

Influenza Pandemic (including Swine Flu) and Diabetes

**Contingency planning and medical management : implications &
implementation considerations for the United Kingdom**

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British Clinical Diabetologists, August 2009**

**(based on a planning paper initially prepared for the Royal College of
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IMPLICATIONS:

People with diabetes are arguably more susceptible to intercurrent infection and have been identified as a group more at risk of serious illness in the event of infection such as swine flu, with greater likelihood of adverse outcome including increased mortality. Diabetes therefore identifies a potentially vulnerable population during an

influenza pandemic. Sub-optimal diabetes control impairs natural immunity to infection and delays recovery. Infection itself further aggravates dysglycaemia leading to a classical adverse vicious cycle. Optimising glycaemic control during acute infection is a fundamental principle of diabetes management.

In addition diabetes is associated with the development of well recognised long-term complications which will further increase risk of co-morbidity and mortality during an influenza pandemic. There will be special considerations for patients with renal impairment (nephropathy) but in particular the greater prevalence of underlying coronary heart disease is likely to lead to increased acute cardiac events, known to be triggered by influenza infection.

The higher risk from influenza for patients with diabetes is recognised by the recommendation that annual seasonal vaccination should be given. Influenza vaccination has been shown to reduce hospital admissions among people with diabetes and to lessen associated complications. A specific vaccine against swine flu should be available in the UK by October 2009 and people with diabetes will be a prioritised group.

PRE-PLANNING

A global influenza pandemic is likely to be reflected by a nationwide outbreak of infection in the United Kingdom. Large numbers of infected patients will place substantial strain on existing health care resources. Accordingly it is crucial that future circumstances arising from a flu pandemic are anticipated and appropriate measures put in place so that health care providers are in as ready a state of operation to manage the service demands that will inevitably arise. Such measures include preliminary set up of required operational infrastructure, educational delivery, service planning, provision of dedicated communication channels, and discussion on difficult prioritisation issues:

:A) PRELIMINARY SET-UP:

- Establish locality-based, multidisciplinary, diabetes-focused working-group with lay representation to assess, advise and develop local policy/strategy contingency arrangements in the event of an acute influenza pandemic.

- Identify designated overall Lead with overarching responsibility for ensuring implementation of district policy across all health care sectors. Separate identified Leads for Primary and Secondary Care as appropriate.
- Ensure Working-Group is familiar with and works to the National Pandemic Influenza UK Guidance ('Surge Capacity & Prioritisation').
- Diabetes Sub-speciality Group works closely with other subspecialities and NHS Management within both acute/community and primary care settings to ensure corporate planning, avoidance of duplication and agreed principles of capacity control and prioritisation.:

B) EDUCATION

- Working-Group remit to ensure local population awareness concerning implications of influenza pandemic to people with diabetes (possibly shared with other long-term conditions)
- Addressing diabetes self-management needs specifically arising during an influenza pandemic (effect of infection on diabetes control, need for increased blood glucose monitoring, importance of appropriate insulin dose adjustment; when to seek advice from a Health Care Professional).

C) SERVICE PLANNING:

- Appraise all staff currently providing diabetes care of the implications, consequences and anticipated service needs for people with diabetes in the event of an influenza pandemic
- Define essential aspects of speciality service that must continue whatever the circumstances (new Type 1 Diabetes requiring insulin, pregnancy, serious life-threatening complications of diabetes).
- Determine aspects of routine clinical service to be suspended during period of pandemic and giving direction for speedy implementation of such.
- Review work-force deployment during pandemic, including anticipating staff illness and identifying those (eg DSNs) who may need to be seconded to acute medical wards, and the necessary arrangements for such.
- Identify specific clinic service needs for diabetic patients suffering from influenza infection, recognising that most patients may be temporarily bed-bound and unable to attend clinics (nor may it be desirable that they do because of infection risk to others). Increased domiciliary specialist support may therefore be required.
- Determine specific needs of inpatients with diabetes by ensuring dedicated specialist nurse support (insulin needs, shortening length of stay, communication discharge).
- Review role of Community Hospitals to off-load pressures on Acute Hospital services, to provide intermediate clinical care and potential 'enhanced rest' facility.

D) COMMUNICATION:

- Establish close liaison across a number of essential interfaces (primary/intermediate/secondary/critical care) and ensure effective communication channels are put in place, including a designated telephone hot-line to specialist advice (likely to be the local diabetes centre). Essential

for ensuring optimal medical advice, minimising need for hospital admission and for facilitating earlier safe discharge from hospital.

