MedNut Mail

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

When should glycaemic levels be checked?

Y Coleman

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https://medicationsandnutrition.online

Commentary

Commonly the pre-breakfast BSLs may be the only routine monitoring strategy for those with long term diabetes and deemed relatively stable. Further, commonly, if the pre-breakfast BSL is within acceptable range then further daily monitoring is rarely considered. Therefore, those people with diabetes and who are also prescribed prednisolone may be experiencing regular afternoon hyperglycaemia and no-one is aware.

Prednisolone has a time to peak of 4-6 hours, and a duration of 12-16 hours, therefore administration in the morning causes afternoon and evening hyperglycaemia, but not overnight hyperglycaemia.

For those prescribed prednisolone, hyperglycaemia management strategies should therefore be designed to target the timeframe from midday to midnight.

There is often a reluctance by care staff to prick fingers anymore often than necessary, therefore I generally suggest a 3-day-only trial; 3 days should provide sufficient evidence to identify whether there are any prednisolone-induced afternoon hyperglycaemia patterns. I usually consider a choice of BSL testing times such as -

- the timeframe of 2 hours after the midday meal (typically midday in residential care facilities) and before afternoon tea, and/or
- before the evening meal (5pm in residential care facilities), and/or
- 2 hours after supper (typically 7pm in residential care facilities).

Complicating the steroid-induced hyperglycaemia is the hypoglycaemic effect of the diabetes management drugs and their durations, and examples include:

- Saxagliptin, sitagliptin, vidagliptin, glargine, detemir have durations of more than 24 hours,
- Metformin XR, gliclazide ER, glimiperide, linagliptin, rosiglitazone, posiglitazone, mixtard, isophane have durations of ~ 24 hours,
- Metformin has a duration of ~ 12 hours,
- Others have shorter durations of various periods.

Many of the diabetes management drugs are administered before breakfast, and so afternoons and evenings are when many of the longer-duration drugs are at their maximally effective period.

Ascertaining glycaemic status becomes quite important when drugs with opposing glycaemic effects are

maximally effective at the same time. If a person has high afternoon glycaemia then one should ask why, especially in the presence of prednisolone and diabetes drugs, and there seem to be 3 options, being:

1. The person's grazing is sufficient to offset the hypoglycaemic effect of the drugs (least likely);
2. The prednisolone's hyperglycaemic effect is greater than the hypoglycaemic effect of the diabetes management drugs;
3. The person is overmedicated with the diabetes management drugs resulting in hyperglcaemia.

It is not unusual for people to be labelled "non-compliant" because they are observed grazing "on naughty foods" in the afternoons – and yet these are otherwise-responsible adults who know what they "should and should not be eating" and are otherwise concerned about their health. So why do these people graze in the afternoons? And do they require 24 hour drug coverage of their glycaemia if they are typically sleeping 8 of those hours? Are they being "naughty" by grazing or is their body actually trying to counteract the combined hypoglycaemic effect of several prescribed drugs ie is the response actually iatrogenically-induced?

What actions will you initiate when reviewing those prescribed prednisolone and/or diabetes management drugs? Will you -

- look a bit more closely at the impacts of these drugs on glycaemia when a staff member informs you that an individual is "non-compliant"?
- question whether they frequently require snacks in the late evenings and/or overnight and if not whether they still require to be medicated at those times?
- ask why the afternoon glycaemia is consistently high and is it because they are overmedicated?
- request regular monitoring of afternoon glycaemia for at least 3 consecutive days to clarify afternoon glycaemic status?

Conclusion

There are many inherited systems within healthcare provision and it doesn't take many questions for some of these systems to be checked and changed - I suggest timing of glycaemic monitoring when prednisolone is prescribed, and when long-duration diabetes drugs are prescribed are 2 such examples.

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: chronic pain, oedema, dyslipidaemia, ? Diabetes

Other: ulcerative colitis/colostomy, GORD, AF, SOB

Biochemistry with Pharmaconutritional Consequences

Na:	142	mmol/l	Hb:	123	g/L	Albumin:	37	g/L	BSL:		mmol/l
K:	4.5	mmol/l	Lymph:	1.7		Total Protein:	73	g/L	HbA1C:		
Urea:	8.3	mmol/l	MCV:	87	mmol/l	B12:		pmol/L	INR:		
Creatinine:	0.070	mmol/l	Zn:		umol/l	Folate:		nmol/L	TSH:		mIU/L

Other: eGFR 65, ESR 10, CRP 2, Fe 11, TRF 2.6, satn 17%, ferritin 58

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
COVERSYL		☐	NV	D			☑				☑	☐	☐
ELEVA	Na	☑	NV	CD	↑	↑	☐				☑	☐	☐
Metoprolol		☐	NV	CD	↑		☑				☑	☐	☑
SOMAC	(40 mg/day) B1, B12, Ca, Fe,	☑	NV	CD		↓	☑				☑	☐	☐
TARGIN		☐	NV	CD		↕	☑				☑	☑	☐
		▩					▩				▩	▩	▩

Extra drug: spiriva

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

Coversyl impairs zinc status.

