MedNut Mail

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

Potential pharmaconutrition research topics 4

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https://medicationsandnutrition.online

Commentary

Some people can be prescribed medications from a very young age eg diabetes, epilepsy, and will consume a range of medications for most of their lives ie for decades. As the limited research indicates there are potentially many significant negative impacts that some of these longterm drugs may have on nutrient status and consequently health outcomes, we do have to ask whether some of the disease progressions are a consequence of pharmaconutrition rather than just the disease itself.

For many people with chronic illnesses prescribed longterm polypharmacy there is no/minimal monitoring of the nutrients that may be affected. Research indicates that many elderly people do not eat adequately to maintain their nutrient stores. The progressive decline in function and health in the elderly person may be exacerbated by depletion of nutrient stores due to the effects of ongoing prescription of medicines. Since depletion of nutrient stores generally takes 3-5 years, an association with polypharmacy may not be considered so one can ask -

- how much of the frailty and debility in those with chronic illnesses is directly attributable to mal-nutrition ie inadequate status of nutrient(s), and
- to what degree does longterm medication prescription contribute to that depletion?
- at what point does the mal-nutrition consequence become irreversible?
- how does the body cater to the ongoing consumption of several different drugs that may have similar or opposing impacts on various nutrients?
- is there an additive effect in the depletion of nutrients common to several prescribed medicines?
- is there a synergistic effect between the medications and their impact on common-to-them nutrients?
- is there a combination of addition and synergy?
- is there an adaptive response and the body increases the effectiveness of nutrient uptake mechanisms? What triggers the adaptation, and what is the duration until adaptation is initiated? At what point is adaptation no longer possible?
- does the body adapt to a certain point during which there is a reversibility of the nutrient depletion, and beyond that point there is an irreversibility component?
- are there identifiable triggers to indicate the pending irreversibility response to nutrient depletion and

what is their duration until the triggers generate/stimulate a response?
- are there indirect impacts of medications on nutrients? For example, magnesium is important in the activation of thiamine, therefore if one or more of the prescribed drugs increase magnesium excretion and one or more of the prescribed drugs increases magnesium resorption from the kidneys, then what is the nett effect on magnesium status? and therefore indirectly, on thiamine status?

Thiamine and cobalamin are examples of the depletion continuum from reversible to irreversible status. We do need to know the impact of drug combinations on the status of all the essential nutrients.

What actions will you initiate to address these inadequacies in our knowledge?

- Will you develop specialty knowledge? For example, will you develop a particular interest in a chronic illness group such as diabetes, epilepsy, depression, other, plus the actions of the prescribed medications for the specialty chronic illness, and then trial treatment formats to address the research-identified negatively impacted nutrients? And of course you would make your findings generally available in some acceptable format;
- Will you develop an increased awareness of the reversibility/irreversibility mechanism of action for known nutrients so that you can intervene before irreversibility is triggered? Again, you would of course make your findings generally available in some acceptable format.

Conclusion

The clinical application of pharmaconutrition continues to be fraught with unanswered questions and we can only apply first principles to a certain degree. Many of the identified issues do require answers in order for potential negative outcomes to be prevented and for optimal health care to be provided.

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: refuses dentures, anxiety, chronic pain

Other: hypercholesterolaemia, Ca bowel, oedema legs

Biochemistry with Pharmaconutritional Consequences

Na:		mmol/l	Hb:	117	g/L	Albumin:		g/L	BSL:		mmol/l
K:		mmol/l	Lymph:	1.1		Total Protein:		g/L	HbA1C:		
Urea:	7.9	mmol/l	MCV:	97	mmol/l	B12:		pmol/L	INR:		
Creatinine:	0.100	mmol/l	Zn:		umol/l	Folate:		nmol/L	TSH:		mIU/L

Other: eGFR 42, Fe 8, TRF 2.0, ferritin 757

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
Atenolol		☐	NV	CD			☐				☑	☐	☑
COVERSYL		☐	NV	D			☑				☑	☐	☐
FERRO-LIQUID	Ca, Mg, Zn	☐	NV	CD			☐				☐	☐	☐
Gliclazide	(08:00) MR	☑	NV	CD	↑	↕	☑				☐	☐	☑
LASIX	(80 mg/day) Ca, Cl, K, Mg, Na,	☑	NV	CD		↓	☐				☑	☐	☑
OSTEVIT-D	(25 mcg/day)	☐					☐				☐	☐	☐
Oxazepam		☑	N				☐		↕		☐	☐	☐
Sennosides		☐		D			☐				☐	☐	☐
SOMAC	(40 mg/day) B1, B12, Ca, Fe,	☑	NV	CD		↓	☑				☑	☐	☐
ZOLOFT	Na	☑	NV	CD	↑	↑	☐				☑	☐	☐

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

Recent relevant available biochemistry indicates

- low Hb – likely due to somac prescription;
- low Fe and elevated ferritin – likely due to somac. Unlikely oral iron interventions will be effective whilst somac prescribed and therefore an iv intervention may confer more benefit;
- elevated MCV – typically indicates low B12 and likely due to somac prescription. Advisable to check B12 and if less than 300 pmol/L then advisable to consider a non-oral intervention whilst somac prescribed.

