ONE LIST OF CHOOSING WISELY RECOMMENDATIONS ON TESTS, TREATMENTS, AND PROCEDURES HEALTH PROFESSIONALS SHOULD QUESTION

As at August 2018

Note: Evidence, references and resources for each recommendation are under appropriate recommendation from each individual College, specialist society and association.

GYNAECOLOGY

1. **Do not perform population screening of women for ovarian cancer**
2. **Do not routinely test FSH levels to establish menopausal status**

The diagnosis of perimenopause and menopause does not require laboratory testing in the majority of cases.

The following conditions can be diagnosed without testing serum FSH in otherwise healthy women who are greater than 45 years of age with menopause symptoms.

- Perimenopause based on vasomotor symptoms and irregular periods
- Menopause in women who have not had a period for greater than 12 months and are not using hormonal contraception
- Menopause based on symptoms in women without a uterus

Do not use the following laboratory tests and imaging to diagnose perimenopause in women greater than 45 years:

- Anti Mullerian hormone
- Inhibin A & B
- Oestrodiol
- Antral follicle count
- Ovarian volume

Do not use FSH if a woman is on the combined oestrogen or progestogen contraception or using high dose progestogen.

Consider using an FSH test to diagnose menopause only in the following situations:

In women 40 – 45 years with menopause symptoms including a change in their menstrual cycle

Women less than 40 years where a premature menopause is suspected

MATERNITY

3. **Do not routinely test the following biochemistry at 1st ANV**
   - U&E, LFT, Cholesterol
   - TSH & Vitamin D
   - Iron studies (BUT continue to routinely test ferritin levels)
4. **Do not perform more than three ultrasound scans during a normal pregnancy**
5. **Do not repeat testing for proteinuria in established pre-eclampsia (see SOMANZ CW list number 3)**

Measuring proteinuria is useful as a diagnostic but not as a prognostic criterion for pre-eclampsia. This is because the level of proteinuria does not correlate with the severity of maternal complications in women with pre-eclampsia, nor are these

levels useful in determining the timing of delivery. Thus, repeat testing for proteinuria in managing established pre-eclampsia is not recommended, particularly given the availability of superior prognostic models.

RHUEMATOLOGY

1. **Do not perform arthroscopy with lavage and/or debridement or partial meniscectomy for patients with symptomatic osteoarthritis of the knee and/or degenerative meniscal tear**

There is consistent evidence to indicate that arthroscopic lavage and/or debridement to treat people for symptomatic knee osteoarthritis, and/or partial meniscectomy for patients with a degenerative meniscal tear (with or without underlying osteoarthritis), is no more effective than placebo surgery or non-operative alternatives. The evidence for this is now so developed that a recent guideline makes a strong recommendation against knee arthroscopy in almost all patients and states that further research is unlikely to change this recommendation.

There is also a high rate of conversion from knee arthroscopy to total knee arthroplasty, which rises with increased age, further suggesting arthroscopic surgery should be avoided in people over the age of 50 years.

2. **Do not prescribe more than the minimum effective dose of glucocorticoid (GC) therapy (10–20 mg daily) for initial treatment of polymyalgia rheumatica (PMR)**

Only the minimum effective individualised glucocorticoid (GC) dose should be prescribed for initial treatment of polymyalgia rheumatica (PMR). The dosage should balance benefits and harms after assessing:

- risk factors for GC-related adverse events;
- comorbidities that may affect the impact of GC therapies (e.g. diabetes, osteoporosis, glaucoma, etc);
- concomitant medications; and
- the risk of relapses and/or prolonged therapy.

One recent guideline indicates a range of 12.5–25 mg prednisone (or equivalent) daily for the initial treatment, while other studies indicate that PMR remission can be achieved with prednisone treatment at a dose of 15 mg/d in most patients. Overall, we support a range of 10–20 mg daily for initial treatment of PMR with the caveat that ultimately these dosages need to be individualised for the patient.

3. **Do not repeat dual-energy X-ray absorptiometry (DEXA) scans for diagnosis of osteoporosis more frequently than every 5 years in patients in good health, with no risk factors for accelerated bone loss or fracture and with T scores greater than -2.00.**

There is still uncertainty over the most appropriate intervals for repeating Dual-energy X-ray Absorptiometry (DEXA) scans for monitoring bone density. Because changes in bone density over short intervals are often smaller than the measurement error of most DEXA scanners, frequent testing of less than 2 years is unnecessary in most patients. The baseline T score (which indicates osteoporosis development) is the most important determinant of a BMD testing interval. For instance, one study estimated that among older postmenopausal women with T scores above -1.50, less than 10 per cent will develop osteoporosis over a 15-year period; while among those with T scores between -1.50 and -1.99, less than 10 per cent will develop osteoporosis over a 5-year period.

The equivalent periods are slightly longer for older men. Based on this and other recent evidence on cumulative incidence of osteoporosis over time, we recommend against DEXA scan monitoring more frequently than every 5 years in patients with T scores above -2.00, who are in good health and have no additional risk factors for accelerated bone loss. Risk factors for accelerated bone loss include (but are not limited to): hyperparathyroidism, aromatase inhibitor therapy, androgen deprivation therapy, steroid therapy and Vitamin D deficiency.

4. **Do not order extractable nuclear antibodies (ENA) testing in patients with negative antinuclear antibodies (ANA)**

Testing for antibodies to extractable nuclear antibodies (ENA) is only advised after detecting a positive antinuclear antibody (ANA) in patients with symptoms consistent with a rheumatic disease. However, in some cases ENA testing may be

advisable even after a negative ANA – e.g. where there is a high pre-test probability of a rheumatic condition such as Sjogren's syndrome or where there are anti-Jo-1 antibodies for clinically suspected inflammatory myopathies.

5. **Do not order anti-double stranded (ds) DNA antibodies in antinuclear antibodies (ANA) negative patients unless clinical suspicion of systemic lupus erythematosus (SLE) remains high.**

International recommendations advise testing for anti-dsDNA antibodies only after detecting a positive antinuclear antibody (ANA) in patients with symptoms consistent with systemic lupus erythematosus. In patients who are ANA negative, anti-dsDNA should only be ordered in clinical situations where the pre-test probability of SLE is high.

PUBLIC HEALTH MEDICINE

1. ***Advance and achieve health equity***

Entrenched systematic health disparities persist in Aotearoa New Zealand. These are driven by differences in the social determinants of health, access to care and the timeliness and quality of care received. Racism is increasingly recognised as a key driver of inequity. Individual clinical practice, institutional biases, and health system barriers also contribute. The failure to redress this health inequity, and with urgency, breaches the Crown's Tiriti o Waitangi obligations to Māori. Achieving health equity will improve the health of New Zealanders and benefit individuals, whānau, communities, the economy and wider society. Equity needs special attention in service planning and implementation, so that existing inequities are not worsened.

Prioritise the needs of the most disadvantaged, and shape approaches that are effective in achieving health equity. Where universal actions are required, the intensity of these actions must be proportionate to the level of disadvantage, so that those most in need receive the most benefit. Nonetheless, focusing only on those most in need will only address a small part of the problem. Monitor and analyse health data and equity outcomes by subgroup, to identify unwarranted variation, and evaluate your actions.

For Māori in particular, achieving health equity will require Treaty partnerships, as well as partnering and power sharing with community groups, and intersectoral and whole-of-government approaches that align with Tiriti o Waitangi principles. Lead and advocate for equitable access to high-value care delivered in culturally competent ways. Commit to improving living conditions and eliminating inequities of the social determinants of health, including power and resource imbalances.

2. ***Allocate health resources systematically, cost-effectively, equitably, sustainably, and responsibly***

Health resources are finite. Allocating them needs good evidence, prioritising and optimising the greatest health gains for the greatest unmet need, equitably and sustainably, taking account of environmental impacts and the time and cost resources available.

An evidence-informed approach to allocating resources means using multicriteria decision-making, with each criterion informed by the best available evidence. Include in the criteria:

a) Health need: the magnitude and distribution of disease burden (premature death, morbidity/disability and suffering)

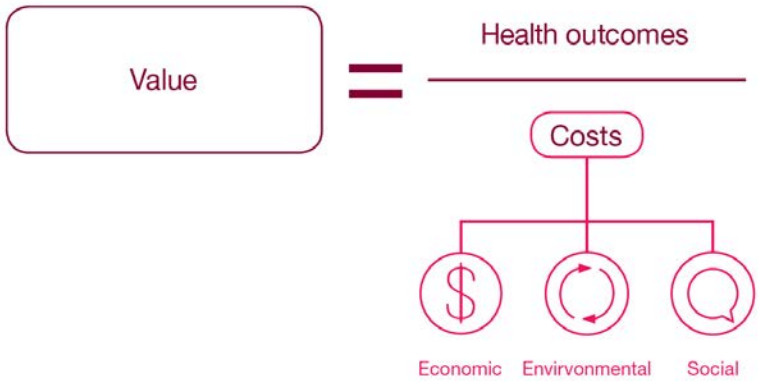
b) Health gains: the effectiveness of the intervention, and the magnitude and distribution of health gains

c) Affordability including sustainability: economic evaluation of cost-effectiveness, costs and savings in the short-term and long-term, and thus measuring how affordable, fiscally durable and environmentally sustainable the intervention

d) Impact on health inequities: using an equity lens such as the Health Equity Assessment Tool (HEAT)

e) Feasibility and acceptability: take account of society's values and expectations, and feasibility of implementation.

Sustainably means doing more with less, and not doing or using too much. Sustainable health improvement meets the essential health needs of the present (especially the world's poor) without compromising generations' abilities to meet their own needs. This approach accepts limits, protects the environmental determinants of health and reduces healthcare spending, so freeing opportunities elsewhere and in future.



adapted from Academy of Royal Medical Colleges, 2014

3. Use absolute risk ahead of relative risk when assessing and communicating risks, harms and benefits

Successful evidence-based practice and shared decision-making between health professionals and the public depends on effective communication about risks, harms and benefits. Health information framed in terms of relative risk is frequently misunderstood and is potentially deceptive. A specific relative risk reduction, such as 50%, may represent markedly different absolute risk reductions depending on the baseline risk. Health professionals, as well as the public, tend to over-estimate the effectiveness of an intervention when results are expressed in relative terms, because such results are naïve to the baseline risk. Absolute risk reduction and numbers-needed-to-treat are more direct measures of the relevance of an effect than relative risk reduction and are less likely to influence medical and public decision-making to inappropriately adopt an intervention. Relative risk has its place, but an absolute risk approach achieves a better balance between prevention and avoiding unnecessary intervention.

Express absolute risk reductions in numbers and as natural frequencies, ahead of relative risk reductions, eg. as “[number] A out of 1000 people will have [outcome] Z with [intervention] X, compared with [number] B out of 1000 people without X [or with an alternative intervention]. Given [number] C people in New Zealand have [disease] D, intervention X will thus reduce the case load by [number] E over 5 years. This is an x% absolute reduction.” Use pictures and pictograms, which are effective.

4. Apply established screening criteria, and consider health equity impacts when assessing potential screening programmes

Screening tests asymptomatic individuals for a particular disease or condition, and can reduce future mortality and morbidity by establishing risk of disease or identifying early asymptomatic disease (or a disease precursor) that is amenable to treatment. Screening programmes can improve population health but can also cause harm and perversely increase health inequities.

Use established screening criteria to make sure that there is robust evidence the programme will provide benefit and minimise potential harms. In Aotearoa New Zealand the following criteria are recommended:

The condition is a suitable candidate for screening.

There is a suitable test.

There is an effective and accessible treatment or intervention for the condition identified through early detection.

There is high quality evidence, ideally from randomised controlled trials, that a screening programme is effective in reducing mortality or morbidity.

The potential benefit from the screening programme should outweigh the potential physical and psychological harm (caused by the test, diagnostic procedures and treatment).

The health care system will be capable of supporting all necessary elements of the screening pathway, including diagnosis, follow-up and programme evaluation.

There is consideration of social and ethical issues.

There is consideration of cost-benefit issues.

Make sure programmes consider the impact on health inequities, have informed choice and equity of access for all the target populations, and are culturally competent. Design screening programmes explicitly for equity – including participation, access, timeliness, and quality of care and outcomes. Carefully consider overall equity impacts and have in place measures and monitoring to ensure programmes improve, not worsen, health equity.

Make sure programmes are coordinated, supported by clinical leadership, independently monitored and evaluated, and have continuous quality improvement.

5. Evaluate programmes at every stage of implementation.

Effective programme evaluation is a systematic way to improve and account for public health actions, ensuring effective use of public and community resources. Programme evaluation leads to more logical programme plans, stronger partnerships, integrated information systems and more systematic measurement, outcome and equity improvement, and the detection of programme effects. Evaluations can inform decisions about and guide changes in public health strategies and ensure equitable programme design and implementation.

Plan for adequately-resourced evaluation early in a programme's inception, to support better design, piloting and implementation, as well to assess its benefits, and the dissemination of successful programmes. Have practical, on-going evaluation strategies and measures developed with all programme stakeholders, that are culturally meaningful and incorporate health equity goals. Evaluation findings should be disseminated appropriately.

MIDWIFERY

1. Fetal monitoring in labour: Don't automatically initiate continuous electronic fetal heart rate monitoring during labour for women without risk factors: undertake intermittent auscultation (IA) first.

Continuous electronic FHR monitoring for healthy women during labour, is a routine procedure in many hospitals, yet is associated with an increase in caesarean and instrumental births without improving Apgar score, NICU admission or intrapartum fetal death rates. IA allows women more freedom of movement during labour, enhancing their ability to cope with labour pain and utilize gravity to promote labour progress. Upright positions and walking have been associated with shorter duration of first stage labour, fewer caesareans and reduced epidural use.

The routine use of CTG for intrapartum fetal surveillance has become entrenched in practice without robust randomised controlled trial (RCT) evidence to support it. The RCTs of continuous CTG which have been undertaken have identified that its use is not associated with statistically significant improvements in long-term neonatal outcomes such as cerebral palsy, but that it is associated with significantly increased rates of (unnecessary) operative delivery.

