MedNut Mail

The How, When, Where, Which and Why of pharmacotnutrition

Templates for common clinical observations 3

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https://medicationsandnutrition.online

Commentary

Templates are useful to ensure inclusion of relevant points and to streamline work efficiency. Further, they can be amended as new research adds to our body of knowledge.

These templates have focussed on some of the negative pharmaconutritional impacts of diabetes – a diagnosis that seems to be the forerunner of further poor health.

Diabetes drugs

- **XXXXX** has a time to onset of 1hour, minimal peak, and duration of 20-26 hours;
- **XXXXX** has a duration of 24 hours;
- **XXXXX** has a duration of 12 hours.

Diabetes drugs coverage

- before breakfast BSLs - minimal, if any, coverage from previous morning's **XXXXX** or **XXXXX**, some coverage from previous evening's **XXXXX**;
- before evening meal BSLs - minimal, if any, coverage from previous morning's **XXXXX** or **XXXXX**; some coverage from previous evening's **XXXXX**; covered by current morning's **XXXXX** and **XXXXX**.

There is an interrelationship between glycaemic control and lipid control. Since **XXXXX** has overall good glycaemic control, advisable to review necessity for continued prescription of **XXXXX** (statin), especially now that **XXXXX** has developed a typical dementia eating pattern whereby it is likely **XXXXX** will start to lose weight.

Evidence now indicates biotin is important in glycaemic control, the TCA cycle in energy metabolism, protein synthesis and degradation. Longterm inadequate biotin intake is associated with increased risk of developing diabetes, poor glycaemic control, and weight gain. The anticonvulsant drugs such as **XXXXX** and **XXXXX** competitively inhibit biotin absorption. Intermittent, short term (90-120 days) supplements may confer benefit. Also advisable to monitor **XXXXX** for diabetes on a regular basis (at least 6-monthly).

Many of **XXXXX's** diagnoses fit within the metabolic syndrome cluster. Metabolic syndrome is characterised by insulin resistance and consequent hyperinsulinaemia - hyperinsulinaemia is associated with increased appetite and consequent weight gain which then compounds the insulin resistance. Physiologically the body releases insulin once glucose is present in the bloodstream - the presence of insulin in the bloodstream at other times increases the risk of insulin resistance.

There are a number of nutritional interventions to improve insulin sensitivity or reduce insulin resistance including -

- **thiamine** - people with diabetes have a significantly increased urinary excretion of thiamine; thiamine is important in glycaemic control; currently also prescribed **XXXXX** which further increases thiamine excretion and **XXXXX** which inhibits thiamine absorption. Advisable to consider short term (90-120 days), low dose (~ 10 mg/day) thiamine intervention on a regular basis such as annually;
- **biotin** – evidence indicates biotin is important in a number of steps in carbohydrate metabolism; currently prescribed **XXXXX** which significantly decreases biotin absorption. A short term (90-120 days) intervention of biotin 25g mcg/day is likely to confer longterm benefit and is not associated with harm;
- **pyridoxine** – Vitamin B6 deficiency increases risk of hyperglycaemia; currently prescribed **XXXXX** which further decreases pyridoxine availability;
- **TNF-α** – evidence indicates TNF- α has systemic effects that result in insulin resistance and NIDDM; low B12 status exacerbates elevated TNF- α and currently prescribed **XXXXX** therefore advisable to check B12 status;
- **vitamin D** - current intervention may not be adequate to attain acceptable range. Early evidence indicates low vitamin D is a predictor of peripheral insulin resistance and elevated inflammatory response markers and currently prescribed **XXXXX** therefore advisable to check vitamin D status;
- **magnesium** – is important in glycaemic control and inadequate intake may impair insulin synthesis, secretion and signalling pathways; in fact there is evidence of an inverse correlation between magnesium status and diabetes incidence. Currently prescribed **XXXXX** which significantly decreases magnesium absorption, and currently no intervention. Advisable to review status;
- **zinc** – is integral to insulin formation, and enhances insulin sensitivity through stimulation of insulin receptors; inadequate intake may impair insulin synthesis, secretion and signalling pathways. It is important in glucose metabolism, protects the mitochondria from oxidative stress and glycation, and altered glomerular function, as well as modifying the inflammatory response pathway and activation of the polyol pathway (a part of intracellular signalling and metabolism). Currently prescribed **XXXXX** which decreases availability therefore advisable to check status;
- **potassium** - important in the glucose metabolism, and functions in β-cells; inadequate intake may impair insulin synthesis, secretion and signalling pathways and