Regular measurement of serum sodium levels recommended whilst eleva prescribed.

Somac decreases B12, vitamin C, magnesium, zinc and iron absorption, may decrease calcium absorption, and decreases thiamine availability.

There is increasing evidence that proton pump inhibitors significantly impair magnesium absorption. Magnesium deficiency manifests as confusion, disorientation, personality changes, loss of appetite, depression, muscle cramps, tingling, numbness, hypertension, cardiac dysrhythmia, seizures. Magnesium is an intracellular ion therefore serum levels are unlikely to detect early depletion of status.

Mrs AAV is a very determined, small, slender, pale lady who was sitting in her room when we went to speak to her - initially she refused to answer my questions and persisted in trying to tell me about the terrible food. As Mrs AAV finally admitted the food has no taste, it seems likely to me this a key issue in the food unacceptability issue.

Mrs AAV has a questioned diagnosis of diabetes ie it is recorded on some medical records but not others. Given both eleva and metoprolol are associated with increasing risk of diabetes, advisable to both –

- clarify current status, and
- monitor glycaemic status on a regular basis.

Mrs AAV also commented she periodically feels upset in the tummy and feels like vomiting - she is quite pale, and nausea and vomiting can be associated with anaemia; she is prescribed a proton pump inhibitor which decreases iron absorption however her iron levels are within acceptable range albeit the ferritin (storage form of iron) is at the low end of the acceptable range. Given a proton pump inhibitor is prescribed, and Mrs AAV is quite pale, she may benefit from a non-oral iron intervention.

Both coversyl and somac negatively impact zinc status and given zinc is important in sense of taste and Mrs AAV admits the food has no taste advisable to consider an effective zinc intervention; however zinc interventions are unlikely to be effective whilst somac prescribed. So there is a conundrum … which is more important – Mrs AAV's food refusal which is now resulting in ongoing weight loss or continuation of current management strategy for GORD?

Commencement of somac indicates prudent clinical practice for B12 management as outlined:-

- establish B12 status at commencement of drug treatment, and monitor on a regular basis, or

- commence a prophylactic B12 intervention with oral supplements as they are not protein-bound and therefore do not require gastric acidity for absorption.

Since Mrs AAV has been prescribed a proton pump inhibitor for 9+ years, it is likely her zinc and magnesium levels are compromised as the drug decreases their absorption, and it is likely their stores are depleted. Advisable to check zinc and magnesium levels and interventions recommended if -

- zinc is less than 11umol/L. Zinc is important in sense of taste, and food taste is one of Mrs V's issues

- magnesium is less than 0.80 units

Further, there is increasing evidence that longterm (3+ years) proton pump inhibitor prescription is associated with

- altered gut microbiome;

- increased risk of food sensitivities at a level of peanut allergy, due to partial protein digestion;

- increased risk of coeliac disease due to partial protein digestion;

- increased risk of scurvy;

- generalised malnutrition due to impaired absorption of a range of nutrients such as B12, vitamin C, magnesium, zinc, iron, etc;

- increased risk of dementia;

- altered gastric pH which reduces absorption dynamics of a range of drugs and nutrients. Altered drug availability is relatively easily identified however reduced nutrient absorption is rarely identified due to the non-specific nature of their signs and symptoms.

Consequently advisable to reconsider reviewing current proton pump inhibitor prescription and consider

- whether proton pump inhibitor prescription is still required

- if suppression of gastric acidity is still required then could it be managed with an H2 antagonist such as ranitidine (there is a general belief that they cause less nutritional harm than proton pump inhibitors)

Various thiamine transporters are negatively impacted by Targin, Eleva, Metoprolol and Somac therefore advisable to consider a thiamine intervention and administer at a different time from these prescribed drugs

What else would you include?

When should glycaemic levels be checked?

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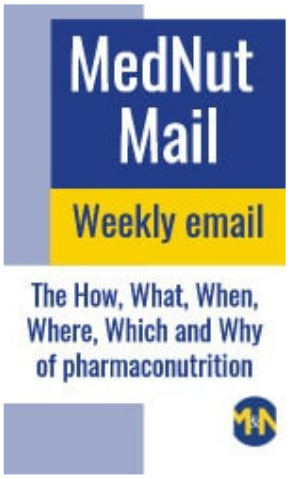

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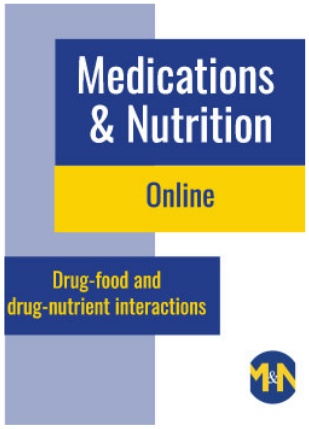

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