MedNut Mail

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

Nutrition support products and pharmaconutrition

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https://medicationsandnutrition.online

Editorial

Nutrition support products are typically administered if a person has lost weight or has very poor appetite, and their purpose is to improve nutritional health, with success typically being identified as weight gain. They are formulaic drinks based on either water or milk and typically contain a range of added nutrients.

The article titled **Distribution of oral nutritional supplements with medication: Is there a benefit? A systematic review (Nutrition 96 (2022) 111569)** identifies a range of issues relating to hospital malnutrition - either acquired during hospitalisation or as one of the admission diagnoses that necessitates intervention. The MedPass program was developed to address some of these issues, and is based on the premise of administration of small doses of a defined nutrition support product more frequently, and that including them on the drug round would improve compliance. Ultimately this systematic review was inconclusive in its conclusions.

There is merit to the argument that nutrition interventions be administered concurrently with prescribed medicines –

- they are identified on a familiar document, being the drug chart,
- administration is confirmed by nurse signature,
- small amounts are administered and so are more likely to be consumed,
- administration with other medicines implies medical intervention and so is important.

However, the evidence relating to negative drug impacts on physiological transporters is steadily increasing. Prescribed medications are typically administered before meals (to enhance drug absorption) and so they either inhibit or occupy the relevant transporters such that they are no longer available for nutrient transport. If prescribed medicines are administered with meals (typically to minimise expression of side effects) then uptake is dependent upon which substance reaches the transporter first – again it is likely to be the drug rather than the nutrient as many nutrients require the digestive process to release them from the food in order to be available for absorption.

Transporter substrates (substances able to be carried by the transporter) typically occupy the transporter for the duration of their journey until their destination and then the transporter is available for the next passenger. We don't know the

turnaround time to delivery and return to the collection point for the next passenger.

Transporter inhibitors block the transporters from functioning – duration of inhibition is unknown, and whether the duration is inhibitor specific or similar for all inhibitors for that transporter is unknown.

Therefore, concurrent administration of nutrition support products and prescribed medicines may be conferring minimal benefit once transporter utilisation is considered.

Perhaps nutrition intervention rounds are also required ie a defined administration time for nutrition interventions that is also monitored as carefully as prescribed medicines – this would both improve the perception of importance of nutrition interventions and reduce the risk of drug-nutrient interactions via the transporter networks.

What interventions will you initiate when you see someone whose prescribed medications include nutrient interventions and/or nutrition support product interventions – will you -

- identify an optimal administration time for the nutrient interventions to maximise their therapeutic benefit? I suggest a minimum of one hour before and two hours after drug administration as a minimum.
- if the biochemistry results are unusual then consider drug-nutrient interactions from a nutrition support product intervention perspective?
- if the biochemistry results are unusual then consider drug-nutrient interactions from a transporter perspective?

Conclusions

Administration of nutrition support products is currently not considered part of the drug-nutrition interactions stable – and perhaps it should be.

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: cognitive impairment, bilat oedema - knees, ankles

Other: AF, deafness, blindness, chronic pain, agitation

Biochemistry with Pharmaconutrition Consequences

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

Other:

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
ALEPAM		☑	N				☐		↕		☐	☐	☐
Atorvastatin		☑	NV	CD	↑	↓	☑				☐	☐	☐
CARTIA	C, Fe	☑	NV				☐				☐	☐	☑
Cholecalciferol	(1000 IU/day)	☐					☐				☐	☐	☐
Lamotrigine	carnitine, D	☐	NV	D		↓	☐				☐	☐	☐
Mirtazapine		☐	N	D	↑	↑	☐				☑	☐	☐
Paracetamol		☐	NV	CD			☐				☐	☐	☐
Perindopril		☐	NV	D			☑				☑	☐	☐
SENOKOT		☐		D			☐				☐	☐	☐

Extra drug: norspan

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

No recent relevant biochemistry available therefore 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 side effects.

BSLs - daily range - 5.1-9.6; recommended range 4-10
- tested thrice weekly
- reportable limits < 4 and > 18.

Currently no prescribed drugs for glycaemic management. Three prescribed drugs – atorvastatin, cartia, perindopril, are likely to exacerbate the expression of altered glycaemic control.

Aspirin plus vitamin C (960 mg/day) attenuates drug-induced gastric damage and restores anti-oxidant protection.