Advisable to check plasma proteins (albumin, total proteins) as markers of nutritional status. The plasma proteins are the primary transporters for 5 of the prescribed drugs and hypoproteinaemia may alter their effects including expression of their side effects.

BSLs (Nov) –

- before breakfast - 6.1-11.0; recommended range 4-6,

- daily range - 6.1-16.3, mostly 5-9; recommended range 4-10,

- tested weekly (Mon and Thur),

- reportable limits: < 4 and > 18,

- advisable to check HbA1c and clarify overall glycaemic control.

Diabetes drugs

- gliclazide MR has a duration of 24 hours - currently on hold.

Diabetes drugs coverage

- before breakfast BSLs - minimal, if any, coverage from previous morning's gliclazide MR,

- before evening meal BSLs - covered by current morning's gliclazide MR.

Atenolol, Lasix and Zoloft all associated with alteration to glycaemic control.

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

Orange juice and apple juice reduce atenolol availability.

Atenolol may mask the symptoms of hyperthyroidism and hypoglycaemia.

Coversyl impairs zinc status.

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

Magnesium supplementation has been associated with resolution of refractory thiamine deficiency when Lasix prescribed

Lasix may increase risk of glucose intolerance, and diabetes.

Somac (PPI commenced 4 years ago) decreases B12, vitamin C, magnesium, zinc and iron absorption, may decrease calcium absorption, and decreases thiamine availability.

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.

Regular monitoring sodium levels recommended whilst zoloft prescribed.

Zoloft may alter glycaemic control.

Ostevit currently on hold.

Ferro-liquid currently on hold.

Currently prescribed the daily double ie two drugs that decrease magnesium availability - being lasix and pantoprazole. 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. Cellular magnesium status is unknown whilst magnesium levels within acceptable range however if magnesium levels are low then typically indicates significant cellular depletion and intervention recommended.

Since Coversyl, Lasix and pantoprazole decrease zinc availability advisable to monitor status on a regular basis.

Bowels –

- regular aperient prescribed,

- oral PRN aperient prescribed; administered 3 x Oct, 4 x Sep,

- Nurse Initiated interventions administered - oral 1 x Sep, and anal 1 x Sep.

Mrs AAU remained weight stable about 82-84 kg or about a year and since then has lost weight. The weight loss seems to coincide with a UTI and consequent antibiotic treatment and commencement of regular actilax for constipation - actilax's side effects include decreased appetite; actilax ceased very recently.

Mrs AAU is a small, pale, frail, yellowy-hued lady who was dozing in bed when I went to speak to her; her daughter was present and commented her mother is not eating much and that they are not overly concerned about her food intake. I explained that some of her mother's pills had been ceased or withheld for a short time to see if

there were any improvements in appetite.

Mrs AAU is currently in an interim stage whereby current management strategies are being reviewed to see if there is any improvement and if not then it is likely there will be a discussion about Palliative Care.

Several thiamine transporters involved, and various functions negatively impacted, including -

MATE – kidney excretion

- Substrate - atenolol
- Inhibitor – atenolol

OCT1 – liver intake

- Substrate - atenolol
- Inhibitor – somac, zoloft

OCT2 – renal intake

- Substrate - atenolol
- Inhibitor – oxazepam, somac, zoloft

OCT3 – skeletal muscle

- Substrate - zoloft
- Inhibitor – somac

THTR2 – absorption from intestines

- Inhibitor - zoloft

A thiamine supplement, administered at a different time from the prescribed drugs, may confer benefit.

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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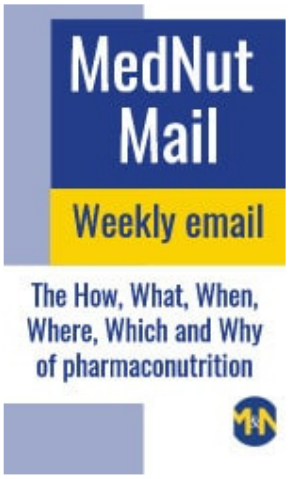

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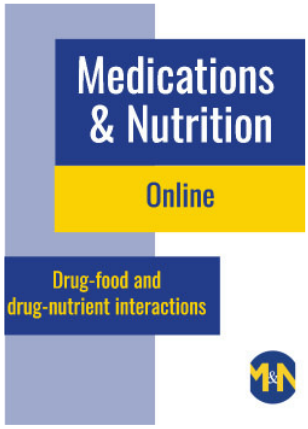

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