



The easy-to-do audit series

Drug management in people with type 2 diabetes and renal impairment



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Undertaking simple audits and reflecting and acting on our findings can be a powerful way to change practice and improve the care we deliver. In this series, Dr Sam Seidu introduces simple, easy-to-run audits. The following audit is on the management of people with type 2 diabetes and chronic kidney disease, specifically ensuring that individuals are on an appropriate medication and dose of metformin or sulfonylurea for their renal function. The PCDS hopes these hands-on “how to” audit guides will provide the practical guidance and motivation we

all need to take action in the limited time available.

Effective glycaemic control in type 2 diabetes reduces the risk of microvascular complications; however, healthcare professionals need to remember that there are risks to very tight glycaemic control, which are dependent on individual risk factors. Kidney disease is one such factor that can often limit the use of oral agents in diabetes management. It is estimated that a third of people with type 2 diabetes have

Table 1. Recommendations for dose adjustments for metformin and sulfonylureas with increasing renal impairment.

	Metformin	Sulfonylurea class				
		Glibenclamide	Gliclazide	Glimepiride	Glipizide	Tolbutamide
Mild renal impairment CKD stage 2 (eGFR 60–89 mL/min/1.73 m ²)	◆	◆	◆	◆	◆	◆
Moderate renal impairment CKD stage 3 (eGFR 30–59 mL/min/1.73 m ²)	◆ ◆	◆	◆	◆	◆	◆
Severe renal impairment CKD stage 4 (eGFR 15–29 mL/min/1.73 m ²)	◆	◆	◆	◆	◆	◆
End-stage renal impairment CKD stage 5 (eGFR <15 mL/min/1.73 m ²)	◆	◆	◆	◆	◆	◆

Information taken from the electronic Medicines Compendium available at <http://www.medicines.org.uk> (accessed on 18.05.2016).
 ◆=No dose adjustment required; ◆=Dose adjustment/caution required; ◆=Contraindicated/not recommended; CKD=chronic kidney disease; eGFR=estimated glomerular filtration rate.

chronic kidney disease (CKD) in some stage of severity (Middleton et al, 2006). In a study using observed and modelled data from the UK, researchers measured the annual probability of transitioning through the stages of CKD, death and other long-term measures. The authors estimated that each year, people with microalbuminuria had a 2.8% chance of progressing to macroalbuminuria and a 3% risk of mortality. Those with macroalbuminuria had a 2.3% chance of progressing to elevated plasma creatinine or requiring renal replacement therapy, and a 4.6% risk of mortality. Those who received renal replacement therapy were estimated to have a death rate of 19.2% (Adler et al, 2003).

Metformin and sulfonylureas are often the first glucose-lowering medications to be prescribed to an individual with type 2 diabetes; however, considerations should be made when renal impairment is present. The modification of drug doses or therapy switch is dependent on level of renal impairment.

NICE (2015) recommends that when estimated glomerular filtration rate (eGFR) falls below 45 mL/min/1.73 m² metformin dose should be lowered. When eGFR falls below 30 mL/min/1.73 m², metformin should be stopped (NICE, 2015; see *Table 1*). Metformin should be used with caution in those at risk of sudden deterioration in kidney function. In a study to assess rates of diagnosis and glucose-lowering medication dose adjustment in individuals with moderate to end-stage renal impairment and type 2 diabetes, after the eGFR calculation, only 0.1% of people prescribed metformin received appropriate doses for their degree of renal impairment (Meyers et al, 2011).

All sulfonylureas are contra-indicated in severe and end-stage renal failure because of increased risk of hypoglycaemia. You can ask your local renal specialist or diabetes team which drugs are suitable for

people with diabetes and an eGFR below 30 mL/min/1.73 m². Many specialists may allow individuals to continue on metformin at least down to 15 mL/min/1.73 m² with careful monitoring, but it is important to seek expert advice.

The audit

Despite guideline recommendations, many individuals with reduced renal function continue on full dose metformin or a sulfonylurea.

1. The first aim of this audit is to assess the prevalence of inappropriate prescribing of metformin and sulfonylureas in people with type 2 diabetes and renal impairment.
2. The second aim of the audit is to explore how to reduce inappropriate prescribing of metformin and sulfonylurea agents in people with type 2 diabetes and renal impairment through appropriate local implementation strategies on general practice computer systems.

Potential intervention

Over the past few years there has been an increased awareness of the use of inappropriate drugs or doses in the treatment of people with type 2 diabetes. Some centres are now implementing computer alert systems for inappropriate prescriptions including for diabetes records. When such an alert system was put into operation in a clinic in Japan, researchers compared the period of time before and after the alert system was introduced. Before the alert system was put into operation, 24% had their medication correctly discontinued, after the system was introduced, the rate of discontinuation increased significantly to 54% (Matsumura et al, 2009). ■

Adler AI, Stevens RJ, Manley SE et al (2003) Development and progression of nephropathy in type 2 diabetes: The united kingdom prospective diabetes study (UKPDS 64). *Kidney Int* **63**: 225–32

“Despite guideline recommendations, many individuals with reduced renal function continue on full dose metformin or a sulfonylurea.”

