidney problems are not picked up early the following symptoms may begin to be evident:

- Passing much more or much less urine
- Tiredness
- Itchy skin
- Loss of appetite
- Nausea and vomiting
- Metallic taste in the mouth
- Drowsiness
- Darkening skin
- Muscle cramps
- Anaemia

It is important that the GP knows about any symptoms as the risk of kidney disease progressing can be reduced by good blood pressure and blood glucose control, so changes may be needed to the person's medication.

Treatment begins with possible changes in the diet and referral may be necessary to a specialist registered dietician who can help to plan an appropriate eating programme. Tablets may be prescribed to help the body get rid of extra fluid.

Foot care

Diabetes can cause poor circulation and reduced feeling in the feet. In older people reduced mobility and failing eyesight can lead to a reduction in the level of foot inspection. (This may mean that damage has become more serious before anyone is aware of it.) Damage can be prevented, but care is needed by the person with diabetes, their carers and health care teams. Care home residents may not be able to self-inspect their feet. Individualised foot care guidance will be documented in the care plan.

Follow the steps below to prevent or detect foot problems

1. Check feet daily, including in between toes and look for thickened hard skin, changes in colour and breaks in the skin.
2. Wash feet (minimum alternate days) in warm water and with a mild soap. Check the water temperature as the person with diabetes may not be able to feel hot or cold temperatures. Dry feet carefully, especially between the toes.
3. If the skin is dry, apply an emollient or moisturising cream but avoid the areas between the toes.
4. Do not use over the counter products to treat corns and calluses.
5. Avoid using hot water bottles (reduced sensation) – bed socks are better.
6. Make sure that socks and shoes are not too tight.
7. Ensure the resident has shoes which are comfortable and broad fitting, checking inside for stones, sharp objects or ruffled lining.
8. Avoid socks or stockings with wrinkles, prominent seams or darned areas.
9. Arrange an appointment with the podiatrist if you become aware of problems.
10. Act immediately if you spot the following danger signs:
 - Swelling
 - Changes in colour of the skin
 - Sores or cuts that do not heal
 - Skin that feels hot to touch
 - Difficulty in moving the foot

These could indicate poor circulation, an infection, the early stages of an ulcer, or gangrene.

Eye care

Age-related changes in the eyes mean that residents are likely to want more light for reading and may need glasses. Age is the most significant risk factor for developing common eye conditions such as glaucoma, age-related macular degeneration (AMD) and cataracts, which can lead to blindness.

Vision is assessed at least bi-annually as part of the Diabetes Annual Review, and for most, an examination of the retina by photographic screening or specialist examination is done every two years. Good vision can also prevent falls.

Oral health

As we get older gums may recede (shrink back), and teeth may become a little more sensitive as a result. A dentist or hygienist will be able to advise on the best brushing methods to keep any gum problems under control and may suggest a mouthwash to deal with the sensitivity.

People with diabetes are more likely to get gum disease

- Although anyone can get gum disease, it is estimated that people with diabetes can be up to three times more likely to develop gum disease than people without diabetes.
- Gum disease is also more likely in people who don't clean their teeth regularly, or those who find it difficult to clean their teeth properly.
- If some teeth have been lost in the past, and a person has bridges or dentures, they may have particular cleaning needs and difficulties.

Avoiding hospital admission

- Good diabetes care and awareness of problems which may become more serious will help to prevent unnecessary admission to hospital.
- If the person with diabetes is unwell, their blood glucose level is likely to be higher – even if they are not eating.
- If the resident is unwell follow the **Sick Day Advice** wall chart guidelines. Appendix 7.
- If the resident is able to eat, but has no appetite:
 - Offer small meals and often
 - Try replacing meals with small snacks such as jelly and ice cream, custard or soup
- If the resident really can't manage to eat anything:
 - Try to ensure they drink plenty of fluid
 - Offer carbohydrate containing drinks such as milk, milky drinks or sugary drinks such as lemonade regularly at two hours intervals.
- If blood glucose is less than 8mmol/L refer to **Hypoglycaemia Wall Chart**. Appendix 5.
- If blood glucose is higher than 4mmol/L, give water, soda water or mineral water.

Falls⁸

All older people with diabetes should have an assessment of their fall risk during the initial visit, annual review, and if there is a recent history of a fall.

Provide education to all older people with diabetes about fall prevention.

Undertake a review of medicines and consider withdrawing all potentially inappropriate medicines. If possible, discontinue unnecessary and problematic medicines especially those with increased risk of falls such as psychotropic drugs and narcotics.

Assess vision regularly and provide correction as needed.

Minimize risk of hypoglycaemia by avoiding tight glycaemic control.

Provide interventions to enhance endurance, gait, balance, and strength training.

Pain management⁸

Stabilise glucose levels to the target range as hyperglycaemia may exacerbate pain. Balance less rigid glucose targets with possible increased pain levels in hyperglycaemic states.

Support people with painful joint or locomotor disorders to continue exercising to reduce disability by an appropriate analgesia programme.