currently prescribed **XXXXX** and **XXXXX** both of which impair status, therefore advisable to check status;
- **calcium** - important in the glucose metabolism, and functions in β-cells; inadequate intake may impair insulin synthesis, secretion and signalling pathways and currently prescribed **XXXXX** and **XXXXX** and both impair availability therefore advisable to check status.

XXXXX diabetes management includes 3 drugs administered before breakfast, of which 2 drugs have durations of about 24 hours and 1 drug has a duration > 24 hours, and 1 drug administered before evening meal has a duration of about 24 hours, and it is this drug that is impacting on the before-breakfast glycaemia. **XXXXX**'s afternoon glycaemia is curious - realistically **XXXXX** should have very low BSLs because all 3 prescribed diabetes drugs administered before breakfast are maximally effective in the afternoons, however **XXXXX's** BSLs are mostly high therefore one should ask why and there seem to be 5 options -

- the hyperglycaemic effects of the afternoon tea snack food, caffeine, and chlorogenic acid in the caffeine are sufficient to offset the hypoglycaemic effects of the drugs (least likely);
- current medication management strategy is undermedicating glycaemic control;
- current medication management strategy is overmedicating glycaemic control and causing the liver to release stored glucose as a physiological response to hypoglycaemia;
- current medication management strategy is overmedicating glycaemic control and **XXXXX** is grazing to offset the hypoglycaemic effect;
- current medication management strategy is overmedicating glycaemic control and causing both the liver to release stored glucose and **XXXXX** to graze.

Therefore advisable to review current diabetes management strategy.

Staff advise **XXXXX** has a sweet tooth and is often observed eating sweet foodstuffs; people with diabetes will eat sweet foodstuffs if they feel their BSLs are dropping. Perhaps **XXXXX** is eating sweet foodstuffs to stop their BSLs falling too low and so is out-eating the drugs; if this scenario is considered then perhaps **XXXXX** is overmedicated and therefore current regimen requires review.

XXXXX has long-standing poorly-controlled glycaemia and I am uncertain as to causes - she has regular meals and snacks at regular times and limited access to foodstuffs at other times unless the family bring in food gifts. Review of **XXXXX**'s BSLs shows there is minimal if any effective hypoglycaemic agent impacting before breakfast BSLs, and that two hypoglycaemic agents are impacting afternoon BSLs.

What templates will you create to optimise your assessment reports – will your templates include a review of -

- timing of administration and duration of effect of prescribed anti-diabetes medicines?
- afternoon glycaemia, or request it to be reviewed, especially if there is a history of grazing?
- status of key nutrients that are negatively impacted by diabetes-related therapeutic interventions?

Conclusions

Diabetes negatively impacts many aspects of a person's life, and results in the juggling of a number of concurrent strategies to maintain good glycaemic control and to delay progression. Identifying and addressing pharmaconutrition inputs positively contributes to both improved glycaemic control and delayed progression.

Case study

Medical History with Nutritional Aspect

Amputation	☐	Constipation	☐	Dysphagia	☐	MND	☐
Anaemia	☑	CVA	☐	Enteral Feed	☐	MS	☐
Arthritis	☑	CVD	☑	Falls	☐	Osteoporosis	☐
Cancer	☐	Dementia	☐	Fracture	☐	PD	☐
CCF	☑	Dentures	☐	Frailty	☐	Pressure Area	☐
Chest Infection	☐	Depression	☑	Gout	☑	Renal	☑
COAD	☑	DM Type 1	☐	Hypertension	☐	Ulcer	☐
Confusion	☐	DM Type 2	☑	Incontinent	☑	UTI	☐

Food Allergies: AF, CKD

Other: chronic pain, hypercholesterolaemia, IDA, oedema

Biochemistry with Pharmaconutritional Consequences

No recent relevant results available that may have a pharmaconutrition component.