Lamotrigine decreases B12, folic acid, vitamin D, pyridoxine and carnitine availability.

Regular monitoring sodium levels recommended whilst mirtazepine prescribed.

Dietary levels of caffeine intake in conjunction with paracetamol inhibit antinocieception.

Concurrent ingestion of paracetamol and iron resulted increased rate of iron absorption and decreased extent of drug absorption; the authors advise drug and iron to be administered at different times from each other.

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

Perindopril impairs zinc status.

Statins interfere early in the cholesterol metabolic pathway and consequently decrease -
- conversion of sun to vitamin D – advisable to check status and if low then vitamin D intervention recommended;
- production of CoQ10 - important in cellular energy production; CoQ10

intervention recommended;
- DHEA production - low DHEA associated with increased risk of metabolic syndrome; intervention recommended.

Advisable to -

- clarify duration of statin prescription and consider its cessation if > 5years,
- check lipid levels and if within acceptable range then review necessity for its continued prescription.

Bowels - regular aperient prescribed -
- oral PRN aperients prescribed; administered 4 x Jun, 3 x Mar;
- Nurse Initiated anal intervention administered 1 x Jun.

Currently no interventions with nutrition support products.

Mr ABG is a man of size, and I am uncertain the contribution of fluid retention to his size and weight.

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

- vitamin D - current intervention may not be adequate to attain adequate range. Evidence indicates increasingly brittle pain control with decreasing vitamin D levels. Currently prescribed atorvastatin which decreases vitamin D status. Advisable to check vitamin D levels and if still low then review current vitamin D management strategy.

- vitamin C - pain increases the reactive substances (formerly Reactive Oxygen Species) within cells. Vitamin C is important in quenching reactive substances and if there is insufficient vitamin C then cell status becomes compromised and the cells typically die which also causes pain. Currently prescribed cartia therefore advisable to consider a vitamin C intervention. Currently Vitamin C is not considered part of the pain management armament however it won't cause harm and evidence suggests it may confer benefit.

Mr ABG's diagnoses include deafness – nutritional factors that are associated with hearing include -

- B12 and folate – currently prescribed lamotrigine,
- Vitamin C – currently prescribed cartia,
- Vitamin D - currently prescribed atorvastatin,
- Zinc – currently prescribed perindopril,
- Thiamine – currently prescribed lamotrigine, mirtazapine, oxazepam.

Many of Mr ABG'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 -

- vitamin D within acceptable range - current intervention may not be adequate to attain adequate range. Early evidence indicates low vitamin D is a predictor of peripheral insulin resistance and elevated inflammatory response markers and currently prescribed atorvastatin**;**
- thiamine - people with diabetes have a significantly increased urinary excretion of thiamine; thiamine is important in glycaemic control; currently also prescribed lamotrigine, mirtazapine and oxazepam which further decreases thiamine availability. Advisable to consider short term (90-120 days), low dose (~ 10 mg/day) thiamine intervention on a regular basis such as annually;
- 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 the 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) and currently prescribed perindopril therefore advisable to check status.

Via the thiamine transporters several prescribed medications, including lamotrigine, mirtazepine and oxazepam, negatively impact thiamine status from absorption to distribution throughout the body. Therefore, in order to ensure an adequate availability of thiamine to meet body requirements, advisable to consider a regular low dose thiamine intervention that is administered at a different time from any of the identified drugs.

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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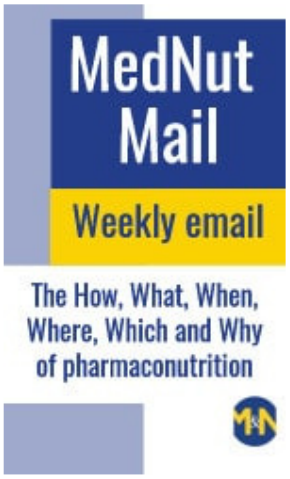

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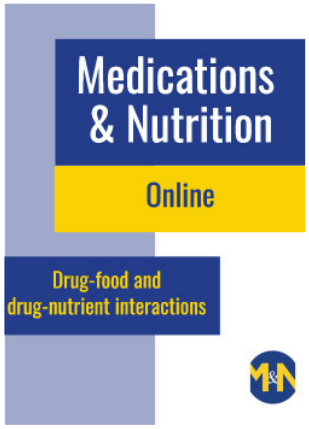

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