During active pain management, keep side-effects of therapy to a minimum in order to maintain functional status.

Diabetes Management in Palliative Care

For patients with diabetes undergoing palliative care, the management of their diabetes can often be a secondary consideration. The focus of care, provided in the palliative phase of life, is the alleviation of symptoms and treatment and this almost always needs adjustment in this setting. Diabetes management for these patients, especially those on insulin and oral therapies, specifically sulfonylureas, can make a difference to their quality of life.

In a patient with diabetes who is terminally ill or has limited life expectancy, maintenance of comfort and control of any symptoms related to hyperglycaemia (e.g., polydipsia, polyuria) are the most appropriate goals of treatment. It is important to document the basis for deciding not to actively manage treatment of hyperglycaemia in the terminally ill patient.

Palliative Care

Both hypoglycaemia and hyperglycaemia can have an impact on patient wellbeing.

Hypoglycaemia

Those who have been on insulin for their Type 2 diabetes treatment medium to long-term, and with a decline in appetite and condition, may need a gradual reduction in insulin dosage or change of insulin regime to prevent hypoglycaemia. In some instances, insulin treatment may need to be discontinued.

Do not discontinue insulin in a patient with Type 1 diabetes, due to the risk of diabetic ketoacidosis (DKA) unless in the end of life phase.

Be mindful of the increased risk of hypoglycaemia in patients with kidney failure and there is a very high risk in hepatic failure.

Hyperglycaemia

In the palliative phase be mindful of the symptoms of hyperglycaemia and the patient's comfort. Management of diabetes focuses on symptom alleviation at this time.

Patients undergoing steroid treatment may well need insulin introduced to prevent symptoms of hyperglycaemia. Steroid use may precipitate symptomatic hyperglycaemia in previously non-diabetic patients at risk, for example, overweight.

Testing

Assessment of blood glucose levels and /or HbA_{1c} needs to be kept in line with patient goals and clinical need. Blood glucose monitoring does not need to be frequent but can be beneficial to overall quality of life. Align the blood glucose testing to the treatment the patient is having for his/her diabetes and ensure the results are reviewed and acted upon. If the patient is not on insulin or a sulfonylurea, blood glucose monitoring may provide no benefit.

Keep in mind that rapidly changing clinical status and the changes in red cell dynamics can cause an inaccurate HbA_{1c} result.

Table 1: Suggested frequency of blood glucose monitoring for patients with Type 2 diabetes

Insulin Regimen	Suggested monitoring frequency
Sulfonylureas	Routine assessment of blood glucose levels carried out before breakfast and before bed, on ONE day per week. (this does not need to be the same day of the week).
Insulin (Basal Only) e.g. Lantus	Routine assessment of blood glucose levels carried out on TWO consecutive mornings per week
Insulin (Fixed Dose) Protaphane or Humulin NPH	Routine assessment of blood glucose levels carried out before each meal on TWO days a week.
Insulin (Basal / Bolus) Humalog or Novorapid or Apidra PLUS Lantus or Protaphane / Humulin NPH or Humalog Mix.	Routine assessment of blood glucose levels carried out before and TWO hours after breakfast, lunch and dinner on ONE day a week.
Metformin, Vildagliptin, Empagliflozin, Dulaglutide WITHOUT insulin or sulphonylurea	Routine capillary blood glucose testing is generally not recommended however a 3 to 6 monthly HbA1c should be carried out.

End of Life Care

In the last few weeks and days of life, the principles of care are symptom management rather than blood glucose measurement. If blood glucose levels are measured, there is a greater tolerance for higher levels (for example up to 15–18 mmol/L).

Key messages:

- Diabetes management does need to be considered in patients under palliative care; the focus is on comfort and prevention of distressing symptoms and preservation of quality of life, rather than disease management
- Have a heightened awareness for hypoglycaemia and utilise blood glucose monitoring appropriately (but to the minimum necessary) to determine when treatment modification is necessary
- Be mindful that steroids may precipitate hyperglycaemia and in some patients, insulin treatment may be needed
- Assessment of blood glucose levels and /or HbA1c is kept in line with clinical need.

Appendices

Appendix 1

Age Related Residential Care Resident with Diabetes: Annual Review and Plan

Appendix 2

Hawke's Bay District Health Board Rest Home Nutritional Care Decision Tree 2011

Appendix 3

Examples of Exercise

Appendix 4

Routine Capillary Blood Glucose Monitoring Wall Chart

Appendix 5

Management of Hypoglycaemia in the Conscious Patient Wall Chart

Appendix 6

Management of Hyperglycaemia Wall Chart

Appendix 7

Managing Diabetes when the Resident is Sick Wall Chart

Appendix 8

Patient Information Brochures

Appendix 9

Blood Glucose monitoring sheets



Age Related Residential Care Resident with Diabetes Annual Review and Plan

It is recommended that this checklist is completed by the ARRC Registered Nurse when a resident with diabetes is first admitted into the Facility and then once a year as part of the National Get Checked Programme.

