

Starting insulin therapy in elderly patients

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J R Soc Med 2002;95:453–455

SECTION OF ENDOCRINOLOGY, 23 MAY 2001

The management of diabetes in an elderly person requires an individualized strategy that takes account of age-related changes in function and cognition and recognizes that life expectancy may be limited by non-diabetes-related disease. For elderly patients with type 2 diabetes, insulin is safe provided that a multidisciplinary diabetes team starts it carefully with defined aims, including avoidance of hypoglycaemia.

In hospital patients with type 2 diabetes, insulin may be part of the initial management of myocardial infarction¹, acute illness, hyperosmolar coma and major surgery². Insulin may also be indicated in the acute management of stroke³. In outpatients the usual reason for insulin therapy is poor glycaemic control manifested by hyperglycaemic symptoms and/or weight loss. Non-specific ill-health or malaise associated with chronic hyperglycaemia is another indication⁴.

Why does the approach to elderly patients differ from that in younger type 2 patients? Important considerations include:

- Greater comorbidity caused by multiple pathology, as well as ill-health associated with specific conditions such as impaired cognitive function, depression, inflammatory arthropathy, and cardiac or renal failure
- Age-related changes in functional ability and the senses, affecting the patient's ability to administer insulin, monitor blood glucose and manage hypoglycaemia
- The expectation that treatment goals and the patient's ability to administer insulin and monitor glucose levels will soon change with ageing and increasing frailty
- Social isolation in the community or, for those in care homes, dependency upon formal carers who are not adequately trained in diabetes management.

STARTING INSULIN

Insulin is best started at home rather than in hospital, though hospital visits may be needed for educational purposes, along with regular telephone contact to review

the results of capillary glucose monitoring and adjust insulin dosage.

Patient assessment

The benefits and disadvantages of insulin therapy must be explained to and understood by patients and carers; and, as with all elderly patients, a structured management plan is desirable, based on comprehensive assessment⁵. Performance in activities of daily living can be assessed by the Barthel index⁶ and cognitive status by the abbreviated mental test score (AMT)⁷. If the AMT score is less than 8 out of 10, cognition should be assessed in more detail with the Folstein Mini-Mental State examination⁸; in addition, mood should be assessed with either the Hospital Anxiety and Depression Scale⁹ or the Geriatric Depression scale¹⁰. This group of instruments has proved valid for judging patients' ability to inject insulin independently and to recognize and deal with hypoglycaemia¹¹. Cardiovascular risk factors should also be evaluated since control of blood pressure, stopping smoking and lowering total cholesterol may be of greater benefit than improving glycaemic control for avoidance of macrovascular disease¹².

Reasons for starting insulin, treatment goals and metabolic targets

Insulin is usually started when full doses of oral hypoglycaemic agents are not achieving acceptable glycaemic control or wellbeing; frequently there has been substantial weight loss. This clinical picture is often referred to as 'sulphonylurea failure' though it reflects disease progression and insulin deficiency.

The results of the UK Prospective Diabetes Study¹³ indicated that, for elderly type 2 diabetic patients with a good quality of life and able to recognize and deal with hypoglycaemic symptoms, the target glycated haemoglobin (HBA_{1C}) should be <7%. However, this may be inappropriate for frail, socially isolated patients without microvascular complications or with limited life expectancy, for whom the emphasis should be more on avoidance of osmotic symptoms and infections and on modification of cardiovascular risk factors. Many elderly patients with poor glycaemic control and weight loss will benefit from insulin even if they do not achieve this HBA_{1C} target, since insulin therapy is usually associated with weight gain of 4–5 kg.

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Box 1 Insulin regimens for type 2 diabetes

- Once-daily isophane insulin
- Twice-daily isophane insulin
- Twice-daily premixed short/intermediate acting insulins
- Basal/bolus isophane and pre-meal short-acting insulins
- Combinations of bedtime isophane and oral agents

As with younger adults, the goals of patients may differ from those of the healthcare professionals. All agree that symptomatic control is an important indication for insulin, but only a minority of patients take a close interest in glycaemic control and target glucose concentrations¹⁴.

Choice of insulin regimen

Box 1 outlines the various insulin regimens. Once-daily isophane insulin is only of use where there is residual pancreatic beta-cell insulin secretion. Glycaemic control is suboptimal and this regimen is justified only in those few frail or severely cognitively impaired residents of care homes for whom the sole aim is relief of hyperglycaemic symptoms. Twice-daily isophane insulin produces better but not good glycaemic control; post-prandial glucose peaks still occur and if the dose is increased patients may become hypoglycaemic before their next meal. For this reason most elderly type 2 patients start with two injections of pre-mixed short and intermediate-acting insulins in a 30/70 combination¹⁵.

