

MedNut Mail

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

Pharmaconutrition – costs and benefits

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<https://medicationsandnutrition.online>

Commentary

Confusion, falls or has poor balance, insomnia, and lethargy - would you immediately be trying to decide if this person is deficient in biotin or pantothenic acid? When I raised this at a Medication Advisory Committee meeting, all the committee members (GP, Clinical Care Co-ordinator, supplying pharmacist, Accredited Pharmacist) looked at me in amazement that such associations could be made.

We question the nutritional adequacy and safety of the food we eat however we don't question the nutritional impacts of medications that are consumed for many years, sometimes from childhood.

Medications have both benefits and costs although there is a strong focus on the benefits. The costs associated with drug-drug interactions are generally integral to decision-making, however drug-food and drug-nutrient interactions are barely acknowledged – and even if considered are mostly deemed “clinically insignificant”.

The interface between drugs and nutrition (food, nutrient supplements) comprises two primary sections, being:-

1. costs - identification and management of both overt and sub-clinical nutritional costs of drug therapy,
2. benefits - positive utilisation of drug-food and drug-nutrient interactions.

1. Costs

If overt signs and symptoms of nutrient deficiencies are recognised then a nutritional intervention may be initiated, however the management of sub-clinical nutrient deficiencies is generally ignored.

Costs include:-

- administration of nutrient supplements with medications that may bind with the nutrient; examples include calcium and alendronate, iron and thyroxine, calcium and tetracyclines;
- administration of nutrient interventions in forms or doses that are unlikely to confer benefit eg calcium carbonate and proton pump inhibitors. Calcium carbonate requires gastric acidity for absorption however proton pump inhibitors alter gastric acidity and so minimal calcium is released from the carbonate; calcium citrate is more effective as it does not require gastric acidity for absorption. Because calcium carbonate is listed on the PBS and calcium citrate is not, GPs preferentially prescribe calcium carbonate even although it does not confer (much) benefit – some call this being seen to do something whilst I consider it to be misleading;
- administration of food with medications that may interfere with

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- the absorption or utilisation of the medication; examples include -
 - caffeine and sedatives,
 - high salt diets and antihypertensive drugs.
- administration of medications that inhibit or displace nutrients eg the administration of metformin prior to a meal minimises thiamine uptake during that meal – metformin can be prescribed for decades therefore the impact on thiamine status is likely to be negatively cumulative.

2. Benefits

Food and nutrient supplements can be integrated into management therapies to enhance the desired effect. Examples include -

- stable vitamin K intake during warfarin therapy results in improved INR levels;
- reduced salt intake is associated with smaller doses of antihypertensive drugs. Smaller drug doses then imply reduced expression of side effects;
- caffeine has been found to enhance the effectiveness of theophylline and other drugs that are substrates for the cytochrome P450 pathway 1A2 isoform;
- stable sodium intake means stabilised lithium levels.

What will you be doing to minimise the costs and optimise the benefits relating to drug-nutrition interactions -

- checking the stability and adequacy of vitamin K intake of warfarin consumers?
- checking stability of sodium intake in those prescribed lithium?
- checking the type of calcium supplement in those prescribed proton pump inhibitors?
- checking that sedatives are not being administered with, or at the same time as caffeinated beverages?

Future Practice

Drug management strategies will include drug-food and drug-nutrient interventions as an integral management strategy. This can only benefit all parties with a vested interest -

- the consumer - as they will feel better,
- the practitioner – as they will have improved clinical outcomes,
- governments - as there will presumably be a reduction in morbidity and related health costs,
- drug companies - as the linking of nutrient supplements to specific drugs will enhance their profitability.

As the research in this area becomes more extensive and readily available, then the inclusion of drug-food and drug-nutrient interactions will be of strategic significance in the ongoing management of those requiring long term administration of medications.

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:							
Other:	hyperglycaemia, GORD, hyperlipidaemia						

Biochemistry with Pharmaconutritional Consequences

No recent relevant data available

Medications That May Adversely Affect Nutritional Status

Drug	Vits + Mins	bpp >90%	N/V	C/D	Wt	App	Tst	Thir	Sal	Drig	d m	Dys	BSL
Allopurinol		☐	NV	D			☒				☐	☐	☐
CIRCADIN		☐	NV	CD	↑		☐				☒	☐	☐
COLOXYL WITH S		☐		D			☐				☐	☐	☐
Memantine		☐	NV	CD	↓	↕	☐				☐	☐	☒
MINAX		☐	NV	CD	↑		☒				☒	☐	☒
Olanzapine		☒		C	↑	↑	☐				☒	☐	☐
Pantoprazole	(20 mg/day) B1, B12, Ca, Fe,	☒	NV	CD		↓	☒				☒	☐	☐
Paracetamol		☐	NV	CD			☐				☐	☐	☐
Ramipril		☐	NV	CD		↓	☒		↑		☒	☒	☒
SPREN	C, Fe	☒	NV				☐				☐	☐	☒
Extra drug:	nesina (mane), lantus (15U mane), norspan												

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

Advisable to check plasma proteins (albumin, total proteins) as they are the primary transporters for 3 of the prescribed drugs and hypoproteinaemia may alter their effects.

Diabetes drugs

- lantus has a time to onset of ~ 1 hour, minimal peak, and duration of 20-26 hours,
- alogliptin has a duration of about 24 hours.

Diabetes drugs coverage

- before breakfast BSLs - minimal coverage from previous morning's lantus or alogliptin;
- before evening meal BSLs - covered by current morning's lantus and alogliptin.

Vitamin C (960 mg/day) attenuates aspirin-induced gastric injury.

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

Pantoprazole decreases vitamins B12 and C, magnesium, zinc and iron absorption, may decrease calcium absorption, and decreases thiamine availability.

Dietary levels of caffeine intake in conjunction with paracetamol inhibit antinociception (pain management).

There is increasing evidence that proton pump inhibitors such as pantoprazole 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. 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.

Commencement of pantoprazole indicates prudent clinical practice for B12 management including establishing B12 status at commencement of drug treatment, and ...

- monitor on a regular basis (at least annually), or
- commence a prophylactic B12 intervention with oral supplements as they are not protein-bound and therefore do not require gastric acidity for absorption, and monitor on a regular basis.

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Impacts on thiamine transporters -

- Inhibitory action – memantine, metoprolol, olanzapine, pantoprazole,
- Substrate (can ride the transporter) action - memantine,
- Outcome is decreased thiamine uptake by many organs including liver, kidneys and skeletal muscles.

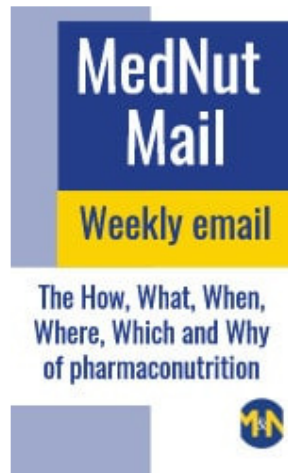
Mr AAC is prescribed 2 drugs for his diabetes - both impact BSLs especially in the afternoons therefore advisable to check afternoon glycaemia on a regular basis to ensure remaining well within acceptable ranges.

What else would you include?

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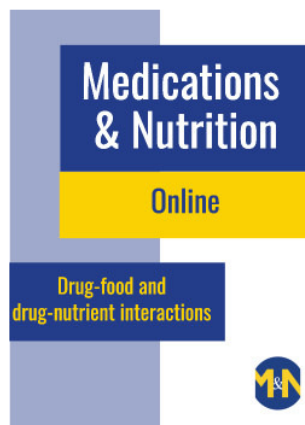
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