CTG is the visual interpretation of continuously generated signals from the fetal heart and is subject to shortcomings in interpretation. Review of cases with poor outcomes repeatedly demonstrate that abnormal CTGs were misinterpreted and the resulting management inappropriate. Admission CTG increases the rate of continuous electronic fetal monitoring use, may increase the rate of caesarean section but may identify a small number of previously unidentified at-risk fetuses.

Women should receive one to one continuous midwifery support during intrapartum care. Cardiotocography should not be used as a substitute for adequate intrapartum midwifery care. Intermittent auscultation is an appropriate method of intrapartum fetal monitoring in women without recognised risk factors.

Regardless of the method of intrapartum monitoring, it is essential that an accurate record of fetal wellbeing is obtained. Fetal and maternal heart rates should be differentiated whatever the mode of monitoring used.

2. ***Early pregnancy ultrasound for dating: Don't offer women with uncomplicated pregnancies a routine early first trimester ultrasound for dating purposes alone.***

   Accurate knowledge of gestational age is valuable for pregnancy care. Pregnancies can be dated based on LMP or ultrasound, with numerous research papers demonstrating that ultrasound is superior. First trimester gestational ultrasound prediction is more accurate than second trimester prediction, but the difference is small. However, a late first trimester scan can give reliable dating information while providing a more detailed fetal assessment.

   A routine early first trimester scan is not justified if pregnancy dating is the sole reason for the scan, other clinical indications are required to justify its use. Nearly 80% of all New Zealand women have a nuchal translucency scan (between 11 weeks and 13+6 gestation as part of the first trimester fetal anomaly screening process). This scan can be used for dating purposes if LMP is uncertain. If women choose not to have fetal anomaly screening, a late first trimester ultrasound may be clinically useful to determine chronicity in twin pregnancies and to exclude major fetal abnormality.

   Routine ultrasound use before 24 weeks improves detection of undiagnosed twins, reduces postdates inductions, and allows detection of fetal anomalies before birth. If a woman declines all pregnancy ultrasounds, estimation of gestational age is calculated by LMP and clinical assessments.

3. ***Ultrasound for large babies: Unless the mother has diabetes, in the absence of other clinical concerns ultrasound scans should not be routinely offered to check if a baby is bigger than normal for its gestational age.***

   The term fetal macrosomia implies fetal growth beyond a specific weight, regardless of the fetal gestational age. Results from large cohort studies support the use of 4,500g as the weight at which a fetus should be considered macrosomic. Large for Gestational Age (LGA) is defined as birth weight above the 90th percentile for population and sex-specific growth curves. There has been a rise in the prevalence of LGA babies over the past few decades in many countries. As birth weight increases, the likelihood of labour abnormalities, shoulder dystocia, birth trauma, and permanent injury to the neonate increases. However, the diagnosis of fetal macrosomia is imprecise. For suspected fetal macrosomia, the accuracy of estimated fetal weight using ultrasound biometry is no better than that obtained with clinical palpation.

   Ultrasonography significantly overestimates the prevalence of LGA in women with gestational diabetes mellitus, and an ultrasound diagnosis of LGA is associated with an increased risk for caesarean delivery independent of birth weight. Caesarean section is associated with increased morbidity for women, and risk of stillbirth in subsequent pregnancy.

   It can be difficult to estimate fetal growth in women with a raised BMI using abdominal palpation alone. In the presence of clinical concerns or factors (such as raised BMI) practitioners decision making regarding ultrasound use to assess fetal growth should be individualised based on clinical assessments.

4. ***Timing of umbilical cord clamping: In term and pre-term infants who do not require resuscitation at birth, delay umbilical cord clamping for at least 3 minutes or until the cord has stopped pulsating (whichever is longer).***

   Delayed cord clamping increases neonatal haemoglobin levels at birth and improves iron stores in the first several months of life, which may have a favourable effect on developmental outcomes. Delayed umbilical cord clamping is associated with significant neonatal benefits in preterm infants, including improved transitional circulation, better establishment of red blood cell volume, decreased need for blood transfusion, and lower incidence of necrotizing enterocolitis and intraventricular haemorrhage. There is a small increase in the incidence of jaundice that requires phototherapy in term infants undergoing delayed umbilical cord clamping but the benefits of delayed clamping outweigh this risk. Delayed umbilical cord clamping does not increase the risk of postpartum haemorrhage.

   The third stage of labour may be completed by either physiological means or active management. If active management or uterotonic drugs are being used, the optimal timing for administration of the uterotonic is currently unknown and the effect of the administration of a uterotonic on neonatal health when given in relation to clamping of the cord is unknown. Until further evidence to support practice is collated, it is advised that the uterotonic drug of choice be administered after the cord has been clamped and cut if possible.

OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

1. ***Do not request low back X-rays or other forms of low back imaging as part of a routine preplacement medical examination.***

The purpose of preplacement medical examinations should be to determine an individual's ability to perform the job. However, such examinations are generally not recommended unless there is a reason for using them to assess some specific occupational risks. Even if a routine preplacement medical examination is justified, low back X-rays and other imaging are not useful preplacement tests to undertake because they have not been found to predict future injuries. These tests also result in unnecessary radiation exposure and age-related, asymptomatic, clinically unimportant findings may trigger further imaging evaluation and/or patient anxiety.

2. ***Do not order X-rays or other imaging for acute non-specific low back pain, unless there are red flags or other clinical reasons to suspect serious spinal pathology.***

   As little as two per cent of low back pain cases represent potentially serious conditions requiring surgical or medical intervention. The majority of acute low back pain episodes are benign, self-limiting cases that do not warrant any X-ray or imaging studies. Indeed, unnecessary X-rays and imaging can be harmful due to the potential adverse health effects associated with radiation exposure, incidental findings that trigger more imaging to be performed, and description of asymptomatic, age-related changes in the spine that can result in inappropriate patient anxiety. Moreover, the attribution of symptoms to unrelated incidental findings can then lead to unnecessary surgery.

   It is therefore recommended that X-rays and other imaging of the lower back should be performed only if there are red flags such as: a history of significant trauma, cauda equina syndrome, symptoms suggestive of a tumour or infection (fever, weight loss, and a history of cancer), and steroid use. Also, plain radiography is insufficiently sensitive and specific pain associated with these risk factors with the exception of suspected 'low energy' fractures e.g. low-height falls in the elderly or osteoporotic. In these cases, plain radiography can be useful to determine whether a fracture is present and inform investigation and treatment of patients at risk of osteoporosis to prevent further fragility fractures.

3. ***Do not prescribe opioids for the treatment of acute or chronic pain without assessing the patient's clinical condition, potential side effects, alternative analgesic options, work status, and capacity to perform safety-critical activities such as driving a motor vehicle.***

   Studies demonstrate that prescribing opioids for workers suffering back injuries is correlated with significantly longer periods of disability and a higher risk of surgery. Some of these relationships may be attributable to the higher likelihood of opiate prescription for people with more serious injuries. However, other studies have documented that long-term opioid use for chronic pain is associated with serious risks such as abuse and dependence, overdose, myocardial infarction, and motor vehicle crashes. These risks may outweigh the benefits given there is also insufficient evidence on whether the pain relief provided by opioids is sustained in the long term.

   The use of opioids can result in euphoria, drowsiness or inability to concentrate, so using opioids is incompatible with many jobs. Thus, opioid prescription for the treatment of acute or chronic pain should not be initiated without first assessing the patient's clinical condition, potential side effects, alternative analgesic options, work status, and their capacity to perform safety-critical activities.

4. ***Do not certify a patient as totally unfit for work unless the work absence is clinically necessary, and the patient is unfit for suitable alternative or restricted duties.***

   While some medical conditions necessitate time off work, for example, a person recovering from surgery or experiencing debilitating pain, with many medical conditions there is a substantial discretionary element to work absence. So some patients may be able to participate in work if employers make appropriate accommodations.

   There is substantial evidence to support a positive link between work and (physical, mental and social) health, as well as evidence that absence from work contributes to declining health, slower recovery times, and longer duration of disability. The certification of work absences due to medically discretionary injuries and illnesses should therefore be discouraged. When asked to provide an opinion on functional abilities to employers or insurers, medical practitioners' focus should be on abilities; restrictions should be objective, specific, and listed only when medically indicated.

5. ***Do not repeat chest X-rays when screening asbestos-exposed workers unless clinically indicated.***

   Asbestosis usually takes years to decades to develop after the initial exposure and chest X-rays cannot immediately indicate whether or not asbestos fibres have been inhaled. Given the long latency period, screening and early detection of asbestosis by chest X-ray is unlikely to confer any health advantage or psychological benefit on asbestos-exposed individuals. Moreover, there is now evidence that low-dose multi-detector CT (MDCT) rather than chest X-ray is justified for initial

examination because it is more sensitive.

Therefore, while it may be appropriate to obtain a baseline chest X-ray at the time of first assessment, for screening purposes the radiation risk outweighs the benefit of frequent chest X-rays.

Radiation exposure is also a concern for repeated CT scans. Further screening may be justified only if exposure to asbestos has continued and, in this case, the frequency and extent of exposure should determine the requirement for repeat screening. In addition, low-dose CT may be appropriate in individual cases, if there is considered to be an increased risk of lung cancer.

CHILD NEUROLOGY

1. Do not routinely perform electroencephalographs (EEGs) for children presenting with febrile seizures

Febrile seizures are seizures associated with fever, but without evidence of central nervous system infection. There is no evidence that epileptiform discharges (i.e. distinctive electroencephalograph patterns associated with epileptic disorders) in children with febrile seizures have any diagnostic or prognostic implications.

For instance, even among otherwise neurodevelopmentally normal children with a first complex febrile seizure (febrile seizures which are prolonged or occur multiple times within 24 hours or are confined to one side of the body) these EEG patterns are a poor predictor for epilepsy. Therefore, an EEG test should not be a routine investigation for these and other patients presenting with febrile seizures.

2. Do not routinely perform computed tomography (CT) scanning of children presenting with new onset seizures

The yield from neuroimaging of children presenting with new onset afebrile seizures is typically low, with one study finding that it led to a change in clinical management for only four percent of patients. As there are already a well-tested set of indicators for determining the likelihood of intracranial abnormalities in children with new onset unprovoked seizures, a combination of clinical history, examination, and electroencephalograph (where relevant) should first be used to determine whether the condition warrants neuroimaging.

Clinical indicators for intracranial abnormalities, which are likely to change initial patient management, include (i) a focal seizure in children aged less than three years, (ii) abnormal neurological examination, (iii) Todd's post-ictal paresis, or (iv) presence of a condition predisposing to seizures.

In children where an intracranial abnormality is considered likely, and neuroimaging is indicated, magnetic resonance imaging (MRI) is recommended over computed tomography (CT) because (i) there is superior anatomic resolution and characterisation of pathologic processes from using MRI, and (ii) there is radiation exposure and escalated future cancer risk associated with CT.

3. Do not routinely undertake repeat blood level monitoring of antiepileptic drug (AED) treatments

The serum concentration of an antiepileptic drug (AED) varies markedly between patients taking the same dosage because of differences in people's ability to absorb, distribute, metabolise and excrete drugs. The utility of drug blood level monitoring assumes that plasma drug level correlates better with clinical response or side effects than with dosage or provides better information than clinical review of the patient. However, evidence from a major randomised controlled trial suggests that repeat blood level monitoring of AED treatments has no discernible impact on patient outcomes in terms of remissions from seizures or incidence of adverse effects. Other studies have also shown that there is no definitive correlation between a patient's AED blood level and clinical efficacy.

Specific exceptions where targeted AED blood level assessment can be useful include their use in assessing compliance, titrating AEDs in complex polypharmacy regimens, or adjusting for altered AED metabolism in disease states, puberty, or pregnancy.

4. Do not routinely undertake neuroimaging for new onset primary headache without first examining for neurological abnormality

Most headaches are attributable to benign conditions. Studies suggest that the yield of neuroimaging findings in children with headache that actually change patient management is no higher than 2.5 per cent. This supports the practice of selective imaging of paediatric headache patients with clinical presentation suspicious for intracranial abnormality.

Moreover, the routine use of neuroimaging may lead to the discovery of incidental benign abnormalities, which may cause undue alarm, and headaches may be wrongfully attributed to these incidental findings. For instance, a retrospective study revealed benign neuroimaging abnormalities in approximately 20 per cent of paediatric headache patients who underwent neuroimaging.

Neuroimaging on a routine basis is therefore not indicated in children with new onset primary headaches and a normal neurological examination. It should be reserved for a selected group of children whose history and/or physical examination suggest serious intracranial pathologies.

5. ***Do not routinely perform electroencephalographs (EEGs) for children presenting with syncope (fainting)***

Studies have found that the incidence of epileptiform discharges (i.e. distinctive EEG patterns associated with epileptic disorders) in patients with syncope is roughly similar to its incidence among healthy subjects, and that therefore EEG has very low diagnostic yield among these patients. Moreover, clinical criteria have been formulated that can differentiate syncope from seizures with very high sensitivity and specificity. Thus, guidelines recommend that an EEG should not be performed if syncope is the most likely cause of the transient loss of consciousness.

SEXUAL HEALTH MEDICINE

1. ***Do not order herpes serology tests unless there is a clear clinical indication.***

Herpes serology is not an appropriate screening test in asymptomatic patients and does not accurately confirm whether the person is infected or is a transmission risk to others from asymptomatic shedding. Clinicians also need to consider whether test results will influence treatment or outcomes because, if they do not, then testing is a waste of finite health resources and is not indicated. Herpes serology tests only have good sensitivity and specificity in high prevalence populations. However, selective use of herpes serological tests may be justified for particular groups, such as those at high risk for STIs and human immunodeficiency virus (HIV) infection who are motivated to reduce their sexual risk behaviour; HIV-infected patients; patients with sexual partners with genital herpes; and in cases where a woman appears to have a first episode of herpes simplex virus (HSV) during pregnancy.