Patient Name: _____

Address: _____ NHI: _____ DOB: _____ Ethnicity: _____

Male / Female _____ GP: _____

Year Diabetes Diagnosed: _____ Date Data collected: _____

Prognosis indicator (Tick one or several)	Age <85yrs <input type="checkbox"/>	Age >85yrs <input type="checkbox"/>	Life expectancy <2yrs <input type="checkbox"/>	Concurrent illness/disability <input type="checkbox"/>
Type of Diabetes (Tick one)	Type 1		Type 2	Other
Treatment (Tick one or more)	Diet only <input type="checkbox"/>	Metformin <input type="checkbox"/>	Sulfonylurea <input type="checkbox"/>	Pioglitazone <input type="checkbox"/>
	Vildagliptin <input type="checkbox"/>	Empagliflozin <input type="checkbox"/>	Dulaglutide <input type="checkbox"/>	Other <input type="checkbox"/> : _____
	Insulin <input type="checkbox"/> Lantus (Glargine)	Insulin <input type="checkbox"/> Protaphane <i>or</i> Humulin NPH	Insulin <input type="checkbox"/> Humalog <i>or</i> Novorapid <i>or</i> Apidra	Insulin <input type="checkbox"/> <i>or</i> Humalog Mix <i>or</i> NovoMix '30'
Associated treatment (tick all that apply)	ACE inhibitor or A2 Receptor Blocker <input type="checkbox"/>	Statin <input type="checkbox"/>	Aspirin <input type="checkbox"/>	Bezafibrate <input type="checkbox"/>

This Year's Plan - Include the following checks:		
✓	Glycaemic Control, nutrition and strength	HbA _{1c} , hypoglycaemic events, weight, waist circumference, skin integrity, falls
✓	Macrovascular	BP, IHD, Cerebrovascular disease, Foot pulses
✓ Or X	Lipids	Fasting cholesterol, TG
✓ Or X	Microvascular	Foot sensation, Microalbuminuria
✓	Renal	eGFR

✓Or X	Retinal	Visual acuity, Retinal photographic screening
✓	Smoking	Smoking status
✓Or X	Other	Details:

Review due: _____ (month) _____ (year)

Nursing Assessment – complete only those items ticked in “This Year’s Plan”

Glycaemic Control, nutrition and strength	HbA _{1c}				
	Hypoglycaemic events	Number recorded since last review:			
	Weight	Weight now		Change since last check	
	Waist circumference				
	Change in nutrition / diet?				
	Patient able to feed self?				
	Skin integrity?				
	Falls?				
Macrovascular	BP				
	Cerebrovascular disease present?				
	Ischaemic heart disease present?				
	Foot pulses	Left		Right	
Lipids	Fasting	TC		TG	
Microvascular	Foot sensation	Left		Right	
Renal	GFR (tick one)	<30	30 - 45	>45	
	Urine albumin/creatinine ratio Tick one	<3.0	>3.0		

Retinal	Visual Acuity	Left		Right	
	Date of last retinal screening				
Smoking	Smoking status				
Other	(As per plan)				

Registered Nurse: _____ **Date:** _____
ARRC RN: PLEASE FAX TO GP PRACTICE FOR SCANNING **File in Residents notes**

Practice to complete

Processed by		(Name)		(Date)
GP Visit booked		(Date)		(Time)

Please Fax back to ARRC Facility to confirm receipt of form and inform of GP visit

Medical Review – complete only those items ticked in ‘This Year’s Plan’

Due: _____ (month) _____ (year)

Glycaemic control	HbA _{1c} appropriate?	
Nutrition	Any concern?	
Macrovascular	BP satisfactory?	
Lipids	Lipids satisfactory?	
Microvascular	Foot health a concern?	
Renal function	Renal function a concern?	

Medication review	Change to diabetes medication?	
	Change to associated medication?	

Next Year’s Plan - Year: _____

Blood Glucose Monitoring for this patient: (tick one)

– For guidance, see Routine Capillary Blood Glucose Monitoring wall chart

<i>Tick</i>	Option	Action	Note
	0	No routine testing	6-mthly HbA _{1c} only
	1	Test before breakfast and before bed ONE day per week	Plus 6-mthly HbA _{1c}
	2	Before breakfast test TWO consecutive mornings per week	Plus 6-mthly HbA _{1c}
	3	Before each meal on TWO days a week	Plus 6-mthly HbA _{1c}
	4	Before each meal AND 2 hours after each meal ONE day per week	Plus 6-mthly HbA _{1c}
	5	Other:	

Next Year's Annual Review - Include the following checks:

✓	Glycaemic Control, nutrition and strength	HbA1 _c , hypoglycaemic events, Weight, waist circumference, Skin integrity, falls
✓	Macrovascular	BP, IHD, Cerebrovascular disease, foot pulses
✓ Or X	Lipids	Fasting cholesterol, TG
✓ Or X	Microvascular	Foot sensation, Microalbuminuria
✓	Renal	eGFR
✓ Or X	Retinal	Visual acuity, Retinal photographic screening
✓	Smoking	Smoking status