Basal/bolus isophane and pre-meal short-acting insulins produce better glycaemic control than other regimens but are expensive and carry a greater risk of hypoglycaemia¹⁶. Results in elderly type 2 patients can be as good as in younger adults. Our group has observed that twice-daily isophane insulin can lead to weight gain without improving glycaemic control or wellbeing whereas the basal/bolus regimen substantially reduced glycated haemoglobin and improved wellbeing at 3 months¹⁷.

For elderly type 2 patients who have poor glycaemic control but normal or increasing weight, addition of a bedtime injection of isophane insulin to existing oral hypoglycaemic therapy can lessen hyperglycaemia without excessive weight gain. This combination of oral agents with insulin is of particular value for patients with poor diabetic control who do not wish to switch to two insulin injections straight away. The new long-acting insulin analogue, insulin glargine, soon to be marketed in the UK, may prove a useful alternative¹⁸.

Mode of insulin delivery

Elderly patients commonly have difficulty in accurately drawing up, mixing and injecting insulin¹⁹; therefore pre-mixed combinations of short and intermediate are preferred²⁰. Patients with poor eyesight or impaired manual dexterity need advice from a diabetes specialist nurse on the selection of a pen device. Short, fine, needles have the advantage of being less painful and are also suitable for thin skin. Unpredictable insulin absorption may be troublesome; and, for elderly patients with little subcutaneous adipose tissue, particular care is needed in pinching up the skin. Differences in subcutaneous tissue may be the reason why abdominal injections of subcutaneous insulin yield 29% lower postprandial blood glucose concentrations than injections into the thigh²¹.

Most elderly patients starting insulin can inject themselves. A pen device is commonly chosen²², and usual practice is to start with 8 U of premixed short-acting/isophane insulin in a 30/70 mixture twice daily, with the dose increased slowly to achieve fasting pre-breakfast capillary glucose values of around 7 mmol/L and post-meal peaks < 11 mmol/L. Many patients obtain advice on dosage by telephone; some are able to make their own adjustments without contacting the diabetes specialist nurse.

Education and glycaemic monitoring

Education for starting insulin and monitoring, usually given by a diabetes specialist nurse², entails 5–10 face-to-face contacts either in the patient's home or at the diabetes clinic; these are in addition to telephone contacts. The essential steps in starting insulin, whether by syringe or by pen, are outlined in Box 2.

Elderly patients receiving insulin should monitor capillary blood glucose; the effect of ageing on the renal threshold for glucose means that urine testing is of little value for assessing glycaemic control. Capillary glucose should be tested twice daily initially as the insulin dosage is

Box 2 Practical steps in starting insulin

- Assess the need for insulin
- Assess function, cognition and mood
- Assess vascular risk
- Identify treatment goals and metabolic targets
- Determine insulin regimen, mode of delivery and method of monitoring
- Decide review date

gradually increased, though after stabilization a four-point profile twice a week is appropriate. During intercurrent ill-health or when hypoglycaemia is suspected, monitoring should be stepped up. Patients or carers with limited dexterity, impaired vision, or poor memory can select from a range of monitoring devices with the advice of a diabetes specialist nurse. Contrary to expectation the majority (more than 65%) of elderly people starting insulin in clinic can monitor capillary glucose at home with a meter. For the remainder monitoring is usually undertaken by either informal or formal carers, or as a last resort by the district nurse.

All elderly patients starting insulin must be instructed on the symptoms of hypoglycaemia and what to do about it. There is evidence that the knowledge of elderly patients about hypoglycaemia is poor^{24,25}—possibly a reflection of teaching methods. Structured group teaching sessions could be beneficial.

ORGANIZATION OF CARE

Insulin treatment will fail if the patient or carers cannot cope with the injections or if hypoglycaemia is troublesome. In those patients who continue with insulin, the glycaemic goals and regimen should be reviewed with ageing and the onset of cognitive impairment or frailty. Support from formal and informal carers, social services and voluntary agencies may have to be increased gradually or abruptly with age-related changes and disease. The regular review of insulin-treated patients in care homes is a matter of particular concern. All patients in nursing and residential homes should have a structured care plan^{26,27}, with regular review of both the goals of treatment and the educational needs of formal carers²⁸.

Acknowledgment I gratefully acknowledge the help of Ms CD Taylor RGN, diabetes specialist nurse, in preparation of this paper.

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