2. ***Do not screen for chlamydia using serological tests.***

There is no role for chlamydia serology as a screening test as antibodies elicited during infection are long-lived, meaning a positive antibody test will not distinguish between a previous and a current infection and are non-specific for genital serovars. Chlamydia serology may be useful in specific circumstances, for example, investigating atypical pneumonia in babies or in identifying late stage Lymphogranuloma Venereum (LGV) infection.

Laboratory tests based on nucleic acid amplification (NAAT) technologies remain the first choice for diagnosis of chlamydial infections during pregnancy and in other settings. NAAT testing for identifying LGV serovars of Chlamydia trachomatis has superseded the use of serology for diagnosis but is only available in some specialist settings.

3. ***Do not treat recurrent or persistent symptoms of vulvovaginal candidiasis with topical and oral anti-fungal agents without further clinical and microbiological assessment.***

While topical and oral anti-fungal agents are the recommended treatment for candidiasis, an adequate clinical and microbiological assessment should be undertaken before they are prescribed or self-administered by patients for recurrent or persistent symptoms of vulvovaginal candidiasis. It is important to rule out other causes of vulvovaginal symptoms such as bacterial vaginosis or genital herpes first so that the other infections are not left untreated. Moreover, inappropriate use of antifungal drugs can lead to increased fungal resistance, especially in non-albicans species of candida.

4. ***Do not test for ureaplasma species in asymptomatic patients.***

Ureaplasma species are part of the normal genital microbiota and there are typically high rates of colonisation of the organism in sexually active adults. Testing or screening for genital infection with ureaplasma species is not recommended outside specialist or research settings as they have not been established as a cause of lower genital tract disease.

5. ***Reconsider the use of nucleic acid amplification testing for gonorrhoea in low-prevalence (i.e. <1% prevalence) populations and people who do not belong to a higher risk group.***

   The introduction of a duplex testing item into the MBS for nucleic acid amplification testing (NAAT) of chlamydia and gonorrhoea has resulted in laboratories performing this duplex test even if a test for only one organism was requested. Use of NAATs as a screening test for gonorrhoea in low-prevalence populations is not advised due to their low positive predictive value. However, an adequate sexual history needs to be taken in all cases to allow for the identification of higher risk groups within the population including men who have sex with men (MSM), the Aboriginal and Torres Strait Islander population, heterosexuals who travel overseas and people with multiple sexual partners. There are potential harms associated with false positive test results and incorrect diagnosis of gonococcal infections. Therefore, it is recommended that use of NAAT for gonorrhoea should be reconsidered in low prevalence (i.e. <1% prevalence) populations.

EMERGENCY MEDICINE

1. ***Avoid requesting computed tomography (CT) imaging of kidneys, ureters and bladder (KUB) in otherwise healthy emergency department patients, age <50 years, with a known history pf kidney stones, presenting with symptoms and signs consistent with uncomplicated renal colic.***

   Acute flank pain due to suspected renal colic is a common clinical presentation in the emergency department. While a CT-KUB allows a rapid, contrast-free diagnosis of kidney stones, it is a high ionizing-radiation technique. Younger patients with typical renal colic pain that remits spontaneously, or with analgesia, and have no features on history, examination or laboratory investigations that suggest complicated renal stones or a serious alternate diagnosis can be managed without repeated imaging. Concerning features include fever, features of urinary tract infection, lack of haematuria, ongoing high analgesia requirements, or palpable abdominal mass.

2. ***Avoid coagulation studies in emergency department patients unless there is a clearly defined specific clinical indication, such as for monitoring of anticoagulants, in patients with suspected severe liver disease, coagulopathy, or in the assessment of snakebite envenomation*.***

   * Point of care testing (POCT) devices are unreliable in assessment of snakebite envenomation.

   Abnormal coagulation test results in conditions such as acute coronary syndrome can usually be predicted by history, and they rarely affect patient management. Routine coagulation studies in the emergency department therefore represent a substantial added cost, with no benefit to patients. Coagulation studies should be performed based on a history of warfarin or heparin use, or a history of severe liver disease.

   Please refer to the joint ACEM/Royal Australian College of Pathologists Guideline on Pathology Testing in the Emergency Department, for further guidance on appropriate pathology test requesting in emergency departments.

3. ***Avoid blood cultures in patients who are not systemically septic, have a clear source of infection and in whom a direct specimen for culture (e.g. urine, wound swab, sputum, cerebrospinal fluid, or joint aspirate) is possible.***

   Blood cultures taken in an emergency department do not add more information that would aid clinical management; they also represent a significant cost. The rate of false positives in blood cultures has been reported as approximately 50% and other, more direct, tests have been shown to have a markedly higher yield – i.e. a diagnostic procedure that often results in a definitive diagnosis.

   Please refer to the joint ACEM/Royal Australian College of Pathologists Guideline on Pathology Testing in the Emergency Department for further guidance on appropriate pathology test requesting in emergency departments.

4. ***For emergency department patients approaching end-of-life, ensure clinicians, patients and families have a common understanding of the goals of care.***

   The emergency department is a challenging environment for end-of-life care, presenting ethical and quality of life issues.

Research indicates that over 50% of Australians who die an 'anticipated' or 'expected' death, will die in acute hospitals, even though the majority approaching end-of-life wish to die at home. In this context, clinicians, patients and their families should work together to ensure they have a common understanding of the goals of care. Values and wishes around medical treatment should be documented. Monitoring and investigations should be appropriate. Clinicians should advocate for the patient by initiating discussion about end-of-life care with inpatient clinicians and community health professionals. When possible, arrange for end-of-life patients to be transferred to a palliative care facility to avoid admission to acute wards.

5. ***Don't request imaging of the cervical spine in trauma patients, unless indicated by a validated clinical decision rule.***

   Cervical spine imaging of every trauma patient is costly and results in significant radiation exposure to a large number of patients, very few of whom will have a spinal column injury. Clinical decision rules have been developed that identify patients who can safely be managed without imaging. These rules include the Canadian C-Spine rule or Nexus Low Risk Criteria. The Canadian C-Spine Rule provides higher specificity and lower imaging requirements, and should be used if possible.

   This is a joint recommendation with The Royal Australian and New Zealand College of Radiologists (RANZCR).

6. ***Don't request computed tomography (CT) head scans in patients with a head injury, unless indicated by a validated clinical decision rule.***

   Most head injuries presenting to emergency departments will be minor and do not require immediate neurosurgical intervention or inpatient care. Mild head injury patients can be risk stratified into 'low' or 'high' risk groups based on the presence or absence of identified clinical risk factors. Current validated clinical decision rules include the Canadian CT Head Rule (for adults) or the PECARN (Paediatric Emergency Care Applied Research Network) Tool (for children). These rules can safely identify patients who can be discharged home, without CT scanning.

   This is a joint recommendation with The Royal Australian and New Zealand College of Radiologists (RANZCR).

INFECTIOUS DISEASES

1. ***Do not use antibiotics in asymptomatic bacteriuria.***

   Antibiotic treatment of patients with asymptomatic bacteriuria is generally not indicated as it does not decrease the incidence of symptomatic urinary tract infection. This also includes patients with indwelling urinary catheters. Exceptions to this are pregnant women and those undergoing an urological procedure.

2. ***Do not take a swab or use antibiotics for the management of a leg ulcer without clinical infection.***

   Lower leg ulcers, most commonly venous ulcers are often treated with oral antibiotics, even in the absence of evidence of clinical infection. There is no evidence to support this use, except if screening for carriage of multi-resistant organisms. Also, a swab for microscopy and culture, in the absence of signs of infection is not recommended. Unnecessary antibiotics and swabbing will add to healthcare costs, antimicrobial resistance and patient allergy.

3. ***Avoid prescribing antibiotics for upper respiratory tract infection.***

   Most uncomplicated upper respiratory infections are viral in aetiology and antibiotic therapy is not indicated. Oral antibiotic therapy of presumed URTI in febrile young infants is not only 'low value' but can be actively dangerous, in delaying presentation to hospital (inappropriately reassuring parents and confounding investigations of sepsis). This is a major issue for paediatrics primary care and ED presentations. Patient education is an important component of management together with symptomatic treatment. Infections with Streptococcus pyogenes and Bordetella pertussis do require antibiotic therapy.

4. ***Do not investigate or treat for faecal pathogens in the absence of diarrhoea or other gastro-intestinal symptoms.***

   Testing of faeces for microscopy and culture or by PCR methods should not be performed in the absence of diarrhoea or other gastro-intestinal symptoms. Similarly, antimicrobial treatment for a gastrointestinal pathogen is not indicated in the absence of symptoms. For immunocompetent non-traveler children with acute gastroenteritis, there are very few circumstances when a stool test for infection would alter clinical management. Possible exceptions include refugee screening and some neurological syndromes such as enteroviral testing for acute flaccid paralysis.

5. ***In a patient with fatigue, avoid performing multiple serological investigations, without a clinical indication or relevant epidemiology.***

Multiple serological testing as investigation for a patient with fatigue, is not recommended. If such testing is not clinically indicated there is a risk of false positive results leading to further unnecessary investigations and useless treatments.

INTENSIVE CARE MEDICINE

1. For patients with limited life expectancy (such as advanced cardiac, renal or respiratory failure, metastatic malignancy, third line chemotherapy) ensure patients have a 'goals of care' discussion at or prior to admission to ICU and for patients in ICU who are at high risk for death or severely impaired functional recovery, ensure that alternative care focused predominantly on comfort and dignity is offered to patients and their families

The ANZICS Statement on Care and Decision Making at the End of Life for the Critically Ill states that the goal of intensive care is to return patients to a quality of life that is acceptable to them. In order to achieve this goal, it is essential that clinicians explore the values and preferences of each patient. Engaging with patients and their families in the discussions around treatment limitations or withdrawal can improve the quality of dying and reduce family and staff stress and bereavement.

2. Remove all invasive devices, such as intravascular lines and urinary catheters, as soon as possible

Patients in the intensive care unit often require invasive devices as part of their treatment as well as monitoring of therapy. These lines however are a potential source of healthcare related infections. Preventative 'bundles' of care including simple measures such as hand hygiene and aseptic methods of insertion and care of devices have reduced the risk of health care related infections. Infections related to invasive devices are a significant cause of morbidity and mortality. Hence, all invasive devices such as arterial lines, central lines, urinary catheters should be removed as soon as possible.

3. Transfuse red cells for anaemia only if the haemoglobin concentration is less than 70gm/L or if the patient is haemodynamically unstable or has significant cardiovascular or respiratory comorbidity

Numerous studies have highlighted the adverse outcomes that may be associated with blood transfusion. Randomised and other trials have indicated that transfusion of red blood cells for the treatment of anaemia in otherwise haemodynamically stable patients is either of no benefit or even harmful. There appears to be little or no proven benefit of transfusing beyond a threshold haemoglobin level of 70gm/L though the precise threshold for any given patient is unknown. Patients with active cardio-respiratory disease or neurological injury may warrant a higher threshold although harm associated with liberal transfusion in this group has also been reported.

4. Undertake daily attempts to lighten sedation in ventilated patients unless specifically contraindicated and deeply sedate mechanically ventilated patients only if there is a specific indication

Critically ill patients requiring mechanical ventilation are frequently treated with sedatives and analgesics, to treat pain, anxiety, dyspnoea and reduce tissue oxygen consumption. However prolonged or excessive sedation can be associated with delirium, critical illness weakness, prolonged ventilation and length of stay. Protocol-based approaches to limit deep sedation, by explicating titrating the sedation to a sedation goal, and daily interruptions of sedation, have been shown to improve patient outcomes, including a reduction in mortality. Exceptions to the daily sedation holiday are for patients requiring muscle paralysis, who should not be woken until the paralytic agent has worn off.

5. Consider antibiotic de-escalation daily

Infection can precipitate a need for intensive care admission and can occur as a complication of an ICU admission. The earliest administration of the most appropriate antibiotic and source control confer mortality benefit. However, antibiotics are also frequently used for the presumptive management of patients with 'sepsis' that may later prove to not have an infectious aetiology. In most circumstances, data regarding the appropriate duration of antibiotic administration are very difficult to interpret. In some conditions, such as endocarditis or osteomyelitis longer courses of antibiotics have been recommended. However, there is increasing evidence that shorter courses of antibiotics for common infections such as hospital acquired pneumonia do not confer worse outcomes or increased mortality than longer courses. Moreover, shorter courses probably help to prevent the development of antibiotic resistance. In the absence of microbiological evidence of ongoing infection and with an improvement in clinical status, consideration should be given to discontinuing antibiotics at the earliest opportunity possible.

IMMUNOLOGY AND ALLERGY

1. ***Don't use antihistamines to treat anaphylaxis – prompt administration of adrenaline is the only treatment for anaphylaxis.***

   For emergency treatment of a severe allergic reaction (anaphylaxis) it is important to promptly administer adrenaline by intramuscular injection using an adrenaline autoinjector if available, or by using adrenaline ampoules and syringe (the latter is only suitable in a medical setting).

   There is a high risk of potential harm (disability or death) from anaphylaxis if it is not treated promptly with adrenaline. There are also cost implications from delayed or inappropriate treatment of anaphylaxis, such as additional ambulance, emergency department and hospital costs, as well as additional anxiety for patients and their families or carers.

   Antihistamines are recommended for treatment of mild and moderate allergic reactions, including allergic rhinitis (hay fever), but have no role in treating or preventing respiratory and cardiovascular symptoms of anaphylaxis. In particular, oral sedating antihistamines should never be used in patients with anaphylaxis as side effects (drowsiness or lethargy) may mimic some signs of anaphylaxis. Injectable promethazine should not be used in anaphylaxis as it can worsen hypotension and cause muscle necrosis.

2. ***Alternative/unorthodox methods should not be used for allergy testing or treatment.***

   Whilst there is currently no cure for allergy, reliable tests and a range of treatments for allergy are available, which are backed up by scientific studies that demonstrate proven safety and efficacy.

