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## Medical Education: Residents

### Five Things Residents and Patients Should Question

by  
Resident Doctors of Canada  
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#### 1 **Don't order investigations that will not change your patient's management plan.**

Investigations may not change your patient's management plan for several reasons. In some cases, the patient's pre-test probability for a condition is low, and further testing is not necessary (e.g., screening for breast cancer in younger women with low risk of breast cancer). Another example is unnecessary preoperative testing before a low-risk surgical procedure where the risk of complications is low. On the other hand, high-risk patients may warrant treatment irrespective of the test result; thus, testing in these patients would not influence the ultimate decision to treat (e.g., thrombophilia testing in patients with an unprovoked pulmonary embolism at high risk for recurrence is not helpful, since these patients should receive indefinite anticoagulation). Where possible, residents can refer to evidence-based clinical decision rules to guide appropriate testing or treatment – examples include the Well's criteria or pulmonary embolism rule-out criteria (PERC) for pulmonary embolism, the Canadian CT Head Rule for CT scan of the head in a trauma patient, or the Centor criteria for likelihood of bacterial infection in adult patients with a sore throat.

#### 2 **Don't order repeat laboratory investigations on inpatients who are clinically stable.**

Daily laboratory investigations can persist despite clinical stability for a variety of reasons (e.g., daily order without a stop date, not reassessing whether investigations are still needed). Observational studies suggest that resident physicians order routine daily CBC (complete blood count) and electrolyte panels more frequently than attending physicians. Daily phlebotomy contributes to patient discomfort and iatrogenic anemia. Studies support the safe reduction of repetitive laboratory investigations when patients are clinically stable without a negative impact on patient outcomes, including readmission rates, critical care utilization, adverse events, or mortality. Laboratory investigations should be ordered with a specific purpose which directly links to a specific management plan for patients.

#### 3 **Don't order intravenous (IV) when an oral (PO) option is appropriate and tolerated.**

Patients are often ordered intravenous (IV) medications when oral (PO) options are available, appropriate, and equally bioavailable. Common examples include antibiotics that are highly orally bioavailable (e.g., fluoroquinolones), oral potassium replacement (which is more effective than IV replacement), proton pump inhibitors (PPI) including in the setting of many cases of acute gastrointestinal bleeding, and oral vitamin B12 replacement (as opposed to intramuscular injections, including in the context of pernicious anemia). Peripheral catheters increase the risk of complications, including extravasation, infections, and thrombophlebitis. Furthermore, IV medication administration is often significantly costlier, decreases patient mobility, and increases length of hospital stay and pharmacist and nursing workload.

#### 4 **Don't order non-urgent investigations or procedures that will delay discharge of hospital inpatients.**

Discharges are commonly delayed for investigations that will not change acute management. Examples include biopsies, imaging to further investigate incidental findings, assessment by a specialist that is non-urgent, waiting for bloodwork results as part of a non-urgent diagnostic work-up, or echocardiography for patients with mild heart failure. Delayed discharges contribute to hospital over-crowding and negatively impact care efficiency. Crucially, longer lengths of stay is a risk factor for nosocomial infections, venous thromboembolism, pressure injuries, immobility, malnutrition, and deconditioning. Consider outpatient investigations when possible, if good follow-up can be assured.

#### 5 **Don't order invasive studies if less invasive options are available and as effective.**

When considering diagnosis or screening investigations, consider all available tests. It is prudent to consider the least invasive option that will have similar sensitivity and specificity to guide clinical decision making to minimize the potential for harm to the patient. For example, when diagnosing acute appendicitis in children, ultrasound should be considered before computed tomography (CT) scanning. Not only is ultrasound radiation- and contrast-free, but it has been shown to be equivalent to CT scanning in the diagnosis and management of acute appendicitis across several clinically-relevant endpoints, including time to antibiotic delivery, time to appendectomy, negative appendectomy rate, perforation rate, or length of stay. Another example is conducting a non-invasive urea breath test rather than invasive endoscopy to prove H. pylori eradication. The sensitivity and specificity of the urea breath test are superior compared to other diagnostic tests and the risk of patient harm is minimal compared to endoscopy.