General Practitioner: _____ **Date:** _____

Appendix 2: HBDHB Rest Home Nutritional Care Decision Tree

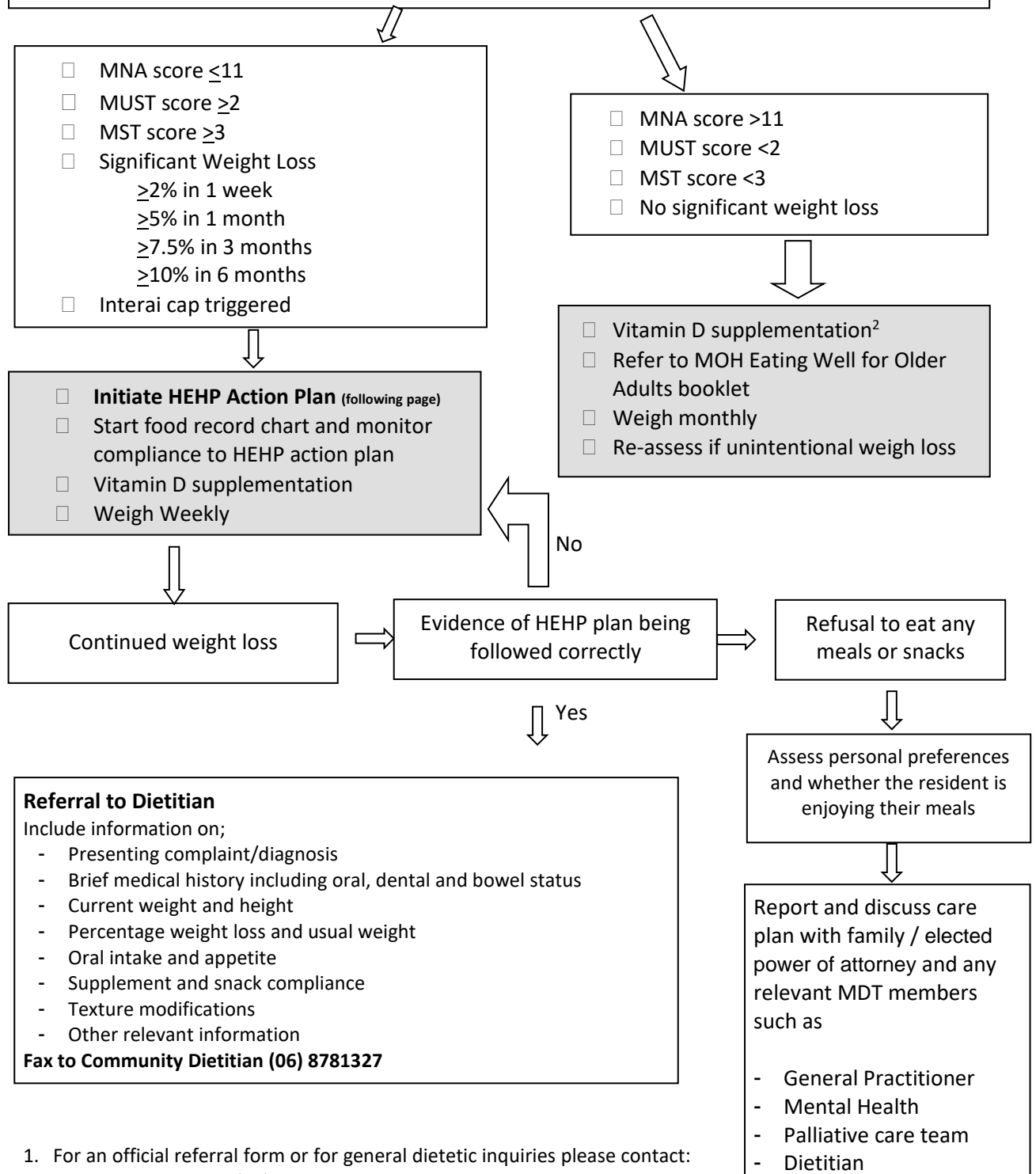
Te Whatu Ora
Health New Zealand

Rest Home Nutritional Care Decision Tree

Assess Nutritional status by either:

- Using a screening tool (MNA, MUST or MST) , or Interai
- Determining % of **unintentional** weight loss

$$\text{Percentage weight loss} = \frac{\text{Usual weight} - \text{Current weight}}{\text{Usual weight}} \times 100$$



1. For an official referral form or for general dietetic inquiries please contact: Community Dietitian (06) 878 8109 ext 6975
2. Vitamin D Supplementation will require a prescription

High Energy High Protein Action Plan for Residents with Poor Appetite, Poor Oral Intake and Weight Loss

1) Correct the cause/contributors to weight loss

It is essential to eliminate any barriers to optimal nutrition, and to identify and correct any conditions contributing to poor oral intake. Ask and listen to *why* a resident cannot finish a meal.