   In contrast, numerous studies have demonstrated the uselessness of several alternative/unorthodox methods that claim to test or treat allergy. These methods continue to be promoted in the community and some even make false claims that they can cure allergy. There is also currently no stringent regulation of alternative/unorthodox diagnostic techniques and devices, so they can be "listed" in Australasia without having to prove that they work.

   There is a risk of potential harm if individuals with allergies are incorrectly diagnosed and inappropriately treated using alternative/unorthodox methods, particularly if they have severe allergies. The costs of alternative/unorthodox methods are significant, and are usually paid for by individuals, with rebates from some private health funds. There are cost implications for healthcare services as well as individuals, as these funds are being directed into non-productive areas, and are therefore not available for more useful medical tests and treatments.

   Examples of alternative/unorthodox methods that have been demonstrated to lack evidence for testing or treating allergy include food specific IgG and IgG4 tests, homeopathy, cytotoxic testing and kinesiology.

3. ***Allergen immunotherapy should not yet be used for routine treatment of food allergy – research in this area is ongoing.***

   Research into allergen immunotherapy for food allergy is ongoing and until further work determining safety and efficacy is determined, it should not be performed outside of well-defined medical research studies, as there is a high risk of potential harm in individuals with severe food allergy.

   Allergen immunotherapy is currently only recommended for treatment of allergic rhinitis (hay fever) due to pollen or dust mite allergy (and sometimes asthma) in appropriate patients when symptoms are severe, the cause is difficult to avoid (such as grass pollen) and medications don't help or cause adverse side effects.

4. ***Food-specific IgE testing should not be performed without a clinical history suggestive of potential IgE-mediated food allergy.***

   Reliable and proven diagnostic tests for food allergy include skin prick testing, blood tests for food specific IgE antibodies and medically supervised food allergen challenges. Allergy test results should never be used on their own, and must be considered together with the patient's clinical history. In the absence of a history of clinical symptoms, low levels of allergen-specific IgE are usually of little diagnostic significance.

   Allergy testing of individuals where there is no evidence that food allergy plays a role in their clinical symptoms increases the likelihood of irrelevant false positive results. This may lead to potential harm due to inappropriate and unnecessary dietary restrictions, with nutritional implications for the individual (particularly in children) and unnecessary fear and anxiety (particularly for the family or carers).

5. ***Don't delay introduction of solid/complementary foods to infants – ASCIA Infant Feeding Advice recommends early introduction of solid foods to infants, from 4-6 months old.***

This recommendation is consistent with ASCIA Infant Feeding Advice (first developed in 2008) which recommends (early introduction of solid foods to infants, from 4-6 months old (including foods considered to be highly allergenic such as peanut) preferably whilst breast feeding, with no delayed introductions, unless an allergic reaction occurs.

It is important to seek medical advice if an allergic reaction occurs and also regarding the safe introduction of foods if an infant has a sibling or parent with food allergy.

This recommendation is also consistent with findings from recent studies, including the 2015 LEAP (Learning Early About Peanut Allergy) trial published in the New England Journal of Medicine (NEJM). The LEAP trial concluded that the (early introduction of peanuts significantly decreased the frequency of the development of peanut allergy among children at high risk for this allergy and modulated immune responses to peanuts.

Whilst a recent Cochrane review cautioned against the use of this treatment despite finding benefits, this was on the basis that it had only found one valid study with 28 subjects and therefore randomised controlled trials with larger samples were needed to strengthen the evidence.

The recent LEAP trial occurred after the publication of this review and had 640 subjects.

NEUROLOGY

1. Don't perform imaging of the carotid arteries for simple faints.

Syncope is common, with a lifetime prevalence of 40%. Carotid imaging studies such as carotid duplex scans are commonly performed in patients presenting with syncope. When symptomatic, occlusive carotid artery disease causes focal neurologic symptoms such as weakness, altered sensation or speech, and not syncope. In addition, studies demonstrate that even elderly patients with syncope are unlikely to have carotid occlusive disease. Therefore, performing carotid imaging studies in patients with syncope increases cost without adding benefit. Furthermore, carotid imaging may identify incidental asymptomatic occlusive carotid artery disease that may be inappropriately assumed to be the cause of the syncope. This can delay the identification of the true cause of syncope and may subject the patient to additional risk-associated procedures such as catheter angiography, carotid endarterectomy (CEA), or carotid stenting.

2. Don't perform imaging of the brain for non-acute primary headache disorders.

Headache is a common disorder with many potential causes. The primary headache disorders, which include migraine and tension headaches, account for the majority of headaches. Secondary headaches, which are those with underlying pathology (e.g., tumour, aneurysm, or giant cell arteritis) are far less common. Most patients presenting with headache will not have a serious underlying condition. Neuroimaging is not usually warranted for patients with recurrent migraine or tension headaches and a normal neurological examination. The likelihood of significant intracranial lesions on CT or MRI in this group ranges from 0.3% to 0.4%. Headache worsened by Valsalva manoeuvre, headache causing awakening from sleep, new headache in the older population, or progressively worsening headache may indicate a higher likelihood of finding significant abnormalities on CT or MRI as does the presence of abnormal neurological signs on examination.

3. Don't perform epidural steroid injections to treat patients with low back pain who do not have radicular symptoms in the legs originating from the nerve roots.

Lumbar epidural steroid injections may provide limited short term benefit (less than 3-6 months) for patients with an acute lumbar radiculopathy causing back pain and symptoms in the legs (Level C evidence). When there is low back pain alone, the outcomes of epidural steroid injections are poor. Although serious adverse events are rare, catastrophic events can occur and any symptom relief from the injection is typically brief. The inconsequential benefits of epidural steroid injections for low back pain without radicular symptoms do not outweigh its risks, no matter how small they may be.

4. Don't use opioids for the treatment of migraine, except in rare circumstances.

Migraine is the most frequent cause of headache seen in the medical office, urgent care, or emergency department. Almost all patients should receive migraine-specific medications or non-opioid analgesics because these medications are the most effective migraine treatments. However, many patients continue to receive opioids for migraine treatment. Use of opioids

increases the risk of headache and chronic migraine arising from medication overuse. The per capita cost of headache and chronic migraine arising from medication overuse is 3 times that of episodic migraine. When medical conditions such as cardiovascular disease or pregnancy preclude use of migraine-specific treatments, or when migraine-specific treatments fail, opioids are sometimes considered for rescue therapy. In these circumstances, use should be limited to 9 days per month or less to avoid medication overuse headache, and doctors should continue to focus on preventive and behavioural aspects of migraine care. In addition, long-term follow-up is needed to prevent treatment complications.

5. Don't routinely recommend surgery for a narrowed carotid artery (>50% stenosis) that has not caused symptoms.

Best medical therapy is generally the appropriate management of patients with asymptomatic carotid stenosis. Medical treatment has improved since trials comparing carotid endarterectomy (CEA) plus best medical treatment with best medical treatment in asymptomatic carotid stenosis were conducted. There is evidence that the annual stroke rate in patients with asymptomatic carotid stenosis receiving best medical treatment has fallen to ≤1% annually. The effectiveness of CEA compared with current best medical therapy is not established. Additionally, randomised trials suggested equivocal benefit in women and patients aged >75. It may be reasonable to consider CEA for highly selected patient aged <75 years with >70% stenosis of the internal carotid artery. Where the perioperative risk of stroke, death and myocardial infarction is <3% and the patient is estimated to have a life expectancy of more than 3 to 5 years, consultation with a physician with expertise in stroke care is recommended prior to surgery.

GERIATRICS

1. Do not use antipsychotics as the first choice to treat behavioural and psychological symptoms of dementia.

People with dementia may exhibit aggression, resistance to care and other challenging or disruptive behaviours. In such instances, the modest effectiveness of atypical antipsychotics may be offset by the higher risks for adverse events and mortality. Non-pharmacological interventions can be an effective substitute for antipsychotic medications. Use of these drugs should therefore be limited to cases where non-pharmacologic measures have failed and patients pose an imminent threat to themselves or others.

2. Do not prescribe benzodiazepines or other sedative-hypnotics to older adults as first choice for insomnia, agitation or delirium.

There is strong evidence that use of benzodiazepines is associated with various adverse effects in elderly people such as falls and fractures. Older patients, their caregivers and their providers should recognize these potential harms when considering treatment strategies for insomnia, agitation or delirium. Thus, these drugs should be prescribed with caution, and their use monitored closely.

3. Do not use antimicrobials to treat bacteriuria in older adults where specific urinary tract symptoms are not present.

Studies have found that asymptomatic bacteriuria frequently resolves without any treatment. Antimicrobial treatment studies for asymptomatic bacteriuria in older adults demonstrate no benefits and, in fact, often show increased adverse antimicrobial effects.

4. Do not prescribe medication without conducting a drug regimen review.

Older patients disproportionately use more prescription and non-prescription drugs than other populations. Evidence shows that such polypharmacy increases the risk of adverse drug reactions and hospital admissions. Medication review with follow up is therefore recommended for optimising prescribed medication and improving quality of life in older adults with polypharmacy.

5. Do not use physical restraints to manage behavioural symptoms of hospitalized older adults with delirium except as a last resort.

There is little evidence to support the effectiveness of physical restraints to manage people with delirium who exhibit behaviours that risk injury. Physical restraints can lead to serious injury or death and may worsen agitation and delirium. Restraints should therefore be used as a last resort and should be discontinued at the earliest possible time, particularly given that effective non-pharmacological alternatives are available.

PALLIATIVE MEDICINE

1. Do not delay discussion of and referral to palliative care for a patient with serious illness just because they are pursuing disease-directed treatment.

Palliative care provides an added layer of support to patients with life-limiting disease and their families. Symptomatic patients can benefit regardless of their diagnosis, prognosis or disease treatment regimen. Studies show that integrating palliative care with disease-modifying therapies improves pain and symptom control, as well as patient quality of life and family satisfaction. Early access to palliative care has been shown to reduce aggressive therapies at the end of life, prolong life in certain patient populations, and significantly reduce hospital costs.

2. Do not delay conversations around prognosis, wishes, values and end of life planning (including advance care planning) in patients with advanced disease

Advance care planning is a process, which includes choosing a surrogate or alternate decision-maker and communicating values or wishes for medical care. Evidence shows that advance care planning conversations improve patient and family satisfaction with care and concordance between patients' and families' wishes, reduce the likelihood of patients receiving hospital care and the number of days spent in hospital, and increase the likelihood of receiving hospice care.

3. Do not use oxygen therapy to treat non-hypoxic dyspnoea in the absence of anxiety or routinely use oxygen therapy at the end of life

Oxygen is frequently used to relieve shortness of breath in patients with advanced illness. However, supplemental oxygen does not benefit patients who are breathless but not hypoxic. Supplemental flow of air is equally as effective as oxygen under these circumstances. The use of a fan for facial air streaming can also be effective.

4. Do not use percutaneous feeding tubes in patients with advanced dementia; instead use oral assisted feeding

Strong evidence exists that artificial nutrition does not prolong life or improve quality of life in patients with advanced dementia. Substantial functional decline and recurrent or progressive medical illnesses may indicate that a patient who is not eating is unlikely to obtain any significant or long-term benefit from artificial nutrition. Feeding tubes are often placed after hospitalization, frequently with concerns for aspirations, and for those who are not eating. Contrary to what many people think, tube feeding does not ensure the patient's comfort or reduce suffering; it may cause fluid overload, diarrhoea, abdominal pain, local complications, less human interaction and may increase the risk of aspiration. Assistance with oral feeding is an evidence-based approach to provide nutrition for patients with advanced dementia and feeding problems.

5. To avoid adverse medication interactions and adverse drug events in cases of polypharmacy, do not prescribe medication without conducting a drug regime review

Older patients disproportionately use more prescription and non-prescription drugs than other populations. Evidence shows that such polypharmacy increases the risk of adverse drug reactions and hospital admissions. Medication review with follow up is therefore recommended for optimising prescribed medication and improving quality of life in older adults with polypharmacy.

HAEMATOLOGY

1. Do not conduct thrombophilia testing in adult patients under the age of 50 years unless the first episode of venous thromboembolism (VTE):

- occurs in the absence of a major transient risk factors (surgery, trauma, immobility), or
- occurs in the absence of oestrogen-provocation, or
- occurs at an unusual site.

Thrombophilia testing is costly and can result in harm to patients if the duration of anticoagulation is inappropriately prolonged or if patients are incorrectly labelled as thrombophilic. Thrombophilia testing does not change the management of venous thromboembolism (VTE) occurring in the setting of major transient VTE
risk factors.

2. Limit surveillance computed tomography (CT) scans in asymptomatic patients with confirmed complete remission following curative intent treatment for aggressive lymphoma – except for patients on a clinical trial.

CT surveillance in asymptomatic patients in remission from aggressive lymphoma may be harmful through a small but cumulative risk of radiation-induced malignancy. It is also costly and has not been demonstrated to improve survival. Therefore, the anticipated benefits of post-treatment CT scans should be weighed against the potential harm of radiation exposure. Due to a decreasing probability of relapse with the passage of time and a lack of proven benefit, CT scans in asymptomatic patients more than 2 years beyond the completion of treatment are rarely advisable.

3. Do not extend anticoagulation beyond 3 months for a patient with a non-extensive, index venous thromboembolic event (VTE), which occurred in the setting of a major, transient risk factor.

Anticoagulation is potentially harmful and costly. Patients with a first venous thromboembolism (VTE) triggered by a major, transient risk factor are at low risk for recurrence once the risk factor has resolved and an adequate treatment regimen with anticoagulation has been completed. Evidence-based and consensus guidelines recommend three months of anticoagulation over shorter or longer periods of anticoagulation in patients with VTE in the setting of a reversible provoking factor.

4. Do not perform baseline or routine surveillance CT scans or bone marrow biopsy in patients with asymptomatic early stage chronic lymphocytic leukaemia (CLL).