E) PRIORITISATION:

- Consideration by the local working-group of potential prioritisation issues that could arise (as discussed within National Guidance document), including 'triage' assessment of 'inclusion/exclusion' criteria for access to critical care management (along lines of 'Canadian' principles). Transparency and clarity of advised action should be anticipated and agreed as part of pre-planning process.

ACUTE INFLUENZA PANDEMIC PERIOD

At the present time (July 2009) numbers affected by swine flu infection in the UK appear to be increasing rapidly. For the majority of those affected the illness has proved relatively mild, but in some the illness has been more severe and a number of deaths have occurred. Most of these deaths have been stated to have resulted in patients with other serious medical illness, but some have been previously healthy. It is not currently known whether diabetes has contributed to any of these deaths so far. Older people per se would seem more immune to this specific swine flu variant (H1N1). In the event of anticipated escalation of UK nationwide infection this autumn (October 2009) measures should be implemented addressing issues of an operational nature and those pertaining to medical management:

A) OPERATIONAL

- In the event of confirmed Influenza pandemic status ('red alert') the district strategic plan should be implemented immediately
- The designated Lead will be released from all other clinical responsibilities to enable effective and efficient 'Command and Control' leadership and implementation of required action.
- All routine clinical work to be suspended with safeguards for agreed other essential life-threatening circumstances.
- Specialist diabetes personnel to be available as previously determined with defined 24 hour rota availability both for clinical input (including domiciliary visits) and telephone communication.
- Close liaison to be established across clinical interfaces with designated individuals (inc A & E dept., specialist inpatient team, critical care unit)

B) MEDICAL MANAGEMENT

The severity of flu infection will vary with most affected experiencing relatively mild illness. Diabetes adds another aggravating factor that may increase the severity of the illness and delay recovery. The presence of long-term diabetic complications such as chronic renal impairment or coronary heart disease adds yet another consideration in terms of vulnerability to adverse outcome. People with diabetes will be aware that a

closer attention to diabetes control will be necessary when suffering infection, including need for more frequent blood glucose monitoring and likely need for adjustment in treatment (Increase in oral medication, switch to insulin, increase in insulin dose or change in insulin regimen).

Present Dept of Health policy expects the majority of patients suffering from influenza to stay and recover at home. Hospital admission is discouraged, partly as it is unnecessary for the vast majority and partly as the emergency services will struggle to cope were numbers to prove overwhelming. Decisions of medical management will therefore need to be made on an individual basis, with assessment based on the severity of symptoms and the degree to which diabetes control has been affected. For the latter purpose it is crucial to have a hot-line access to specialist diabetes advice and immediate access to a community based specialist service, particularly for issues around insulin. A significant number of patients with Type 2 diabetes on maximum oral hypoglycaemic agents and with borderline glycaemic control may experience rapid deterioration in diabetes control necessitating urgent conversion to insulin.

In addition to the general advice given to the population in the event of swine flu infection (www.direct.gov.uk/pandemicflu), including immunisation and antiviral medication (Tamiflu) where appropriate, specific guidance should be considered for people with known diabetes. The outcome of combined diabetes and swine flu will be affected by the severity of the infection and for most patients close monitoring and some adjustment of treatment will be all that is needed. For others a greater severity of infection is likely to cause greater disturbance of diabetes and increased risk to the individual.

Serious adverse signs indicating a severe interaction between diabetes and infection with likely need for hospitalisation include:

- Disturbed conscious level
- Ketoacidosis
- Vomiting & Diarrhoea
- Dehydration
- Respiratory distress
- Worsening of associated complications (renal/cardiac)

Suggested additional guidelines for management of diabetes in the event of swine flu infection:

Type 1 Diabetes

Mild symptoms (likely moderate disturbance of glycaemic control)

- Close monitoring of blood glucose levels
- Adjustment of insulin dosage as appropriate (usually a temporary increase)
- Seek specialist diabetes advice when uncertain

Severe symptoms (risk of dehydration & ketoacidosis)

- Close monitoring of blood glucose levels & appropriate insulin adjustment
- Urgent contact with specialist diabetes service for advice on immediate medical management
- In the event of serious adverse signs (as above) very likely need of hospitalisation(intravenous fluid replacement, continuous iv insulin therapy, respiratory support)

Type 2 Diabetes

Mild symptoms (likely increase in glucose levels)

- Monitoring of blood glucose levels
- Increase of oral medication (usually the sulphonyurea) if previously advised
- Seek specialist diabetes advice when uncertain

Severe symptoms (risk of diabetic (hyperglycaemic) coma, dehydration)

- Close monitoring of blood glucose levels
- Urgent contact with specialist diabetes service
- Consider immediate conversion to insulin therapy – in the community if facility set-up
- In the event of serious adverse signs (as above) likely need for hospitalisation (iv fluids, iv insulin, respiratory support)

Diabetes with Renal & Cardiac complications

Those with known long-term complications either renal, cardiac or both are at increased risk in the event of influenza infection.