Common contributors to poor appetite, poor oral intake and weight loss

Cause	Action plan
Does the resident have poor dentition?	Refer to dentist for dental review. Ensure soft textured meals that are easy to chew or require little chewing.
Does the resident have difficulty swallowing?	Refer to Speech and Language Therapist for appropriate food texture recommendations.
Does the resident suffer dry mouth and taste changes?	Check for and treat oral thrush. Ensure oral cares are done daily, including tongue brushing. Try rubbing pineapple on gums and/or use saliva spray to help dry mouth.
Does the resident have signs of clinical depression?	Review by Mental Health Team or general practitioner. Ensure the resident attends the dining room for meals.
Does the resident become too tired to finish meals or have difficulty feeding themselves?	Initiate assistance at every meal. Ensure extra time for meals. Ensure assistance to and from the dining room. Adjust food texture to soft, pre-cut, easy to consume meals.
Is the resident constipated?	GP to review medications. Ensure 6-8 cups fluid/day. Increase resident activity levels where possible. Add high fibre foods to meals such as kiwifruit, prunes, bran, and wholegrain cereals.

2) Initiate high energy high protein eating plan

It is important to organise with the kitchen to initiate a High Energy High Protein (HEHP) menu for those you have identified as being underweight or with poor appetite or weight loss. The menu should include;

- A) High energy high protein snacks** (examples over the page)
- B) Minimum one per day high energy high protein milk shakes** (recipe over the page)
- C) Meal fortification** (examples over the page)
- D) Replace water and watery tea and coffee with fruit juice, full milk drinks or milkshakes**

3) Record food / fluid intake and take weekly weights

It is beneficial to have a process in place to enable you to monitor what your residents are eating and to ensure this action plan is being followed by all staff involved. Weekly weighs are important to ensure the action plan is working.

4) Elect a nutrition advocate

Mealtimes and eating can often be overlooked as a high priority area of resident care. Consider appointing a staff member as a 'nutrition advocate' who will be responsible for ensuring these guidelines are being followed accordingly and that mealtimes are prioritised.

A) High energy high protein snack examples

Include for morning tea, afternoon tea *and* supper:

- | | |
|--|---|
| <ul style="list-style-type: none"> ▪ cheese and extra butter or margarine on toast/crackers/scones/muffins ▪ instant pudding/milky pudding/ice cream ▪ creamy yoghurt/custard | <ul style="list-style-type: none"> ▪ milky Milo/milky coffee/milk (standard milk) ▪ high energy milk shake (see below) ▪ meat/cheese/egg mayonnaise sandwiches ▪ cuts/peanut butter |
|--|---|

B) High energy high protein milkshake recipe

Include minimum one per day either after or between meals:

<p>Recipe: 200ml whole or fortified milk 2 tablespoons milk powder or Complan 2 scoops ice cream 50ml cream (optional)</p> <p>Method: Beat or blend well. Serve chilled.</p>	<p>Flavouring options: 2-3 teaspoons Milo, 1-2 teaspoons instant coffee, milkshake syrup, vanilla essence, honey, banana, ½ cup stewed fruit or fruit juice</p>
---	--

C) Meal fortification examples

Fortify meals and drinks with the following high energy food products wherever possible

Cheese	Mayonnaise	Oil	Cream
Margarine	Peanut butter	Cheese Sauce	Butter

For example: add oil, margarine or cream to porridge, desserts, soups, mashed potato, and milky drinks.

Add cheese or cream cheese to crackers, muffins, scones, toast and potatoes.

Add cheese sauce, gravy and oil to vegetables and meat.

High energy high protein menu plan example

Breakfast:	Porridge made with milk (cream as appropriate), brown sugar and stewed fruit or toast with extra margarine/butter or peanut butter plus milky drink
Morning Tea:	HEHP snack and/or HEHP drink (see HEHP snack examples)
Lunch:	Additional cheese sauce to vegetables, gravy to meats and oil / margarine / butter / cream to soups and mashed potatoes. Ensure dessert is taken with extra sauce/ice cream, cream
Afternoon tea:	HEHP snack and/or HEHP drink (see HEHP snack examples)
Tea:	Additional cheese/oil/margarine/butter/cream to soups and bread (as appropriate)
Supper:	Milky drink plus HEHP snack (see HEHP snack examples)
Extra:	At least one fortified milk shake/day (see HEHP milkshake recipe)

Acknowledgement: Compiled by New Zealand Registered Dietitian March 2010 Reviewed 2022