In patients with asymptomatic, early-stage chronic lymphocytic leukaemia (CLL), baseline and routine surveillance computed tomography (CT) scans do not improve survival and are not necessary to stage or prognosticate patients. CT scans expose patients to small doses of radiation, and can detect incidental findings that are not clinically relevant but lead to further investigations and are costly. For asymptomatic patients with early-stage CLL, clinical staging and blood monitoring is recommended over CT scans.

5. Do not treat patients with immune thrombocytopenic purpura (ITP) in the absence of bleeding or a platelet count <30,000/L without risk factors for bleeding.

Treatment for immune thrombocytopenic purpura (ITP) should be aimed at treating and preventing bleeding episodes and improving quality of life. Unnecessary treatment exposes patients to potentially serious treatment side effects and can be costly, with little expectation of clinical benefit. Unless they are preparing for surgery or invasive procedure, or have significant additional risk factor for bleeding, ITP treatment is rarely indicated in adult patients with platelet counts greater than 30,000/L. In patients preparing for surgery or other invasive procedures, short-term treatment may be indicated to increase the platelet count prior to the planned intervention and during the immediate post-operative period.

GENETICS

1. Don't use brain magnetic resonance imagery (MRI) for routine surveillance of asymptomatic neurofibromatosis type 1.

Neurofibromatosis type I (NF-1) is a tumour disorder caused by the mutation of a gene on chromosome 17 that is responsible for control of cell division. It causes tumours along the nervous system that can grow anywhere in the body. Routine screening investigations are not recommended for the detection of the majority of complications associated with the condition. Baseline brain and spine MRI, and routine imaging of the chest and abdomen to identify asymptomatic tumours, do not influence management and should not be undertaken.

2. Don't undertake sequential testing for heterogeneous genetic disorders when targeted next generation sequencing (NGS) is available.

A heterogeneous genetic disorder is one where the same disease or condition can be caused, or contributed to, by a number of different genes. The traditional strategy for genetic testing involves sequential sequencing of individual genes, selected according to the patient's clinical presentation and family history. By contrast, next generation sequencing (NGS) involves the sequencing of millions of small fragments of DNA at the same time. Reductions in the cost of NGS now make it a more attractive solution for clinical diagnostic testing to identify the disease-causing mutation(s) in patients with genetically heterogeneous disorders than traditional sequential testing.

In particular, the targeted NGS approach which restricts analysis to genes known to be implicated in a particular phenotype

has been also successfully applied to heterogeneous disorders such as inherited peripheral neuropathy (IP).

3. Don't undertake genetic testing for methylenetetrahydrofolate reductase (MTHFR), apolipoprotein E (APOE) and other such tests where the clinical utility for diagnostic purposes is extremely low.

While genetic testing can help indicate susceptibility to particular genetic conditions, there are some conditions where the presence of particular alleles is neither necessary nor sufficient to cause the condition or where the alleles have a higher prevalence in the general population than the condition itself. This is the case for instance with apolipoprotein E as a genetic marker for Alzheimer's disease and methylenetetrahydrofolate as a marker for venous thromboembolism.

4. Don't undertake carrier state testing for rare recessive disorders where a partner has a family history, the couple is non-consanguineous and there are no common causative mutations.

With a rare recessive disorder, although the individual with the family history will have an increased risk of being a carrier, their unrelated partner will have a low general population risk. Therefore, their a priori combined risk of having a child with this rare recessive condition will generally be less than 1%. If the gene has no known common disease causative mutations, then testing the unrelated partner for carrier status has low sensitivity and specificity.

5. Don't undertake genetic testing when clinical diagnostic criteria exist and there are no reproductive or predictive testing implications.

Like other screening or diagnostic tests, genetic tests do not have inherent utility. It is the adoption of therapeutic or preventive interventions that influences health outcomes. If clinical diagnostic criteria already exist for the condition in question and there are no reproductive or other predictive testing implications as a result of definitively identifying a genetic cause for the condition, then this renders genetic testing unnecessary.

DERMATOLOGY

1. Don't prescribe oral antifungal therapy for suspected nail fungus without confirmation of fungal infection.

About half of nails with suspected fungus do not have a fungal infection. Because other nail conditions, such as nail dystrophies, may look similar in appearance, it is important to ensure accurate diagnosis of nail disease before beginning treatment.

By confirming a fungal infection, patients are not inappropriately at risk for the side-effects of antifungal therapy, and nail disease is correctly treated.

2. Don't perform sentinel lymph node biopsy or other diagnostic tests for the evaluation of early, thin melanoma because they do not improve survival.

Patients with early, thin melanoma, such as melanoma in situ, T1a melanoma, or T1b melanoma ≤ 0.5mm, have a very low risk of the cancer spreading to the lymph nodes or other parts of the body. Further, patients with early, thin melanoma have a 97 per cent five-year survival rate, which also indicates a low risk of the cancer spreading to other parts of the body. As such, the performance of sentinel lymph node biopsy is unnecessary.

Additionally, baseline blood tests and radiographic studies (e.g. chest radiographs, CT scans, and PET scans) are not the most accurate tests for the detection of cancer that is spreading because they have high false-positive rates. These tests have only shown benefit when performed as indicated for suspicious signs and symptoms based on the patient's history and physical exam.

3. Don't treat uncomplicated, non-melanoma skin cancer less than 1 centimetre in size on the trunk and extremities with Mohs micrographic surgery.

In healthy individuals, the use of Mohs micrographic surgery for low-risk, small (< 1cm), superficial or non-aggressive (based on appearance under a microscope) squamous cell carcinomas and basal cell carcinomas is inappropriate for skin cancers on the trunk and extremities. In these areas of the body, the clinical benefits of this specialized surgical procedure do not exceed the potential risks. It is important to note that Mohs micrographic surgery may be considered for skin cancers that appear on the hands, feet, ankles, shins, nipples, or genitals because they have been shown to have a higher risk for recurrence or require additional surgical considerations.

4. Don't use oral antibiotics for the treatment of atopic dermatitis unless there is clinical evidence of infection.

The presence of high numbers of the staphylococcus aureus bacteria on the skin of children and adults with atopic dermatitis is common. It is widely believed that staph bacteria may play a role in causing skin inflammation, but the routine use of oral antibiotic therapy to decrease the amount of bacteria on the skin has not been definitively shown to reduce the signs, symptoms (e.g. redness, itch), or severity of atopic dermatitis. In addition, if oral antibiotics are used when there is not an infection, it may lead to the development of antibiotic resistance.

The use of oral antibiotics can also cause side effects, including hypersensitivity reactions, or exaggerated immune responses such as allergic reactions. Although it can be difficult to determine the presence of a skin infection in atopic dermatitis patients, oral antibiotics should only be used to treat patients with evidence of bacterial infection in conjunction with other standard and appropriate treatments for atopic dermatitis.

5. Don't routinely use topical antibiotics on a surgical wound.

The use of topical antibiotics on clean surgical wounds has not been shown to reduce the rate of infection compared to the use of non-antibiotic ointment or no ointment. Topical antibiotics can aggravate open wounds, hindering the normal wound-healing process.

When topical antibiotics are used in this setting, there is a significant risk of developing contact dermatitis, a condition in which the skin becomes red, sore, or inflamed after direct contact with a substance, along with the potential for developing antibiotic resistance. Only wounds that show symptoms of infection should receive appropriate antibiotic treatment.

PAEDIATRICS & CHILD HEALTH

1. Do not routinely prescribe oral antibiotics to children with fever without an identified bacterial infection.

The vast majority of children presenting with fever do not have a bacterial infection and therefore will not benefit from being prescribed oral antibiotics. For instance, one study of febrile infants found overall bacteraemia frequency of well below one per cent. Sometimes, in exception to this, oral antibiotics are prescribed to treat an unapparent bacterial infection or prevent development of severe bacterial infection and appear to have beneficial effects, though even the significance of these effects is disputed. Given that inappropriate prescribing of antibiotics is a major cause of antibiotic resistance and antibiotics have adverse effects, it is not considered good clinical practice to prescribe antibiotics in children without a specific bacterial infection.

2. Do not routinely undertake chest radiography for the diagnosis of bronchiolitis in children or routinely prescribe salbutamol or systemic corticosteroids to treat bronchiolitis in children.

Chest radiography - Chest x-rays for patients with acute lower respiratory tract infections rarely affect clinical treatments and outcomes. Chest x-ray films do not discriminate well between bronchiolitis and other forms of lower respiratory tract infection and in mild cases do not offer information that is likely to affect treatment. It is estimated that 133 children with typical bronchiolitis would have to undergo radiography to identify one radiograph that is suggestive of an alternate diagnosis.

Salbutamol - With the exception of improving clinical scores in infants treated as outpatients, the evidence overwhelmingly shows that bronchodilators, including salbutamol, do not improve oxygen saturation, reduce hospital admissions or shorten the duration of hospitalisation and time to resolution of illness in children with bronchiolitis. Compared with these minimal benefits, salbutamol is associated with adverse impacts such as tachycardia, oxygen desaturation and tremors. If a bronchodilator is required, epinephrine appears to be a superior alternative to salbutamol in reducing the severity of bronchiolitis.

Steroids - The majority of randomised controlled trials have not found a clinically relevant, sustained impact of systemic or inhaled glucocorticoids on admissions or length of hospitalisation in children with bronchiolitis or other forms of lower respiratory tract infection.

3. Do not routinely order chest radiography for the diagnosis of asthma in children.

There is extensive evidence that the majority of x-rays ordered for children admitted for asthma and wheezing disorders do not provide clinically relevant information and therefore do not contribute to their diagnosis and management. Clear clinical criteria outlining the indications for radiography in asthma should be defined to avoid unwarranted chest radiography in

children with acute wheeze.

4. Do not routinely treat gastroesophageal reflux disease (GORD) in infants with acid suppression therapy.

Gastroesophageal reflux is common in preterm infants, infants and children and uncomplicated gastroesophageal reflux typically does not require medical therapy. However, gastroesophageal reflux may evolve into gastroesophageal reflux disease (GORD), a condition where the persistent leaking of stomach contents back into the oesophagus results in heartburn and other troublesome symptoms. Proton pump inhibitors (PPI) are sometimes prescribed in cases of GORD to achieve a pronounced and long-lasting reduction of gastric acid production.

However, numerous randomised controlled trials have concluded that PPIs are no more effective than placebo in treating GORD in infants, though there is some evidence (of moderate quality) of their effectiveness in treating GORD in older children. Moreover, there is still a paucity of trials confirming the long-term safety of PPI use in children more generally while there is considerable evidence that PPIs have significant negative side effects such headache, diarrhoea, constipation, nausea, increased rates of infection and increased rates of food allergy.

5. Do not routinely order abdominal radiography for the diagnosis of non-specific abdominal pain in children.

Retrospective studies of medical records of children and adults admitted for constipation and other forms of non-specific abdominal pain conclude that in only a very small minority (under five per cent) of cases do abdominal x-rays make a difference in patient treatment. A recent study also showed that abdominal x-rays were performed more frequently in misdiagnosed children. Numerous studies yield significantly varying estimates of the sensitivity and specificity of abdominal x-rays and insufficient evidence of a diagnostic association between symptoms of constipation and faecal loading seen on abdominal radiographs. There is significant scope for reducing the number of abdominal x-rays performed without sacrificing diagnostic accuracy for children with abdominal pain.

GENERAL SURGERY

1. Don't perform repair of minimally symptomatic or asymptomatic inguinal hernias without careful consideration, particularly in patients who have significant co-morbidities.

The proportion of patients presenting with inguinal hernias who are suffering significant co-morbidities is increasing. In these populations and in the presence of multiple of co-morbidities, the importance of carefully assessing the risks and benefits of surgical intervention is vital. Studies have shown that adoption of a watch and wait approach does not heighten the risk of the patient developing more severe symptoms. In cases of minimally symptomatic and asymptomatic inguinal hernias, the patient's prognosis and long term health may be improved by non-surgical intervention. Ongoing surgical review is required to ensure that an individual's condition is monitored and that a re-evaluation of their surgical need is made should their symptoms increase in severity.

2. Do not use ultrasound for the further investigation of clinically apparent groin hernias. Ultrasound should not be used as a justification for repair of hernias that are not clinically apparent.

The role of ultrasound in the diagnosis and treatment of groin hernias is limited. When the clinical diagnosis of a groin hernia is uncertain, any sonographic findings should be interpreted in conjunction with clinical judgment and treated conservatively. The diagnostic accuracy of ultrasound is reduced in the absence of any clinically palpable hernia.

3. Don't transfuse more units of blood than absolutely necessary, noting that many hospitals have developed policies on indications for transfusion with a view to minimisation.

The limited blood resources available within the health system and the lack of evidence to support transfusing more blood than required necessitate the use of appropriate guidelines. Patients should be carefully evaluated (through use of applicable guidelines) when being assessed for blood transfusions and closely monitored.

4. Do not use endoscopy for investigation in gastric band patients with symptoms of reflux.

The treatment of reflux in gastric band patients should be carefully considered. Endoscopy should not be used without consideration of alternative strategies. Reflux in gastric band patients is often related to the device. It is best managed by

removal of fluid, in consultation with a Bariatric Surgeon or other appropriately qualified person.

5. Don't do computed tomography (CT) for the evaluation of suspected appendicitis in children and young adults until after ultrasound has been considered as an option.

Although computed tomography (CT) is accurate in the evaluation of suspected appendicitis in the paediatric population, ultrasound is a good diagnostic tool that will reduce radiation exposure. Ultrasound is the preferred initial consideration for imaging examination in children and young adults. If the results of the ultrasound exam are equivocal, it may be followed by CT.

PHARMACOLOGY AND TOXICOLOGY

1. Recognise and stop the prescribing cascade.

A prescribing cascade occurs when a new medicine is prescribed to 'treat' an adverse reaction to another drug in the mistaken belief that a new medical condition requiring treatment has developed. Prescribing cascades should be avoided because they are associated with adverse outcomes due to the second or additional drugs, which places the patient at risk.