## How the list was created

Resident Doctors of Canada (RDoC) established its Choosing Wisely Canada Top 5 recommendations by forming a resident taskforce comprised of 5 residents representing geographic and specialty diversity. The taskforce established six principles of development: 1) arise frequently in residency training, 2) have relevance to residents, 3) play a role in shaping future behaviours, 4) be one that residents may feasibly address during their training, 5) focus on residents' use of tests, treatments, or procedures, and 6) contribute to building a more economically sustainable, cost-conscious healthcare system. The task force generated a list of 20 candidate recommendations along with supporting evidence that were reviewed by the RDoC Practice Committee, and then narrowed the list to 12 recommendations to move forward for national consultation. The candidate recommendations were distributed to residents across Canada through an online questionnaire. Residents were asked to rank the recommendations keeping in mind the above principles for development. Over 750 residents from all provincial housestaff organizations provided feedback and weighted aggregate scores for each recommendation were calculated. The taskforce discussed the results and used the information to inform the final list of five recommendations. The RDoC Board approved and officially endorses the list of resident recommendations.

## Sources

- 1 Feely MA, et al. Preoperative testing before noncardiac surgery: guidelines and recommendations. *Am Fam Physician*. 2013 Mar 15;87(6):414-8. PMID: 23547574.  
Kirkham KR, et al. Preoperative laboratory investigations: rates and variability prior to low-risk surgical procedures. *Anesthesiology*. 2016 Apr;124(4):804-14. PMID: 26825151.  
Kirkham KR, et al. Preoperative testing before low-risk surgical procedures. *CMAJ*. 2015;187(11):E349-58. PMID: 26032314.  
Rolfe A, et al. Reassurance after diagnostic testing with a low pretest probability of serious disease: Systematic review and meta-analysis. *JAMA Intern Med*. 2013;173(6):407-16. PMID: 23440131.  
Rusk MH. Avoiding unnecessary preoperative testing. *Med Clin North Am*. 2016 Sep;100(5):1003-8. PMID: 27542420.  
Stevens SM, et al. Guidance for the evaluation and treatment of hereditary and acquired thrombophilia. *J Thromb Thrombolysis*. 2016 Jan;41(1):154-64. PMID: 26780744.  
Stevens SM, et al. Thrombophilic evaluation in patients with acute pulmonary embolism. *Semin Respir Crit Care Med*. 2017;38(1):107-20. PMID: 28208204.
- 2 Choosing Wisely Canada. [Canadian Association of Pathologists: Five Things Physicians and Patients Should Question](#) [Internet]. 2014 Oct 29 [cited 2017 May 19].  
Choosing Wisely Canada. [Canadian Society of Internal Medicine: Five Things Physicians and Patients Should Question](#) [Internet]. 2014 April 2 [cited 2017 May 19].  
Ellenbogen MI, et al. Differences in routine laboratory ordering between a teaching service and a hospitalist service at a single academic medical center – a survey and retrospective data analysis. *South Med J*. 2017;110(1):25-30. PMID: 28052170.  
Konger RL, et al. Reduction in unnecessary clinical laboratory testing through utilization management at a US Government Veterans Affairs Hospital. *Am J Clin Pathol*. 2016 Mar;145(3):355-64. PMID: 27124918.  
Melendez-Rosado J, et al. Reducing unnecessary testing: an intervention to improve resident ordering practices. *Postgrad Med J*. 2017 Jan 19. pii: postgradmedj-2016-134513. PMID: 28104806.
- 3 Choosing Wisely Canada. [Association of Medical Microbiology and Infectious Disease Canada: Five Things Physicians and Patients Should Question](#) [Internet]. 2015 Sep 4 [cited 2017 May 19].  