Instructions to complete the audit.

Aims

1. To assess the prevalence of inappropriate prescribing of metformin and sulfonylureas in people with type 2 diabetes and renal impairment.
2. To reduce inappropriate prescribing of metformin and sulfonylurea agents in people with type 2 diabetes and renal impairment through appropriate local implementation strategies on general practice computer systems.

Audit method

This will be two-step completed audit in primary care centres in the UK. The first data collection will be done between 1st July and 31st August 2016 and follow-up data collection will be done 6 months later to allow for appropriate interventions to be put in place at the local or practice level in order to effect change.

Criteria

1. People with type 2 diabetes and a most recent estimated glomerular filtration rate (eGFR) less than 30 mL/min/1.73 m² should not be on metformin.
2. People with type 2 diabetes and a most recent eGFR between 30 and 45 mL/min/1.73 m² should have had a dose reduction of metformin.
3. People with type 2 diabetes and a most recent eGFR less than 30 mL/min/1.73 m² should not be on a sulfonylurea.

Standards

1. For criterion 1, 95% people with type 2 diabetes and a most recent eGFR less than 30 mL/min/1.73 m² should have had their metformin stopped.
2. For criterion 2, 95% people with type 2 diabetes and a most recent eGFR between 30 and 45 mL/min/1.73 m² should have had a dose reduction of metformin.
3. For criterion 3, 95% of people with type 2 diabetes and a most recent eGFR less than 30 mL/min/1.73 m² should have had their sulfonylureas stopped.

As this is a safety issue, a target of 95% should be considered to allow for renal or diabetes specialists who may have sanctioned continued therapy.

N.B. Set a reminder on the practice's electronic calendar to repeat the audit 6 months later.

Download the full-size audit form at
www.diabetesandprimarycare.co.uk/audits

Matsumura Y, Yamaguchi T, Hasegawa H et al (2009) Alert system for inappropriate prescriptions relating to patients' clinical condition. *Methods Inf Med* **48**: 566–73

Meyers JL, Candrilli SD, Kovacs B (2011) Type 2 diabetes mellitus and renal impairment in a large outpatient electronic medical records database: Rates of diagnosis and antihyperglycemic medication dose adjustment. *Postgrad Med* **123**: 133–43

Middleton RJ, Foley RN, Hegarty J et al (2006) The unrecognized prevalence of chronic kidney disease in diabetes. *Nephrol Dial Transplant* **21**: 88–92

NICE (2015) *Type 2 diabetes in adults: management*. NICE, London. Available at: <https://www.nice.org.uk/guidance/ng28/resources/type-2-diabetes-in-adults-management-1837338615493> (accessed 20.05.16)

Your turn:

The instructions alongside explain how to complete the audit. You can download the full-size audit form at www.diabetesandprimarycare.co.uk/audits to fill in and retain. The audit should take no more than a few hours to complete.

After you have completed the first data collection, you can send in your top-line aggregated data to dpc@omniamed.com.

An audit of drug management in people with type 2 diabetes and renal impairment: Metformin and sulfonylurea

Date of first data collection: __/__/__

Date of second data collection (6 months later): __/__/__

Steps to complete the audit

1. Search computer system for all individuals with type 2 diabetes and estimated glomerular filtration rate (eGFR) <30 mL/min/1.73 m² (any treatment) and 30–45 mL/min/1.73 m². Note the numbers in each search for the corresponding criterion in the first data collection column.
2. Search for all individuals not on metformin and all not on glibenclamide, gliclazide, glimepiride, glipizide and tolbutamide (if any). These are your achievement numbers for criteria 1 and 3 respectively.
3. From those with eGFR 30–45 mL/min/1.73 m² taking metformin, count the number taking less

than 2 g daily. This is your achievement for criterion 2.

4. Note the numbers and percentages of the respective criteria in the appropriate columns in the results table below.

Criteria

1. People with type 2 diabetes and a most recent eGFR less than 30 mL/min/1.73 m² should not be on metformin.
2. People with type 2 diabetes and a most recent eGFR between 30 and 45 mL/min/1.73 m² should have had a dose reduction of metformin.
3. People with type 2 diabetes and a most recent eGFR less than 30 mL/min/1.73 m² should not be on a sulfonylurea.

Criteria	First data collection Number with an eGFR <30 mL/min/1.73 m ² or 30–45 mL/min/1.73 m ²	Date one achievement Number of people meeting the criterion	Percentage	Second data collection Number with an eGFR <30 mL/min/1.73 m ² or 30–45 mL/min/1.73 m ²	Date two achievement Number of people meeting the criterion	Percentage	Standard
<i>e.g. 1</i>	<i>120</i>	<i>90</i>	<i>75%</i>	<i>124</i>	<i>122</i>	<i>98%</i>	<i>95%</i>
1							95%
2							95%
3							95%

1. What change(s) will be implemented after the first data collection?

E.g. Work with the practice or local IT staff to set up an alert system for individuals with low eGFR who are on metformin and/or a sulfonylurea. Dose adjustments and changes to medications can then be implemented.

2. What are the conclusions and lessons learned following the first and second data collections?

3. Are any further steps required for change, such as repeating the audit next year?