One example of a prescribing cascade is when a patient is prescribed a non-steroidal drug for pain, and is then prescribed proton pump inhibitors (PPIs) to reduce the risk of stomach side effects caused by the first prescribed drug. As prescribing cascades are precipitated by adverse drug reactions, they can be prevented by avoidance and early detection of the initial adverse drug reaction. For instance, many adverse drug reactions in the elderly are dose-related. It is advised that starting treatment at low doses and titrating to effect may reduce their risk. Most adverse drug reactions occur within a few months of starting a medicine. Clinicians should consider the potential for an adverse drug reaction to be the cause of any new symptoms, particularly if a drug has been recently started or changed. Patients should be asked about new symptoms, as many patients do not report adverse drug reactions. When such reactions occur, non-drug treatment strategies should be considered as the most appropriate first-line management, rather than starting a second medicine to counteract adverse effects.

2. Reduce the use of medicines when there is a safer or more effective non-pharmacological management strategy.

Pharmacological treatments should be avoided or minimised if safer or more effective nonpharmacological alternatives are available. Pharmacological treatments may become a panacea for chronic lifestyle-related problems, and may detract from behaviour management tools that have proven effective in managing these same problems. There is also a risk of adverse effects from particular pharmacological treatments which may be avoidable by using non-pharmacological management strategies. For instance, physiotherapy should be used instead of oxycodone for addressing non-cancer pain, because of the risk of adverse effects. Another example is the use of psychotropic medicines for behavioural and psychological symptoms of dementia when non-pharmacological management strategies are both more effective and safer.

3. Avoid using a higher or lower dose than is necessary for the patient to optimise the 'benefit-to-risk' ratio and achieve the patient's therapeutic goals

Therapeutic dosage should be adjusted to optimise the benefit-to-risk ratio of the treatment. Dosage should be no higher or lower than needed to achieve the patient's therapeutic goals. As patients become more frail, potential harms usually increase and potential benefits usually decrease for a given dosage of pharmacological treatment. For example, carefully assessing the risk and benefits when initiating non-steroidal inflammatory drugs in elderly patients is important, because of the increased risk of stroke associated with NSAID therapy; and use of proton pump inhibitors in the elderly should be stepped down after an initial course of therapy. Related to this, high drug doses are not necessarily more effective than low doses. An example of this is the relationship between doses of a selective serotonin re-uptake inhibitor for patients with major depressive disorder and useful clinical improvements.

4. Stop medicines when no further benefit will be achieved or the potential harms outweigh the potential benefits for the individual patient.

Pharmacological treatments should cease when there are no further benefits to be achieved from the treatment, or when the potential harms from the treatment start to outweigh the potential benefits. This is particularly pertinent for elderly patients with a limited life expectancy where the treatments are unlikely to prevent disease events, and may in fact lead to adverse

effects that reduce quality of life.

These patients are at an increased risk of polypharmacy and increased drug events. For example, bisphosphonate treatment should not be administered to patients living in residential aged care facilities when these patients are already too frail to swallow drugs or have a life expectancy which is significantly less than 12 months.

5. Reduce use of multiple concurrent therapeutics (hyper-polypharmacy).

Polypharmacy — variously defined as more than five or up to 10 or more medications taken regularly — is common among elderly patients. However, patients who are prescribed with multiple, concurrent therapeutics may be on as many as 15 to 20 drugs at time. Research has confirmed a significant association between polypharmacy and adverse outcome among older people living in the community because the toxicities and side effects associated with prescribed drugs are accrued over many years. Polypharmacy in older people is associated with decreased physical and social functioning; increased risk of falls, delirium and other geriatric syndromes; hospital admissions; and, deaths.

CLINICAL RADIOLOGY

1. Don't request imaging for acute ankle trauma unless indicated by the Ottawa Ankle Rules (localised bone tenderness or inability to weight-bear as defined in the Rules).

Most clinically significant acute ankle injuries can be diagnosed with history, examination, and selective use of plain radiography. Extensive validation studies have shown that the Ottawa Ankle Rules can be safely applied to adult and paediatric populations.

Selective use of plain radiography in patients with acute ankle injury is useful in identifying patients who have sustained clinically important fracture, dislocation, and osteochondral injuries. However, acute ligamentous injuries involving the anterior talofibular ligament can be diagnosed clinically and treated symptomatically.

When there are persistent symptoms (such as pain and swelling) after an acute injury, which raise suspicion of either instability or other internal derangement, such as osteochondral injury, MRI can be used if the non-urgent (or delayed or elective or similar) weight bearing x-rays show no abnormality.

2. Don't request duplex compression ultrasound for suspected lower limb deep venous thrombosis in ambulatory outpatients unless the Wells Score (deep venous thrombosis risk assessment score) is greater than 2, OR if less than 2, D dimer assay is positive.

The potential complications of untreated deep venous thrombosis (DVT) include thrombus propagation, pulmonary embolism (PE) and death from PE. A significant but under-appreciated longer-term complication is post-thrombotic syndrome (PTS) and this can occur in up to 40% of patients with proximal DVT, as a result of venous incompetence and hypertension.

Wells et al. (2003) showed that ambulatory outpatients with suspected lower limb DVT and a DVT risk assessment score (Wells Score) of less than 2, can have DVT excluded by a negative result on D dimer assay, obviating the need to perform duplex compression ultrasound. The lower limit of the negative predictive value of the combination of a score.

3. Don't request any diagnostic testing for suspected pulmonary embolism (PE) unless indicated by Wells Score (or Charlotte Rule) followed by PE Rule-out Criteria (in patients not pregnant). Low risk patients in whom diagnostic testing is indicated should have PE excluded by a negative D dimer, not imaging.

Pulmonary embolism (PE) affects 2-3 per 1000 adults per year. It can be fatal if untreated, more often in hospitalised people than outpatients. The symptoms and signs of PE (chest pain, cough, dyspnoea, and tachycardia) are non-specific and so imaging is required to make the diagnosis.

PE is diagnosed by direct (CT pulmonary angiogram) or indirect (ventilation/perfusion or "V/Q" lung scanning) demonstration of the emboli within the pulmonary arterial tree. PE can be excluded in low risk patients by a negative result on whole blood D dimer. Some low risk patients ("Pulmonary Embolism Rule-out Criteria [PERC] negative") are at such low risk they require no diagnostic testing, including D dimer.

Clinical decision rules (CDRs) are more specific than clinical gestalt in determining which patients are unlikely to have PE, and thus can prevent unnecessary imaging in these groups.

Validated risk assessment strategies are not applicable to pregnant women and D dimer is physiologically elevated early in

pregnancy. Ventilation perfusion lung scanning is the test of choice in the presence of a normal chest radiograph in a pregnant woman with suspected PE as the radiation dose to the breast is much lower than for CT pulmonary angiography and the fetal dose is very small and comparable for both imaging tests.

4. Don't perform imaging for patients with non-specific acute low back pain and no indicators of a serious cause for low back pain.

Low back pain (LBP) is extremely common, being the third most common health complaint seen by Australian general practitioners.

A simple classification places patients into one of three categories:

- LBP associated with sciatica or spinal canal stenosis
- Serious spinal pathology (such as cancer, infection, fracture, and cauda equina syndrome) comprises 1% of GP presentations with LBP
- Non-specific low back pain (90% of presentations)

When evaluating patients with acute LBP, one of the key issues to be addressed is whether or not the patient should be investigated using imaging to confirm or refute the presence of an underlying/associated condition that would change the subsequent medical treatment or investigation of the patient.

Age over 70 years, trauma, corticosteroid therapy, and female gender are risk factors for fracture and previous or current cancer significantly increases the likelihood of cancer related back pain. At least one of fever, systemic symptoms, recent invasive procedure or sepsis, or elevated CRP are seen in most but not all patients with discitis or epidural abscess. New lower limb or bladder motor dysfunction increase the likelihood of cauda equina syndrome in a patient with LBP and are indications for emergency MRI.

5. Don't request imaging of the cervical spine in trauma patients, unless indicated by a validated clinical decision rule.

Cervical spine imaging of every trauma patient is costly and results in significant radiation exposure to a large number of patients, very few of whom will have a spinal column injury. Clinical decision rules have been developed that identify patients who can safely be managed without imaging. These rules include the Canadian C-Spine rule or Nexus Low Risk Criteria. The Canadian C-Spine Rule provides higher specificity and lower imaging requirements, and should be used if possible.

This is a joint recommendation with The Australasian College for Emergency Medicine (ACEM).

6. Don't request computed tomography (CT) head scans in patients with a head injury, unless indicated by a validated clinical decision rule.

Most head injuries presenting to emergency departments will be minor and do not require immediate neurosurgical intervention or inpatient care. Mild head injury patients can be risk stratified into 'low' or 'high' risk groups based on the presence or absence of identified clinical risk factors. Current validated clinical decision rules include the Canadian CT Head Rule (for adults) or the PECARN (Paediatric Emergency Care Applied Research Network) Tool (for children). These rules can safely identify patients who can be discharged home, without CT scanning

This is a joint recommendation with Australasian College for Emergency Medicine (ACEM).

RADIATION ONCOLOGY

1. Don't initiate whole-breast radiation therapy as a part of breast conservation therapy in women age ≥50y with early-stage invasive breast cancer without considering shorter treatment schedules.

Whole-breast radiation therapy decreases local recurrence and improves survival of women with invasive breast cancer treated with breast conservation therapy. Most studies have utilised "conventionally fractionated" schedules that deliver therapy over 5-6 weeks, often followed by 1-2 weeks of boost therapy. Recent studies, however, have demonstrated equivalent tumour control and cosmetic outcome in specific patient populations with shorter courses of therapy (~4 weeks). Patients and their physicians should review these options to determine the most appropriate course of therapy.

2. Don't initiate management of low risk prostate cancer without discussing active surveillance.

Patients with prostate cancer have a number of reasonable management options. These include surgery and radiation, as well as conservative monitoring without therapy in appropriate patients. Shared decision making between the patient and the physician can lead to better alignment of patient goals with treatment and more efficient care delivery. ASTRO has published patient-directed written decision aids concerning prostate cancer and numerous other types of cancer. These types of instruments can give patients confidence about their choices, improving compliance with therapy.

3. Don't routinely use extended fractionation schemes (>10 fractions) for palliation of bone metastases.

Studies suggest equivalent pain relief following 30 Gy in 10 fractions, 20 Gy in 5 fractions, or a single 8 Gy fraction. A single treatment is more convenient but may be associated with a slightly higher rate of retreatment to the same site. Strong consideration should be given to a single 8 Gy fraction for patients with a limited prognosis or with transportation difficulties.

4. ***Don't routinely add adjuvant whole-brain radiation therapy to stereotactic radiosurgery for limited brain metastases***.

Randomised studies have demonstrated no overall survival benefit from the addition of adjuvant whole brain radiation therapy (WBRT) to stereotactic radiosurgery (SRS) in the management of selected patients with good performance status and brain metastases from solid tumours. The addition of WBRT to SRS is associated with diminished cognitive function and worse patient-reported fatigue and quality of life. These results are consistent with the worsened self-reported cognitive function and diminished verbal skills observed in randomised studies of prophylactic cranial irradiation for small cell or non-small cell lung cancer. Patients treated with radiosurgery for brain metastases are at higher risk of developing metastases elsewhere in the brain. Careful surveillance and the judicious use of salvage therapy at the time of brain relapse allow appropriate patients to enjoy the highest quality of life without a detriment in overall survival. Radiation oncologists should discuss these options with patients, including participation in appropriate clinical trials.

5. Don't routinely use extensive locoregional therapy in most cancer situations where there is metastatic disease and minimal symptoms attributable to the primary tumour.

In the past, extensive local regional therapies (e.g., surgery) were often provided in patients with metastatic disease, regardless of the symptomatology of the primary tumour. However, recent evidence has suggested that in many cases these therapies do not improve outcome and, at times, delay the more important treatment of metastatic disease (e.g., chemotherapy). In general, patients with metastatic disease from solid organ malignancies and a relatively asymptomatic primary tumour should be considered for systemic therapy as a priority; the delay in systemic therapy and potential additional morbidity arising from extensive locoregional therapies should be avoided in these patients.

PATHOLOGY

1. Do not perform surveillance urine cultures or treat bacteriuria in elderly patients in the absence of symptoms or signs of infection.

Asymptomatic bacteriuria is a common finding in all ages and in association with other comorbidities. Treatment of asymptomatic bacteriuria is recommended in pregnancy but not in other clinical situations. Prophylaxis against development of symptoms prior to simple cystoscopy and prosthetic joint replacement is not recommended. Extensive guidelines from the Infectious Diseases Society of America (IDSA) are available for this condition and asymptomatic bacteriuria in catheterised patients. The use of chemical screening strips in asymptomatic patients may lead to unnecessary urine cultures when positive results are obtained. Increasing antibiotic resistance in urinary pathogens may be a consequence of unnecessary treatment.

2. Do not perform PSA testing for prostate cancer screening in men with no symptoms and whose life expectancy is less than 7 years.

Prostate cancer causes significant mortality and morbidity and all patients with concerns about their risks of having the disease and/or their prognosis if diagnosed, including the role of prostate specific antigen (PSA) testing, should discuss these with their doctor.

PSA testing has no proven value in the management of asymptomatic prostate cancer in men whose life expectancy is less than 7 years. Men in this age group often have co-morbidities that are likely to be of greater clinical significance than the risk of prostate cancer.

3. Do not perform population based screening for Vitamin D deficiency.

The quality of the evidence for the health benefits of an adequate vitamin D status is highly variable. As the main source of vitamin D is UVB sunlight exposure, vitamin D status as assessed by the measurement of 25 hydroxyvitamin D (25OH-D) is correlated with time spent outdoors, exercise and other aspects of a healthy lifestyle including body weight. Vitamin D insufficiency is associated with low levels of exercise, obesity and/or reduced sun light exposure, such as occur more commonly in the elderly, the overweight, the frail and unwell or institutionalised and where there are occupational, racial or cultural reasons.