Renal: Hyperglycaemia and dehydration will aggravate renal status and worsen existing renal impairment. It is recommended that anti-viral agents (Tamiflu) should not be given if $GFR < 30$.

- Monitor urea & electrolyte status
- Liaise with specialist diabetes & renal services
- Low threshold consideration for hospitalisation

Cardiac: Influenza infection and diabetes will place particular strain on the heart, including increased risk of acute coronary insufficiency, myocardial infarction and congestive cardiac failure.

- Monitor cardiac status (blood pressure, signs of failure)
- Adjust cardiac therapy (increase diuretics when needed)
- Admit if cardiac symptoms severe or serious adverse signs present

Conclusion

The interaction between diabetes and intercurrent influenza infection will be unpredictable and very variable. Assessment should be on an individual basis taking into account severity of infection and symptoms experienced, the presence of associated long-term diabetic complications and the development of serious adverse signs. Ideally, people with diabetes should be pre-prepared through education so that they can undertake personal responsibility and appropriate self-management at the time of infection. However, it is essential that a specialist diabetes advisory service is available to the at risk population for urgent advice on medical management, to offer immediate resource for insulin conversion in the community and to assist decisions, including triage, concerning hospital admission.

Expected demand from Diabetes on Healthcare Services in the event of Swine Flu infection: Implications to Diabetes service providers

Diabetes is recognised as an identified vulnerable population (www.direct.gov.uk/pandemicflu):

- People with diabetes are more susceptible to infection, particularly if diabetes (blood glucose) control is suboptimal
- Diabetes complicates c. 15% of hospital in patients in normal times. Admission rates for diabetes may increase 6 fold during influenza epidemic
- People with diabetes have worse outcome to influenza infection and a greater susceptibility to complications of infection
- Intercurrent illness, such as swine flu infection, puts additional stress on diabetes control, and blood glucose levels frequently deteriorate, causing a classic vicious cycle
- Poor diabetes control impairs body immune mechanisms, impairs defence responses and delays recovery
- Specific immunisation (swine flu vaccination) is recommended for people with diabetes. Evidence indicates that it reduces severity of infection and risk of hospitalisation
- In the event of influenza infection, diabetes requires a number of specific medical management measures to be in place, including facility for blood glucose monitoring and advice concerning treatment adjustment, particularly insulin
- Patients (both those not on insulin as well as on insulin) are advised to measure their blood glucose levels more frequently (often upto 4-6 times daily)
- People with diabetes should have immediate access to a designated diabetes healthcare professional advisory service. This may be through an existing primary care diabetes care arrangement, or others may be under a hospital based specialist service. Ideally there should be a close integration between primary and secondary care with an agreed care pathway and dedicated line of communication
- A significant number of patients will experience deterioration in diabetes control. Some will need hospital admission (dependent on presence of serious clinical indicators); others may not need admission but will nonetheless require urgent specialist advice on treatment. Of these it is anticipated that many will need urgent

conversion to insulin injections. Provision of such a service in the community will reduce need for hospitalisation and clearly is a highly desirable development

- Anticipating precise figures on service demand is difficult with uncertainties concerning the severity of infection and its impact on people with diabetes, and the as yet undetermined effectiveness of the forthcoming immunisation r the strategy
- The DOH has provided some estimate, indicating that at the peak of a pandemic for a population of 100,000, upto 10,000 new contacts with suspected influenza infection will present, of which c.440 will be new cases in need of hospitalisation
- For an average District General Hospital this could (worst case scenario) extrapolate to a 10 fold increase in numbers that would overwhelm present acute hospital service capacity, and hence the likely need for 'triage' guidance
- A substantial increased insulin requirement with some urgency should be anticipated both as strategic district policy and for individuals already on the borderline of insulin need (Type 2 patients, suboptimal glycaemic control, maximum oral hypoglycaemic agents). Those responsible for such provision of an emergency insulin service, should anticipate a 5-10 fold increase in demand from existing current usage

Appendix 2

Information for People with Diabetes in the Event of Swine Flu (influenza) Pandemic

Why is Swine Flu and Diabetes of special concern?

People with diabetes may be more susceptible to influenza infection, particularly if blood sugars are not well controlled. Furthermore, infection itself can result in higher sugar levels than usual, which in turn can impair immune responses to infection and delay recovery (a classic vicious cycle). Experience from previous influenza pandemics would indicate that people with diabetes may be more affected by the infection both in terms of severity and in respect of treatment needs. The risk of problems arising can be minimised by a number of sensible precautionary steps.