Appendix 3: Examples for Exercise

	exercise	benefit to	action	resources
Module A Exercise Primary Areas Targeted Modifications Equipment Needed	Sunshine arm circles	Torso and shoulders; opens ribcage	Make small circles by extending arms in front	Ball (optional)
	Tummy twists	Sides of the waist	Soup cans or a hand weight for resistance. Can replace a ball	Ball (optional)
	Hand squeeze	Grip-strength; chest		Ball
	Seated shin strengtheners	Shins and lower legs	Try to hold a ball on top of flexed feet	Ball (optional)
	Back massage	Upper back and rear shoulder relaxation		Ball
	Neck stretch	Neck and shoulder relaxation	Gently reach extended arm behind back	
	exercise	benefit to	action	resources
Module B Exercise Primary Areas Targeted Modifications Equipment Needed	Ball chest press	Chest; upper back	Stand and rock the body forward and back as you do the presses	Ball (optional)
	Front arm raises	Shoulders	Soup cans or water bottles for resistance can replace a ball	Ball (optional)
	Inner thigh squeeze	Inner part of thighs	Change the count of the squeezes	Ball
	Duck wing squeeze	Shoulders; chest	Without a ball, move arms in flapping motion	Ball (optional)
	Knee extensions (CDC and NIA)	Muscles surrounding the knee	Add a long lever by lifting and lowering entire extended leg	
	Chest and upper back stretches (CDC)	Upper and lower back, shoulders, and chest relaxation		
	exercise	benefit to	action	resources
Module C Exercise Primary Areas Targeted Modifications	Chair stands (NIA)	Buttocks; front and back of legs	Try squats	Ball (optional)
	Overhead arm extensions (NIA)	Back of arms; shoulders	Substitute seated tricep extensions	Ball (optional)
	Elbow to knee	Stomach	Stand up to do this one	

Equipment Needed	Balancing toe taps	Stomach (abdominals); hip flexors and stabilizers for balance	Lift both feet off floor and release hands from chair; without ball, stand on one foot behind the chair	Ball (optional)
	Seated heel raises	Calves of lower legs	Try doing this exercise standing	
	Overhead reach with side bends	Opens entire torso; oblique abdominals		
	exercise	benefit to	action	resources
Module D Exercise Primary Areas Targeted Modifications Equipment Needed	Pliés	Front of thighs; inner thighs; buttocks	Hold a ball instead of holding onto the chair, or change the count of the pliés	Ball (optional)
	Rear leg extensions (NIA)	Buttocks; back of thighs	Change the count of the extensions	
	Side leg lifts (CDC and NIA)	Hips; outer thighs	Tap toes out to one side, then pull back in	
	Inner thigh stretch	Inner part of thighs	Hold onto back of a chair for more support	
	Sit and reach/stretch	Calves of the lower legs and back of legs	Reach to knees or ankles depending on flexibility	

Diabetes Guidelines for Older Residents in Age Related Residential Care (ARRC) Facilities

Recommendations

Diet Metformin, Empagliflozin, Dulaglutide, Vildagliptin & Pioglitazone		Routine assessment of blood glucose levels is NOT recommended. ² Monitor glucose control using 6-monthly HbA _{1c} . When HbA _{1c} levels continue outside the individual's target, limited blood glucose monitoring may be a useful component of treatment review.
Sulphonylureas ①		Routine assessment of blood glucose levels carried out before breakfast and before bed, on ONE day per week. (this does not need to be the same day of the week)
Insulin (Basal Only) ② Lantus		Routine assessment of blood glucose levels carried out on TWO consecutive mornings per week.
Insulin (Fixed Dose) ③ Protaphane or Humulin NPH		Routine assessment of blood glucose levels carried out before each meal on TWO days a week.
Insulin (Basal/Bolus) ④ Humalog or Novorapid or Apidra PLUS Lantus or Protaphane/Humulin NPH or Humalog Mix or NovoMix 30		Routine assessment of blood glucose levels carried out before and TWO hours after breakfast, lunch and dinner on ONE day a week. (These residents may require more frequent testing.)

PLEASE NOTE:

Blood glucose monitoring should always be undertaken if a resident with diabetes has:

- change in behaviour or cognitive function
- signs/symptoms of hypoglycaemia
- change of insulin or tablet dose (excepting Metformin)
- infection
- pyrexia
- exacerbation of other illness

THINK!!

What does the blood glucose result mean?

Do I need to act upon it/report it to someone else?

HYPOGLYCAEMIA IS SERIOUS AND NEEDS TREATMENT

Tests are done for useful information. If the information is not useful, or not used, the test should NOT be done.

Monitoring of diabetes

One of the aims of diabetes management is the improvement of glycaemic control. Glycaemic control can be measured by assessment of capillary blood glucose levels and the concentration of glycated haemoglobin (HbA_{1c}).

Measurement of HbA_{1c} remains the most useful tool for monitoring glycaemic control. Current research suggests that for people with non-insulin treated Type 2 diabetes blood glucose monitoring has little or no effect on glycaemic control.

The monitoring of blood glucose is an invasive clinical intervention which poses risks. Gathering information about a person's blood glucose levels is only useful when it can be used to improve the individual's clinical outcomes. Alternate monitoring may be as per the individual resident's Care Plan

Diabetes Guidelines for Older Residents in Age Related Residential Care (ARRC) Facilities

Be aware that symptoms may not be obvious, and hypoglycaemia may be unrecognised by the patient.