In individuals at risk of vitamin D deficiency, measurement of 25OH-D is an appropriate, case-finding strategy. Routine screening of healthy infants, children and adults (including pregnant women) for vitamin D deficiency is currently not recommended.

4. Do not perform serum tumour marker tests except for the monitoring of a cancer known to produce these markers.

The measurement of levels of certain tumour biomarkers is known to be helpful in monitoring the progress of specific cancers in response to treatment or in detecting changes in cancer activity or secondary or recurring cancer. In some rare circumstances, they are helpful adjuncts in detecting specific cancers, where there is a strong known underlying predisposition or suspicion, such as in detecting liver cancer in patients with chronic hepatitis C and cirrhosis. However, the testing for a broad range of biomarkers in patients with non-specific symptoms in the hope of finding an undetected cancer is not supported by the evidence from numerous systematic reviews. Tumour markers generally should not be used in the initial diagnostic pathway and are rarely diagnostic due to low sensitivity and specificity.

5. Do not routinely test and treat hyperlipidaemia in those with a limited life expectancy.

Measurement of lipid levels is part of absolute risk assessment for the prevention of cardiovascular disease. This remains true beyond age 75, but by this stage age becomes the predominant risk factor. Absolute risk calculators accommodate this trend by fixing 75 years as the maximum age that can be included in the calculation. Clinicians need to consider whether or not the assessment and treatment of risk factors beyond this age is likely to yield clinical benefit within the patient's remaining life expectancy. On rare occasions lipid testing may provide relevant information in life threatening diseases, but in most critical illnesses lipid measurement for prevention of chronic disease will no longer be a priority.

REHABILITATION MEDICINE

1. Do not discharge patients with osteoporotic fractures without an assessment and/or treatment for osteoporosis.

Studies of patients with osteoporotic fractures have found that they are at significantly greater risk of suffering a new fracture compared to the general population. This risk is particularly marked in but not restricted to elderly patients, particularly given that recent clinical guidelines recommend that all individuals over the age of 50 who sustain a fracture following minimal trauma (such as a fall from standing height or less) should be considered to have a presumptive diagnosis of osteoporosis. Despite this, there have been reports of insufficient provision for the management of these patients before discharge.

Osteoporosis assessments and/or treatments before discharge are clinically very important and moreover may be highly cost effective even after taking account of the additional resources associated with providing these services.

2. ***Do not prescribe spinal orthotics or bed rest for patients with non-specific low back pain.***

There is insufficient and conflicting evidence on the effectiveness of spinal orthotics and other forms of lumbar support for treating or preventing low back pain, either as an intervention in its own right or as a supplement to other interventions.

While there is no evidence that short term bed rest is harmful, long periods of bed rest can lead to complications such as muscular atrophy. The only randomised control trial to assess optimal periods of bed rest suggests two days is as effective as any longer period but the evidence is of low quality. There is evidence to support other approaches, such as advice to stay active and exercise which help with pain relief and improved function.

3. ***Do not use Mini Mental State Examination as the only tool to assess cognitive deficit in acquired brain injury.***

   Numerous studies suggest that the Montreal Cognitive Assessment (MoCA) is one of the most effective means of assessing cognitive deficits in acquired brain injury (for instance after transient ischemic attack and stroke) and is to be preferred to the Mini Mental State Evaluation (MMSE). MMSE may under-detect cognitive impairment in acquired brain injury; it is more appropriate for assessing dementia.

2. ***Do not routinely use splinting for prevention and/or management of contractures after stroke.***

   Reviews of the evidence and individual case studies on the use of hand splinting for stroke patients have been unable to find conclusive evidence that it leads to improvements in managing spasticity and preventing contractures or more generally improving upper limb function. Moreover, there is high quality evidence that stretch, whether administered from splints or other means, does not have clinically important effects on joint mobility in people with or without neurological conditions, at least for the periods it is typically prescribed of less than seven months.

3. ***Do not use imaging for diagnosing non-specific acute low back pain in the absence of red flags.***

   The majority of acute low back pain episodes are benign, self-limited cases that do not warrant the use of imaging (e.g. X-rays, CTI or MRI). There is evidence that early imaging for low back pain in the absence of red flags does not facilitate improvements in primary outcomes such as pain and function, even for older patients. If anything, such imaging may be harmful insofar as it may reveal incidental findings that divert attention and increase the risk of having unnecessary interventions and invasive treatments including unnecessary surgery.

ANAESTHESIA

1. ***Avoid routinely performing preoperative blood investigations, chest x-ray or spirometry prior to surgery, but instead order in response to patient factors, symptoms and signs, disease, or planned surgery.***

   Preoperative testing aims to provide results that will guide preoperative, intraoperative and postoperative care, particularly results that may change the intended plans. Preoperative laboratory blood investigations in asymptomatic patients undergoing low risk surgery are of little value in detecting abnormalities that will alter patient management and/or improve outcomes. Even when minor abnormalities in laboratory values are detected in asymptomatic patients, adverse outcomes are rare. Clinical history and physical examination should be used to determine the need for laboratory blood testing before low risk surgery; that is, test on the basis of patient and surgical factors.

   Similarly, in the absence of positive clinical findings, or significant history, abnormal chest X-ray or spirometry results are uncommon. Positive results, in the absence of symptoms or signs, are unlikely to significantly influence perioperative management. Although the diagnostic yield of preoperative chest X-rays increases with age, most abnormalities reflect chronic disorders and when performed in asymptomatic patients do not impact on anaesthetic management or perioperative outcome. In other words, chest X-ray results are not predictive of postoperative pulmonary complications in most patients. Preoperative chest X-rays may, however, be appropriate prior to cardiac and thoracic surgery and as part of oncological evaluation. There is insufficient evidence to support spirometry as an appropriate tool to stratify risk of postoperative adverse respiratory events. Spirometry may be of value in lung resection surgery, unexplained dyspnoea, and uncertainty about whether known airflow obstruction is optimally reduced. Rather than performing these investigations routinely for surgery, decisions should be individualised, depending on patient history and examination.

   Further, for all of these tests, lack of symptoms, signs or known disease increases the likelihood that positive findings are false positives exposing patients to the risks of unnecessary further testing.

2. ***Avoid ordering cardiac stress testing for asymptomatic patients prior to undergoing low to intermediate risk non-cardiac surgery.***

   Unnecessary cardiac stress testing increases the patient risk profile for the intended surgery by exposing the patient to the inherent complications of the investigation employed. A further consequence may be the invasive treatment of asymptomatic non-critical coronary disease leading to further patient risk and delay of surgery. Cardiac stress testing should be reserved for symptomatic patients who would normally qualify for the investigation regardless of the need for an operation, and asymptomatic patients at high risk of coronary disease with a significant risk of major adverse cardiac events due to co-morbidity or the high-risk nature of the surgery.

3. ***Avoid administering packed red blood cells (blood transfusion) to a young healthy patient with a haemoglobin of ≥70g/L who does not have on-going blood loss, unless the patient is symptomatic or haemodynamically unstable.***

   The optimal haemoglobin criterion for transfusion remains controversial and under investigation, varying between 60 and 100 g/L. Compared with higher haemoglobin thresholds, a lower haemoglobin threshold is associated with fewer red blood cell units transfused, without adverse associations with mortality, cardiac morbidity, functional recovery or length of hospital stay in young otherwise healthy patients. Hospital mortality is lower in younger patients randomised to a lower haemoglobin threshold for transfusion versus those randomised to a higher haemoglobin threshold.

   The decision to transfuse should be based on a combination of both haemoglobin level and assessment of the patient's clinical status, in particular, haemodynamic indicators and underlying cardiovascular pathology. Currently there is no evidence of benefit and some evidence of harm in the transfusion of packed red blood cells to young healthy haemodynamically stable patients without symptoms.

4. ***Avoid initiating anaesthesia for patients with limited life expectancy, at high risk of death or severely impaired functional recovery, without discussing expected outcomes and goals of care.***

   The high risk of postoperative morbidity and mortality in the elderly population in particular has been well documented. Patients over 70 years of age having major surgery in Australia and New Zealand health care facilities are at high risk for postoperative events, with 20% experiencing complications within 5 days, 10% requiring critical care admission and 5% dying within 30 days.

   Frailty is the state of increased vulnerability to stressors and increases the risk of adverse outcomes including falls, delirium and disability. Such stressors may include hospitalisation and surgery. Functional capacity, one aspect of frailty assessment, has been shown to be an independent predictor of mortality with each ASA class. There is currently much research into the implementation of frailty assessment as part of clinical practice and into whether preoperative measures and postoperative management can improve outcomes. Discussion with the patient and family about the risks and benefits of hospitalisation and surgery in this context are important.

   Discussion must centre on patient values and preferences for care and the goals of care when there is significant risk of perioperative morbidity or mortality. This is particularly pertinent in patients with limited life expectancy due to advanced cardiac, renal or respiratory failure and / or metastatic malignancy. Discussions around expected functional recovery and treatment limitations have been demonstrated to reduce stress and anxiety in patients and their families. Many healthcare facilities now require advanced care directives or goals of care plans on or shortly after admission in the appropriate clinical setting.

   For patients at highest risk, and where time allows, the discussions should be led by a multidisciplinary, consultant level team, particularly where there is a risk of futile surgery and/or futile intensive care. It is important to ensure that alternative care, focused predominantly on comfort and dignity, is offered to patients and their families.

5. ***Avoid initiating anaesthesia for patients with significant co-morbidities without adequate, timely preoperative assessment and postoperative facilities to meet their needs.***

   The ability to provide adequate perioperative care for patients with significant co-morbidities including morbid obesity is a crucial factor in determining whether surgery should be performed in a particular facility. The complexity of the proposed surgery should also be considered. Adequate and timely preoperative assessment must be facilitated to ensure that scheduling of a procedure is appropriate for the facility. In particular, small private hospitals which have no on-site medical practitioners overnight and no intensive care backup must have robust pre-admission processes in which higher risk patients are screened to ensure that they are not accepted for overnight admission unless they have been assessed as suitable for that facility by an anaesthetist or medical specialist.

   Intraoperative staffing, equipment and infrastructure are crucial. Postoperatively, staffing ratios and skill sets, requirements for monitoring, medical support and high dependency unit care, as well as optimal pain management, must be considered.

   Patients with obstructive sleep apnoea (OSA) and obese patients who may or may not have a formal diagnosis of OSA and/or obesity hypoventilation syndrome represent a particularly high-risk group when pain management includes opioid analgesics. The inherent risks of postoperative respiratory depression demand adequate post procedure monitoring by skilled staff.

In summary, the patient and the proposed surgery must be appropriate for the facility. Importantly, patients in rural and remote locations may accept higher risk to be closer to home and a discussion may be required with the patient and treating physicians about whether performing a procedure at a local facility is an acceptable risk.

INTERNAL MEDICINE

1. ***Avoid medication-related harm in older patients (>65 years) receiving 5 or more regularly used medicines by performing a complete medication review and deprescribing whenever appropriate.***

   Studies show that the risk of medication-related harm rises once the number of regularly prescribed medicines exceeds five; this risk increases exponentially as the number reaches eight or more. Medicines that deserve particular attention are benzodiazepines and other sedative-hypnotics, anti-psychotics, hypoglycaemic agents, antithrombotic agents, anti-hypertensives, and anti-anginal agents.
   Trying to achieve aggressive treatment targets, such as BP <130/80 or HbA1c Discontinuation should be considered where past indications for specific medicines are no longer valid, the risk of harm outweighs the benefits within a patient's remaining life span, or medicines are associated with past toxicity or non-adherence.

2. ***Don't request daily full blood counts, erythrocyte sedimentation rate (ESR) or C-reactive protein (CRP) as measures of response to antibiotic treatment if patients are clinically improving.***

   The decision on whether or not to cease antibiotic treatment or switch from intravenous (IV) to oral antibiotics should be guided by the results of microbiological cultures indicating bacterial species and antimicrobial sensitivities, and evidence of defervescence and improved clinical status rather than by changes in the levels of white cell count (WCC) from a full blood count, C-reactive protein (CRP) or erythrocyte sedimentation rate (ESR).

   However, these markers can help to predict poor prognosis in patients with severe infections in whom the clinical response may be difficult to determine (e.g. immunosuppressed patients or those who are critically ill or those at risk of drug-resistant hospital-acquired infections). In these cases, the failure of markedly elevated CRP and WCC to decrease by specified amounts would suggest that the antimicrobial therapy is not being effective. While no references could be found that explicitly support not using ESR or CRP in mild to moderate infections, available evidence suggests that their use is only of benefit in severe infections.

3. ***Once patients have become afebrile (non-feverish) and are clinically improving, don't continue prescribing intravenous antibiotics to those with uncomplicated infections and no high-risk features if they are tolerant of oral antibiotics.***

   Patients with uncomplicated infections not requiring prolonged antibiotic therapy and with no high-risk features should be switched from intravenous (IV) to oral antibiotics once they are afebrile, clinically improving and able to tolerate oral medication. In hospital, this often occurs by day three. Exceptions to this rule are those suffering life threatening or deep-seated infections (such as suspected endocarditis, osteomyelitis or meningitis), and high risk patients (such as immunocompromised patients including from HIV, intravenous drug use, underlying advanced cancer, or documented multi-resistant bacteraemia or hospital-acquired infection).

   There is no evidence to support the belief that oral medications are insufficiently bioavailable to be as effective as IV medications, or that the same agent must be used both IV and orally.

   The scope for early IV-to-oral conversion has broadened, owing to the advent of newer, more potent oral agents that achieve higher and more consistent serum and tissue concentration. Moreover, earlier switchover from IV-to-oral therapy reduces the risk of cannula-related infections, carries no risk of thrombophlebitis, and allows for earlier discharge and reduced cost.