Medications That May Adversely Affect Nutritional Status

Drug	Vits + Mins	bpp >90%	N/V	C/D	Wt	App	Tst	Thir	Sal	Drlg	d m	Dys	BSL
Allopurinol		☐	NV	D			☑				☐	☐	☐
Fluoxetine	Na	☑	NV	CD	↑	↓	☑				☑	☑	☐
Frusemide	(160 mg/day) Ca, Cl, K, Mg, Na	☑	NV	CD		↓	☐				☑	☐	☑
Hydromorphone		☐	NV	CD		↓	☑				☑	☐	☐
Prazosin		☑	NV	CD			☐				☑	☐	☑
SENOKOT		☐		D			☐				☐	☐	☐
		▩					▩				▩	▩	▩

Extra drug: norspan

Comments – medication and nutrition impacts (direct and indirect) only

FLUID RESTRICTION 1.5L/DAY

Advisable to check plasma proteins (albumin, total proteins) as markers of nutritional status. The plasma proteins are the primary transporters for 3 of the prescribed drugs and hypoproteinaemia may alter their effects including expression of their side effects.

BSLs –

- before breakfast - 4.8-7.6; recommended range 4-6

- daily range 4.8-9.2; recommended range 4-10

- tested daily

- reportable limits: < 4 and > 18

- PRN insulin 6U if BSLs > 20

- advisable to check HbA1c and clarify overall glycaemic control

No diabetes drugs prescribed

Regular measurement sodium levels recommended whilst fluoxetine prescribed.

Frusemide increases urinary excretion of calcium, magnesium, potassium, sodium and thiamine.

Chronic use of senokot may promote excessive loss of water and electrolytes, especially potassium, and their regular monitoring recommended.

Bowels –

- regular aperient prescribed

- oral + anal PRN interventions prescribed

- no Nurse Initiated intervention administered

Mr ABF is a tall, gaunt, pale, yellowy man who was lying in bed when we went to speak to him - he responded to our presence but did not respond, or responded inappropriately to our questions; he has had a profound loss of weight in the last year.

Loss of appetite - total number of prescribed drugs with side effects that include poor appetite is **3** ie may be a contributing factor to poor food intake.

Mr ABF's diagnoses include diabetes, and 2 of the prescribed medications increase risk of diabetes therefore advisable to monitor glycaemia on a regular basis ie at least 6 monthly.

Mr ABF's diagnoses include arthritis ie chronic pain - nutritional factors that may be useful to consider in pain management include -

- **magnesium** – proposed mechanism magnesium blocks the NMDA receptor channels in the spinal cord and thus limits the influx of calcium ie reduces

the risk of excitotoxicity and consequent exacerbation of pain. Currently prescribed frusemide which decreases magnesium absorption.

Currently prescribed 2 drugs, being fluoxetine and prazosin, that either inhibit or are substrates for some thiamine transporters therefore advisable to consider a regular low-dose thiamine intervention administered at a different time from the prescribed medications.

What else would you include?

Medications have profoundly and positively changed health outcomes however they do generally come with some nutritional harms. By identifying and addressing the nutritional harms, optimal health outcomes are closer to being achieved.

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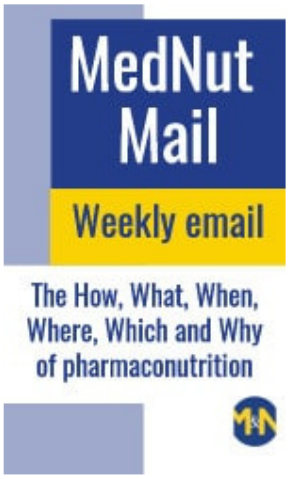

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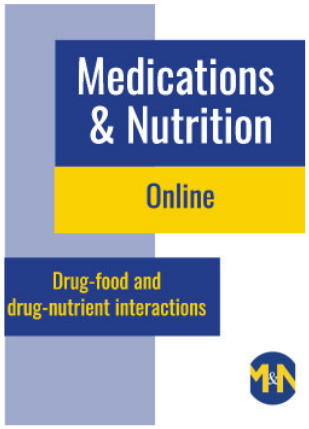

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