Cyriac JM, et al. Switch over from intravenous to oral therapy: a concise overview. *J Pharmacol Pharmacother*. 2014 Apr;5(2):83-7. PMID: 24799810.  
Dellit TH, et al. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clin Infect Dis*. 2007 Jan 15;44(2):159-77. PMID: 17173212.  
Lau BD, et al. Budget impact analysis of conversion from intravenous to oral medication when clinically eligible for oral intake. *Clin Ther*. 2011;33(11):1792-6. PMID: 22001356.  
Tsoi KK, et al. Meta-analysis: comparison of oral vs. intravenous proton pump inhibitors in patients with peptic ulcer bleeding. *Aliment Pharmacol Ther*. 2013 Oct;38(7):721-8. PMID: 23915096.  
Wanh H, et al. Oral vitamin B12 versus intramuscular vitamin B12 for vitamin B12 deficiency. *Cochrane Database Syst Rev*. 2018 Mar 15;3:CD004655. PMID: 29543316.
- 4 Bhatia RS, et al. An education intervention reduces the rate of inappropriate echocardiograms on an inpatient medical service. *JACC Cardiovasc Imaging*. 2013 May;6(5):545-55. PMID: 23582360.  
Canadian Association of Emergency Physicians. [Overcrowding](#) [Internet]. 2017 [cited 2017 May 19].  
Gundareddy VP, et al. Association between radiologic incidental findings and resource utilization in patients admitted with chest pain in an urban medical center. *J Hosp Med*. 2017 May;12(5):323-8. PMID: 28459900.  
Laurent ME, et al. Early discharge in low-risk patients hospitalized for acute coronary syndromes: feasibility, safety and reasons for prolonged length of stay. *PLoS One*. 2016 Aug 23;11(8):e0161493. PMID: 27551861.  
McNicholas S, et al. Delayed acute hospital discharge and healthcare-associated infection: the forgotten risk factor. *J Hosp Infect*. 2011 Jun;78(2):157-8. PMID: 21497945.  
Richardson DB. The access-block effect: relationship between delay to reaching an inpatient bed and inpatient length of stay. *Med J Aust*. 2002;177:492-5. PMID: 12405891.  
Webster BS, et al. The cascade of medical services and associated longitudinal costs due to nonadherent magnetic resonance imaging for low back pain. *Spine (Phila Pa 1976)*. 2014 Aug 1;39(17):1433-40. PMID: 24831502.
- 5 Aspelund G, et al. Ultrasonography/MRI versus CT for diagnosing appendicitis. *Pediatrics*. 2014 Apr;133(4):586-93. PMID: 24590746.  
Mathews JD, et al. Cancer risk in 680,000 people exposed to computed tomography scans in childhood or adolescence: data linkage study of 11 million Australians. *BMJ*. 2013 May 21;346:f2360. PMID: 23694687.  
Mitchell H, et al. Epidemiology, clinical impacts and current clinical management of *Helicobacter pylori* infection. 2016 Jun 6;204(10):376-80. PMID: 27256648.  
Mostbeck G, et al. How to diagnose acute appendicitis: ultrasound first. *Insights Imaging*. 2016 Apr;7(2):255-63. PMID: 26883138.  
Perri F, et al. *Helicobacter pylori* antigen stool test and 13C-urea breath test in patients after eradication treatments. *Am J Gastroenterol*. 2002 Nov;97(11):2756-62. PMID: 12425544.  
Shogilev DJ, et al. Diagnosing appendicitis: evidence-based review of the diagnostic approach in 2014. *West J Emerg Med*. 2014 Nov;15(7):859-71. PMID: 25493136.

## About Resident Doctors of Canada

Resident Doctors of Canada (RDoC) is a proud partner of the Choosing Wisely Canada campaign. RDoc represents over 9,000 resident doctors across Canada. Established in 1972, it is a not-for-profit organization providing a unified, national voice for our members. RDoC collaborates with other national health organizations to foster excellence in training, wellness, and patient care in patient care through research, education and advocacy.



## About Choosing Wisely Canada

Choosing Wisely Canada is the national voice for reducing unnecessary tests and treatments in health care. One of its important functions is to help clinicians and patients engage in conversations that lead to smart and effective care choices.