4. ***Don't request Holter monitoring, carotid duplex scans, echocardiography, electroencephalograms (EEGs) or telemetry in patients with first presentation of uncomplicated syncope and no high-risk features.***

   Holter monitoring, carotid duplex scans, echocardiography, electroencephalograms (EEGs) and telemetry have very low diagnostic yield in patients with uncomplicated syncope and no clinical features of, or risk factors for, the following:

- arrhythmia (e.g. palpitations preceding syncope, exertional syncope, unheralded syncope, history suggestive of heart failure or ischaemic heart disease),
- carotid stenosis (syncope would need to be associated with focal neurological symptoms or signs suggestive of transient ischaemic attack),
- cardiac valvular disorders (e.g. definite heart murmurs), or
- seizures (very rarely present as syncope with no other epileptic features e.g. tongue biting, urinary incontinence, post-ictal confusion, muscle pain).

Most syncopal episodes are vasovagal or secondary to postural hypotension for which careful history and lying and standing blood pressure measurements are the most important diagnostic criteria combined with standard 12-lead ECG.

5. ***Don't request computerised tomography pulmonary angiography (CTPA) as first-choice investigation in non-pregnant adult patients with low risk of pulmonary thromboembolism (PTE) by Wells' score (score <= 4); imaging can be avoided in low risk patients if D-dimer test is negative after adjusting for age.***

The D-dimer test is highly sensitive for deep vein thrombosis and pulmonary thromboembolism, such that a negative result in non-pregnant adults (adjusted for age) rules out this condition in patients with low pre-test probability. A positive result is however non-specific and may be due to many other conditions apart from PTE. In ruling out PTE, D-dimer assay should be the first-choice investigation in patients classified as being low risk according to the Well's score (equal to or less than 4).

These considerations are heightened by the risks associated with CTPA testing such as radiation exposure and incidental imaging findings, e.g. lung nodules and adrenal lesions that may provoke further investigations and diagnosis of isolated small subsegmental emboli whose natural history is unknown and for which anticoagulation is not yet shown to be of benefit. There is however a 1-3% failure rate with a low risk Well's score and negative D-dimer prediction method, so close follow-up is indicated in all patients in whom a D-dimer has been requested. Note that laboratories do not report age adjusted values, though it is well known that D-dimer levels rise with age in the presence of co-morbidities.

An example of age adjustment, endorsed by the clinical guidelines committee of the American College of Physicians (see reference from Raja et al below) quotes an upper limit of normal for D-dimer tests equal to age × 10 ug/L, rather than a generic upper limit of 500 ug/L. Clinical judgement is necessary in applying this adjustment method, with some reports adopting a more conservative formulae of age x 5 ug/L.

OTOLARYNGOLOGY HEAD AND NECK

1. ***Don't order computed tomography (CT) scan of the head/brain for sudden hearing loss.***

Computed tomography scanning is expensive, exposes the patient to radiation and offers no useful information that would improve initial management. CT scanning may be appropriate in patients with focal neurologic findings, a history of trauma or chronic ear disease.

Sudden hearing loss is distinct from progressive loss and chronic ear disease. Sudden sensorineural hearing loss (SSHL) can be described as at least 30dB sensorineural hearing loss (SNHL) in at least three consecutive frequencies within a three-day period.

2. ***Don't prescribe oral antibiotics for uncomplicated acute discharge from grommets.***

Oral antibiotics have significant adverse effects and do not provide adequate coverage of the bacteria that cause most episodes; in contrast, topically administered products do provide coverage for these organisms. Avoidance of oral antibiotics can reduce the spread of antibiotic resistance and the risk of opportunistic infections.
A discharge is uncomplicated when it is not associated with any other symptom, for example fever, pain or swelling of the ear canal.

3. ***Don't prescribe oral antibiotics for uncomplicated acute otitis externa.***

Oral antibiotics have significant adverse effects and do not provide adequate coverage of the bacteria that cause most episodes; in contrast, topically administered products do provide coverage for these organisms. Avoidance of oral antibiotics can reduce the spread of antibiotic resistance and the risk of opportunistic infections.

4. ***Don't routinely obtain radiographic imaging for patients who meet diagnostic criteria for uncomplicated acute rhinosinusitis.***

   Imaging of the paranasal sinuses, including plain film radiography, computed tomography (CT) and magnetic resonance imaging (MRI) is unnecessary in patients who meet the clinical diagnostic criteria for uncomplicated acute rhinosinusitis. Acute rhinosinusitis is defined as up to four weeks of purulent nasal drainage (anterior, posterior or both) accompanied by nasal obstruction, facial pain-pressure-fullness or both. Imaging is costly and exposes patients to radiation. Imaging may be appropriate in patients with a complication of acute rhinosinusitis, patients with comorbidities that predispose them to complications and patients in whom an alternative diagnosis is suspected.

5. ***Don't obtain computed tomography (CT) or magnetic resonance imaging (MRI) in patients with a primary complaint of hoarseness prior to examining the larynx.***

   Examination of the larynx with mirror or fibre optic scope is the primary method for evaluating patients with hoarseness. Imaging is unnecessary in most patients and is both costly and has potential for radiation exposure. After laryngoscopy, evidence supports the use of imaging to further evaluate 1) vocal fold paralysis, or 2) a mass or lesion of the larynx. It is essential to have the larynx examined by a specialist if the hoarseness has not resolved within 4 weeks.

NZ MEDICAL STUDENTS' ASSOCIATION

1. ***Ensure the test, treatment or procedure is indicated and will make a difference to the course of patient care.***

   A consideration of how the result of an investigation or test will change your management should be undertaken. Any investigation that will have no influence on management should not be performed. In these situations, the test will incur a cost (to both the patient and the health care system), but provide no benefit to the patient.

2. ***Provide an opportunity for the patient to discuss the necessity of tests, treatments and procedures.***

   Patient expectations/ideas and requests of medical care can influence decision making regarding tests, investigations and procedures. An open discussion about the necessity and harms of these can help reduce patient requests for non-beneficial interventions. Justify why the particular test/investigation is non-beneficial and provide alternatives for the patient in a shared decision making process.

3. ***Establish discussion regarding tests, treatments or procedures if you question their necessity in a patient's management.***

   Medical students and Trainee interns should be able to have discussions about the necessity of tests, treatments or procedures in patients under their care. The hospital is a learning environment and facilitating open discussion regarding benefit and harms of interventions is critical for development into competent clinicians. Thus, requires an environment where students feel safe to ask supervisors questions without fear of repercussions or bullying. This also extends to patient's requests. In the case of a patient requesting a test that is unlikely to be of benefit, rather than acceding to avoid conflict, question why they are requesting this test, treatment or procedure.

4. ***Ensure you are only suggesting tests, treatments or procedures for the benefit of the patient, rather than*** to ***gain further clinical experience.***

   All investigations and procedures should be done for the benefit of the patient. It is unacceptable to suggest these for the sole purpose of gaining experience.

5. ***Ensure decision about tests, treatments or procedures are joint decisions with the patient.***

   Patients bring their own experience of illness and attitudes to risk that may affect their preferences for certain test, procedures of treatments. They may have cultural and/or religious beliefs that need to be considered. These patient factors need to be considered alongside the diagnosis, prognosis and treatment options when making decisions. This integrated approach is expected to lead to better outcomes through improvement of communication, acceptability of tests/treatment/procedures.

6. ***Consider less invasive options and weigh up the risk of harm versus chance of benefit.***

   The options for an investigation, treatment or procedure will come with differing levels of invasiveness. There are situations where the least invasive approach may provide the same outcomes with minimal harm, for example ultrasound is the preferred initial consideration for imaging examination in children and young adults with suspected appendicitis. Thus, the least invasive options should always be considered first before those options that may be associated with potential harm

7. ***Not ordering a range of non-indicated tests, treatments and procedures just in case the senior clinician might want/expect them.***

   In the effort to not look inadequate in front of a senior clinician, it is can be tempting to order a range of investigations to ensure everything has been covered. These investigations are unlikely to provide further information and be of relevance to the patient. Senior clinicians should instead encourage delivery of high value and appropriate health care.

OBSTETRICS

1. ***Do not perform a D-Dimer test for the exclusion of venous thromboembolism during any trimester of pregnancy.***

   As D-dimer levels are raised during pregnancy, they do not have a high positive predictive value for venous thromboembolism (VTE) in pregnancy (i.e. they are unreliable for ruling in VTE in pregnancy). However, nor are they a reliable rule-out test for VTE. One study estimated the sensitivity of the D-Dimer test at 73 per cent, meaning that 27 per cent of patients with a negative D-Dimer had VTE. There have also been case reports of pregnant women with pulmonary embolism presenting with a negative D-Dimer. Therefore, there is no value in performing a D-Dimer test for the exclusion of venous thromboembolism at any trimester in pregnancy.

2. ***Do not test for inherited thrombophilia for placental mediated complications.***

   While older retrospective studies suggested that inherited thrombophilia is associated with adverse pregnancy outcomes such as stillbirth, recurrent miscarriage and placental abruption, more recent and more rigorous studies have either failed to find an association or have found only a weak association. Moreover, the association is a moot point as there is now good quality evidence from randomised controlled trials that low-molecular-weight heparin does not significantly reduce the rate of placental mediated complications.

3. ***Do not do repeat testing for proteinuria in established pre-eclampsia.***

   Measuring proteinuria is useful as a diagnostic but not as a prognostic criterion for pre-eclampsia. This is because the level of proteinuria does not correlate with the severity of maternal complications in women with pre-eclampsia, nor are these levels useful in determining the timing of delivery. Thus, repeat testing for proteinuria in managing established pre-eclampsia is not recommended, particularly given the availability of superior prognostic models.

4. ***Do not undertake methylenetetrahydrofolate reductase (MTHFR) polymorphism testing as part of a routine evaluation for thrombophilia in pregnancy.***

   Patients with the thermolabile variant of the methylenetetrahydrofolate reductase (MTHFR) polymorphism are at higher risk of hyperhomocysteinaemia which has been associated with venous thrombosis. However, these associations appear to hold only in countries lacking grain products nutritionally fortified as a public health measure. Moreover, homozygous variants are found in up to 15 per cent of some populations, so that detection of this variant would lead to many women undergoing complex counselling unnecessarily and may also be a cause of distress. Polymorphism is not more prevalent in women with pregnancy-associated venous thromboembolism and testing for this polymorhism is not recommended as part of a routine evaluation for thrombophilia in pregnancy.

5. ***Do not measure erythrocyte sedimentation rate (ESR) in pregnancy.***

   Measuring the erythrocyte sedimentation rate (ESR) is a non-specific test to identify inflammation. An elevated result indicates inflammation but does not indicate where it is in the body or the cause. The normal range outside of pregnancy in women aged 18–50 is <20mm/h. One study found that levels varied from 4-70mm/hr and another found a range from 4-112mm/ hr, with levels being affected by gestational age and haemoglobin concentration. This is likely to reflect normal changes in pregnancy, meaning that testing for an elevated ESR does not sufficiently differentiate between healthy pregnant women and those who may be suffering from inflammatory diseases.

PAEDIATRIC ENDOCRINOLOGY

1. ***Do not rely on random measures of circadian hormones for diagnostic purposes.***

   Numerous hormones, such as growth hormone and testosterone, are subject to circadian rhythms. Relying on random measures of these hormones is therefore of limited diagnostic utility as their levels may peak and plateau at particular times throughout the day. Unless adjustments are made to take account of these circadian rhythms then random readings will not be sufficiently informative.

2. ***Do not rely solely on bone age measurement for assessing growth in young children with short stature under 2 years of age.***

   There is no consensus protocol on bone-age assessment of younger children and infants, particularly those under the age of two. Skeletal growth and maturation is most rapid in infants and toddlers, so accurate bone-age assessment in these children is challenging.
   Of the bone-age measurement techniques available, there is a major inadequacy with one of the most used methods: the limited change in the appearance of the ossification centres of the hand/wrist change in the first months of life. A recent survey found much lower rates of confidence in the accuracy of this technique when applied to the one-to-three-year-old group. Although a recently reported and validated bone-age measurement technique based on fibular shaft length was found to outperform other methods, it still yielded significant errors when applied to infants (i.e. under one year).

3. ***Do not routinely measure insulin-like growth factor binding protein 3 (IGFBP-3) for workup and diagnosis of childhood short stature.***

   Particularly given its low sensitivity, insulin-like growth factor binding protein 3 (IGFBP-3) does not significantly contribute to the diagnosis of childhood short stature resulting from growth-hormone deficiency (GHD), which can lead to the under identification of GHD. It should therefore not be used as a routine measure for the workup and diagnosis of children with short stature. However, IGFBP-3 testing may have a role, along with IGF-1 testing, as an auxiliary diagnostic index for provocative testing.

4. ***Do not initiate gonadotropin-releasing hormone (GnRH) analogue treatment in children outside of central precocious puberty, for the target outcome of delaying puberty and improving final adult height.***

   While there is some evidence that the use of GnRH agonists can achieve improvements in height in females with early puberty, it is also associated with the development of polycystic ovary syndrome (PCOS) in adolescence and risks compromising bone health. Its use outside of clinical trials is not recommended. Given that the treatment duration must also be lengthy for its benefits to be manifested, its use is not recommended to augment height in adolescents with short stature and normally timed puberty.

5. ***Do not routinely prescribe aromatase inhibitors to promote growth in children with short stature.***

   Aromatase inhibitors are used as adjuvant therapy for breast cancer. There is growing acceptance of their use to increase the adult height of children with short stature and some evidence that aromatase inhibitors can at least improve short-term growth outcomes. One recent clinical trial of aromatase inhibitors used in paediatric patients found them to be safe and effective. Even so, there is still little evidence overall that this treatment improves final adult height or is sufficiently safe. A 2015 Cochrane review found a significant proportion of pre-pubertal boys undergoing this treatment suffered mild morphological abnormalities of their vertebrae. More evidence is needed to demonstrate safety and efficacy of aromatase inhibitors before they can be routinely prescribed to promote growth in children with short stature.

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