Be prepared:

- **Understand the principles of self-management** of diabetes in the event of illness (most local diabetes services provide guidance on this): the importance of blood sugar monitoring with adequate supplies available, and the potential need to adjust treatment, often by a temporary increase of usual prescribed dosage
- **Understand how influenza infection can affect diabetes**, particularly blood glucose control. Most commonly sugar levels will be higher, which may affect your overall wellbeing and ability to respond to the infection, and hence the importance of monitoring blood sugars and adjusting treatment when necessary
- **Make sure your blood sugar levels are as well controlled** as possible. This should put you in the best position to reduce risk of severe infection and to help you cope better should you suffer infection
- **Discuss specific swine flu immunisation** with your general practitioner. As with seasonal flu, people with diabetes are regarded as a priority group. There is good evidence that flu vaccine reduces both risk and severity of infection
- **Take sensible precautions** to avoid infection where possible; using alcohol rubs or wipes when out and about; avoiding contact with those possibly infected
- **Read the Swine Flu information leaflet** supplied by the Dept of Health (www.direct.gov.uk/swineflu)

In the event of Swine Flu infection:

- **Recognise the symptoms** likely to indicate swine flu infection: (sudden onset of fever – temperature >38 C or >100.4 F; headache, cough, shortness of breath and other symptoms such as sore throat, aching muscles & joints, sneezing, runny nose , loss of appetite or watery diarrhoea)

- **Recognise the symptoms** that may arise because of the effect of swine flu infection on your diabetes: dryness of mouth, thirst, and urinary frequency; poor appetite and weight loss; undue breathlessness (which may indicate either respiratory infection or ketoacidosis or both); excess sleepiness and poor mental concentration
- **Notifying your General Practitioner:** In the event of probable swine flu infection you should notify your GP service (by phone). You will receive current advice on the use of anti-viral drugs such as Tamiflu or Relenza. Ensure your GP is aware of your symptoms and the effect of the infection on your diabetes control
- **In the event of being seriously unwell** with severe symptoms (continued diarrhoea, vomiting and dehydration; distressed breathing or drowsiness/disturbed consciousness) you may need to call an ambulance or go directly to the hospital A & E dept.
- For the majority of patients with mild symptoms: staying at home with bed rest for 2-3 days, simple analgesics (painkillers) as needed, and drinking plenty of fluids will meet basic needs
- People with diabetes need **to monitor blood glucose levels** closely (4-6 times daily if necessary). High readings (>12 mmol/l) are likely to require adjustment of usual drug treatment and if very high (>15 mmol/l with severe symptoms or >20 mmol/l if symptoms mild) you should notify your GP service immediately
- **Do not stop your existing diabetes medication.** This is particularly important with insulin, the dose of which may need to be increased (on the basis of blood sugar measurement) even if appetite & food intake are reduced
- **Insulin Treated patients** (Type 1 diabetes or Type 2 on insulin): Guidance on insulin adjustment in the event of intercurrent illness should be part of routine information (education) given when insulin is started. Where there is any doubt you should contact your usual diabetes care professional for advice on whether your present insulin regimen is appropriate and gives you sufficient flexibility for insulin dose adjustment. Those patients normally on once daily insulin injections may need to have further divided injections with

higher dosage over the illness period. The precise details of need should be discussed with your healthcare professional

- **Patients with diabetes not on insulin** (Type 2 diabetes diet alone or treated with tablets): because of the unpredictable effect of influenza infection on diabetes it is still important to have knowledge of blood sugar levels during illness. Patients on diet alone may need prescribed treatment (a tablet or just possibly temporary insulin) if glucose levels are high (>12 mmol/l). Patients on tablets (oral hypoglycaemic agents) may have some flexibility to increase tablet dosage (usually the sulphonylurea (SU) agent, but for those known to be on 'maximum tablets' conversion to insulin may be necessary. In the event of influenza infection, patients with diabetes not currently on insulin may need to discuss their treatment needs with their diabetes healthcare professional with some urgency, especially in the event of severe symptoms and/or high blood sugar levels (>12 mmol/l)
- **People with diabetes and known complications of diabetes:** two of the long-term complications of diabetes, kidney disorder (nephropathy) and the heart (coronary disease) are important considerations in the event of influenza infection. Both have the potential to be aggravated. Patients known to have these conditions should contact their usual diabetes healthcare advisor, which may be the hospital specialist service with whom they are already familiar.

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