Capillary glucose less than 4mmol/L	Needs Treatment	Give either: ✓ 4 glucose tablets (10-15g glucose) or ✓ 3 heaped teaspoons of sugar dissolved in water or Half a cup of fruit juice
Repeat treatment	If NO response or glucose less than 4mmol/L	Retest in 10 minutes
Notify doctor if capillary glucose level is not above 4mmol/L within 30 minutes and continue with ' hypo' treatment.	Give either: ✓ Slice of bread, small yoghurt, 2 plain biscuits or ✓ 1 glass of milk or Meal if due within 15 minutes	
NOTIFY GP if capillary blood glucose level is not above 4mmol/L within 30 minutes BUT continue with ' hypo' treatment.		
REMINDER: Be wary of ' hypos' in the older person who is on a sulfonylurea (glipizide or gliclazide) . Re-check capillary glucose again in 3-4 hours after treating the hypo as the action of these medications can cause the capillary glucose to fall again.		
If unconscious... This is a medical emergency. If no doctor is immediately available dial 111.		

Hypoglycaemia is defined as: a blood glucose level less than 4mmol/L. Hypoglycaemia in the older person can have significant complications, can be severe and prolonged and can precipitate a cardiovascular event (heart attack!)

‘ Four is the floor’

Residents with diabetes taking sulfonylureas or insulin are at an increased risk of hypoglycaemia. Symptoms usually begin when a blood glucose level is less than 4mmol/L. Blood glucose levels between 4-6mmol/L is too low for older people and requires medication adjustment.

Hypoglycaemia can progress to stupor, seizure or coma and will become a medical emergency if not treated promptly.





Predisposing factors for hypoglycaemia include unsuitable diabetes medication regimen, poor nutrition, renal disease, advanced age (>80 years old).

Hypoglycaemia happens suddenly - minutes to hours.

- New onset confusion, irritability, anxiety or change in behaviour
 - New weakness, trembling hands or shaking knees
 - Feeling suddenly dizzy and lightheaded or new headache
 - Fast pulse and palpitations (thumping heart)
 - Pins and needles (tingling) of lips and tongue or feeling hungry
 - Pale and sweaty skin (late sign!)
- Loss of consciousness

Diabetes Guidelines for Older Residents in Age Related Residential Care (ARRC) Facilities

Recommendations for the management of capillary blood glucose levels:

Capillary blood glucose Less than 6 mmol/L		Notify GP for review of diabetes medication
6 – 15 mmol/L		This range is acceptable. If the patient has hypoglycaemia (More than twice a month) notify the GP for review of diabetes medication.
Greater than 15 mmol/L		Carry out ketone test. Notify GP to review diabetes medication.
Greater than 25 mmol/L		Notify GP for active treatment guidance.
Complications of high blood glucose- hyperglycaemia		
Hyperglycaemic Hyperosmolar State This occurs in people with Type 2 diabetes who are experiencing very high blood glucose levels (greater than 40 mmol/L). It can develop gradually, over a course of weeks, through a combination of illness, dehydration and an inability to take routine diabetes medication. Symptoms include frequency urination, great thirst, nausea, dry skin and mucous membranes, disorientation and during later stages, drowsiness and loss of consciousness. This is a potential life-threatening emergency and hospitalisation is required.		Diabetic ketoacidosis This occurs when ketones develop when the blood glucose level is high and there is a lack of insulin available to the body. Because the body cannot use glucose, it burns fat as an alternative energy source. The by-product of this process is the production of ketones. Ketones are easily detected by a simple urine test, using strips available on prescription. People with diabetes should be tested for capillary ketones if their blood glucose is high or they have symptoms of ketoacidosis. Any person with diabetes who relies on administering insulin could develop diabetic ketoacidosis.

Hyperglycaemia - happens when blood glucose levels rise **too high**.





There is no cut off as high blood sugar levels needs to be assessed in the context how well a person with diabetes is. Generally, once the blood glucose is above 25 mmol/L, a person feels unwell, and has symptoms.
Be aware that glucose between 15-25 mmol/L can be too high for an unwell person with diabetes.

The symptoms include:

- increased thirst and urination
- headaches
- lethargy/ lack of energy

Diabetes Guidelines for Older Residents in Age Related Residential Care (ARRC) Facilities

Recommendations

Test blood glucose 4 times a day		If the test is continually higher than 15mmol/L, then contact the GP.
Ensure plenty of fluids taken		Dehydration can develop quickly Give one glass of fluid every hour.
Find the cause of the illness.		Contact the GP if necessary.
If the resident has any of the following: <input type="checkbox"/> Vomiting or diarrhoea persisting more than 12 hours <input type="checkbox"/> Persistent blood glucose levels >15mmol/L Infection or fever		Contact the GP.
Medication considerations in illness		
Metformin	Stop if patient has gastrointestinal illness	
Dulaglutide		
Acarbose		
Empagliflozin	Stop in any illness – Check capillary ketones if nausea, vomiting or abdominal pain	
Sulfonylureas	DO NOT STOP – Discuss with GP for dose guidance	
Vildagliptin		
Insulin		

Sick Day Advice

Illness such as colds, flu, infections, vomiting or diarrhoea may create special problems for people with diabetes, as illness tends to worsen diabetes control. When sick, fluids are lost from the body and must be replaced. Give at least one glass of fluid every hour, especially if there is diarrhoea or vomiting. If blood glucose is **less than 8mmol/L**, give fruit juice or flat fizzy drinks. If blood glucose is **higher than 8mmol/L**, give water, soda water or mineral water.

If the resident has a sore mouth or cannot chew, offer custard, fruit yoghurt, Milo, ice cream or jelly.

If the resident has diarrhoea, avoid dairy products. Give Oxo cubes or beef stock, chicken cubes or stock, or Vegemite/Marmite as a drink, soup with dry toast or bread.

Special care is required to prevent more serious problems developing.

Appendix 8: Patient Information Brochures

Patient information brochures are available from the following sources:

Te Whatu Ora Hawke's Bay
Resource Room
Napier Health Centre
76 Wellesley Road
Napier 4110
Tel: 06 834 1815 ext: 4162
Fax: 06 834 1894
E-mail: wendi.wolfen-duvall@hbdhb.govt.nz

Health Navigator New Zealand Website
<http://www.healthnavigator.org.nz/health-topics/diabetes>

Diabetes New Zealand
<http://www.diabetes.org.nz/home>

Appendix 9: Blood Glucose Monitoring Sheets

The following five sheets have been developed for the recording of routine blood capillary glucose levels and any additional monitoring e.g. during periods of illness. They have been set up in 13 week blocks to allow the resident's general practitioner a quick glance and levels since his/her previous three-monthly appointment.

- ① Sulfonylureas (glipizide, gliclazide)
- ② Insulin: Basal Only (Lantus)
- ③ Insulin: Fixed Dose (Protaphane, Humulin NPH)
- ④ Insulin: Basal / Bolus (Humalog, Novorapid or Apidra and Lantus; Protaphane and Humulin NPH; Humalog Mix or NovoMix '30')
- ⑤ Prescriber requested testing regimen

① Sulfonylureas (glipizide, gliclazide)



Age Related Residential Care Resident with Diabetes Blood Glucose Monitoring

Resident Name: _____ NHI: _____ DOB: _____

Regular Monitoring - Current Plan:

Test before breakfast and before bed **ONE day per week**

Week	Date	Before Breakfast	Before Bed
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

Sick Day Monitoring

Date	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading

② Insulin: Basal Only (Lantus)



**Age Related Residential Care Resident with Diabetes
Blood Glucose Monitoring**

Resident Name: _____ NHI: _____ DOB: _____

Regular Monitoring - Current Plan:

Before breakfast test **TWO consecutive mornings per week**

<i>Week</i>	<i>Date</i>	<i>Before Breakfast</i>	<i>Date</i>	<i>Before Breakfast</i>
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Sick Day Monitoring

<i>Date</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>

③ Insulin: Fixed Dose (Protaphane, Humulin NPH)



**Age Related Residential Care Resident with Diabetes
Blood Glucose Monitoring**

Resident Name: _____ NHI: _____ DOB: _____

Regular Monitoring - Current Plan:

Before **each meal** on **TWO** days a week.

<i>Week</i>	<i>Date</i>	<i>Before Breakfast</i>	<i>Before Lunch</i>	<i>Before Evening Meal</i>	<i>Date</i>	<i>Before Breakfast</i>	<i>Before Lunch</i>	<i>Before Evening Meal</i>
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								

Sick Day Monitoring

<i>Date</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>

④ Insulin: Basal / Bolus (Humalog, Novorapid or Apidra and Lantus; Protaphane and Humulin NPH; HumalogMix or NovoMix '30')



Age Related Residential Care Resident with Diabetes Blood Glucose Monitoring

Resident Name: _____ NHI: _____ DOB: _____

Regular Monitoring - Current Plan:

Before and TWO hours after breakfast, lunch and dinner on **ONE day a week.**

Week	Date	Before Breakfast	2 hours after Breakfast	Before Lunch	2 hours after Lunch	Before Dinner	2 hours after Dinner
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							

Sick Day Monitoring

Date	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading

⑤ Prescriber requested testing regimen



Age Related Residential Care Resident with Diabetes Blood Glucose Monitoring

Resident Name: _____ NHI: _____ DOB: _____

Regular Monitoring - Current Plan:

Instructions:							
<i>Week</i>	<i>Date</i>						
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							

Sick Day Monitoring

<i>Date</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>	<i>Time</i>	<i>Reading</i>

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We are indebted to all those involved with the development of these resources and their ongoing review, including attending meetings extramurally and accepting additional responsibilities. It is very much appreciated.

Our grateful thanks go to the Age Related Residential Care facility staff that provided feedback on the resources and then embraced them by incorporation into daily clinical practice. Your energy and enthusiasm for providing high quality care to your residents is infectious.

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Hawke's Bay District Health Board

Emma Jones

Terrie Spedding

If you would like further information, please contact:

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Monday and Tuesday

Ben.firestone@healthhb.co.nz

(021) 8362083

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