



CADTH Conference

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Objectives

- Review literature on mis-utilization of laboratory tests
- Costs
- Role of HT assessment



Why Now?



- Dixon 1974- 25 randomly selected patients- 95% of tests ordered did not generate an order for treatment, results were not considered in planning for subsequent evaluation, were not considered in progress note
- Sandler 1984- two year combined retrospective and prospective study of 555 patients- 90% did not lead to a Dx not suspected on initial exam and did not change treatment plan
- 1970's-Frequent Editorials in Lancet, BMJ (cost efficiencies, resourcemanagement)
- 1980's- NEJM, ClinChem (Educating residents, ethics)

21st Century



- Lab requests continue to rise disproportionate to admissions and outpatient appointments
- Labs are financially overextended and experience human resource and labour issues
- All health care costs are skyrocketing, with laboratory tests (5%) showing a disproportionate increase, driven by molecular and genetic testing.
- Worldwide examination of medical laboratory testing

More Recent Literature



- ▶ Q-Probes (2000's) surveys sponsored by the College of American Pathologists have found high rates of misordering for a variety of specific tests
- ▶ 25% of outpatient blood cultures (and 10% of inpatient blood cultures) were ordered only as a single tube
- ▶ 25% of toxic digoxin levels were found to be caused by inappropriately timed specimen collection
- ▶ 5% of inpatients on unfractionated heparin therapy did not have any coagulation monitoring in the first 12 hours, and 13% did not have a platelet count within the first 72 hours

Population-based study of repeat laboratory testing



- van Walraven C, Raymond M. Clin Chem. 2003 Dec;49(12):1997-2005
- **METHODS:** We performed a cross-sectional study using high-quality, population-based clinical databases that included adults in Eastern Ontario, Canada, between September 1999 and September 2000 for **incidence of repeating eight common laboratory tests** . Tests were classified as potentially redundant if repeated within the test's baseline testing interval
- **RESULTS:** Almost 4 million tests were conducted during the study year. Most tests (76%) were conducted on patients in the community. An overall testing rate of 367 tests per 100 people per year. **Repeat testing within 1 month accounted for 30% of all utilization.**
- For the eight tests included in the study, charges of potentially redundant repetition in adults totaled between **13.9 and 35.9** million dollars (Canadian) annually.

Factors contributing to inappropriate ordering of tests in an academic medical department and the effect of an educational feedback strategy



- Postgrad Med J. 2006 Dec;82(974):823-9.Miyakis S, Karamanof G, Lontos M, Mountokalakis TD.
- AIMS: To identify factors contributing to laboratory overutilisation in an academic medical department, and to assess the effect of an educational feedback strategy on inappropriate test-ordering behaviour.
- METHODS: The records of **426** patients admitted during a 6-month period were reviewed. The usefulness of **25 investigations** was assessed according to implicit criteria. The medical staff was informed about their test-ordering behaviour, cost awareness and the factors associated with overuse of diagnostic tests. The test-ordering behaviour of the same doctors was reassessed on **214 patients managed during 6 months after the intervention**.
- RESULTS: Overall, 24 482 laboratory tests were ordered before the intervention (mean 2.96 tests/patient/day). Among those, **67.9% were not considered to have contributed towards management of patients (mean avoidable 2.01 tests/patient/day)**. The avoidable tests/patient/day were significantly decreased after the intervention (mean 1.58, $p = 0.002$),.

Accepted Position



- At least 20% of laboratory tests are ordered in an incorrect fashion, (e.g., blood tests for possibility of heart attack ordered only once, instead of with a second test a few hours later).
- Up to 30% of outpatient testing is redundant (i.e., the patient has had the exact test done previously, or within a time period when it is not possible for the patients biochemistry to have changed in any way that can be captured by that test).
- Up to 50% of all laboratory tests ordered are not supported by evidence based clinical guidelines

Why?



- Patient is transferred from one health system to another without reciprocity
- More than one physician is involved in a patient's treatment
- Literally thousands of laboratory tests that clinicians might request as they evaluate a patient - difficult, if not impossible to be proficient in all areas of medicine
- House-staff 'overkill' to avoid criticism
- Rural practices and TAT
- Defense Medicine

WHY?

- Unrestricted testing- is open to any MD, NP, and DDS at any time in any amount
- Very expensive testing, e.g. genetic and molecular testing, often can be ordered under any circumstance
- Laboratory professional often take a backseat to other clinicians in decisions on lab menus- new and usually expensive tests added without EBM



Within Labs



- Overutilization of laboratories is not restricted to health care providers outside the laboratory
- Currently all tissues removed from patients are examined by pathologists in many CA laboratories (tonsils removed from otherwise healthy children, toenails, cosmetic skin removal, etc., the examination of which holds no clinical value for the patient)
- Simultaneous testing of patients samples is common (e.g. Stool for infections). A more appropriate pattern would be sequential, with the result of the first test determining the need for the second

Can we change clinician behaviour?



- My experience
- Multiple laboratories in Canada removed AST from their laboratory menu over the last 10 years- no evidence of patient harm-little reaction from clinicians
- Several Laboratories have shown that when a laboratory request form has a new test on it, the new box is checked off with disproportionate frequency
- Interventions That Improve Diagnostic Service

Utilization: Phillip Morehouse, MLT, Director, Health Transformation, Cape Breton District Health Authority, Sydney, Nova Scotia, Canada

A utilization management intervention to reduce unnecessary testing in the coronary care unit



- Arch Intern Med. 2002 Sep 9;162(16):1885-90 Wang TJ, Mort EA, Nordberg P, Chang Y, Cadigan ME, Mylott L, Ananian LV, Thompson BT, Fessler M, Warren W, Wheeler A, Jordan M, Fifer MA.
- **OBJECTIVE:** To determine whether a 3-part intervention in a coronary care unit could decrease utilization without affecting clinical outcomes.
METHODS: *Practice guidelines* for routine laboratory and chest radiographic testing were developed by a multidisciplinary team, using evidence-based recommendations when possible and expert opinion otherwise
- **RESULTS:** During the intervention period, there were significant reductions in utilization of all chemistry tests (from 7% to 40%. After controlling for trends in the control intensive care unit, however, the reductions in arterial blood gas tests ($P = .04$) and chest radiographs ($P < .001$) became significant. The reductions in potassium, glucose, calcium, magnesium, and phosphorus testing, but not other chemistries, remained significant. The estimated reduction in expenditures for "routine" blood tests and chest radiographs was 17% ($P < .001$).
- There were no significant changes in length of stay, readmission to intensive care, hospital mortality, or ventilator days.

Curtailing Laboratory Test Ordering in a Managed Care Setting Through Redesign of a Computerized Order Form



- Natan R. Kahan, RPh, MHA; Dan-Andrei Waitman, MD, MPH; and Daniel A. Vardy, MD, MSc
- **Objective:** To increase appropriate use of blood tests for folic acid and vitamin B12 ordered by primary care physicians in a managed care organization in Israel through redesign of a computerized order form.
- **Study Design:** Pre–post intervention. Methods: A new version of the computerized order form was launched. Utilization patterns were calculated for tests of vitamin B12, folic acid, and ferritin, which were previously grouped together. Concomitant utilization patterns for tests of hemoglobin and iron were evaluated as controls.
- **Results:** Tests ordered for the 3 targets decreased by 31% to 41% relative to the preintervention month, with a further decrease to 36% to 53% the following month. Negligible changes in utilization patterns were observed for the controls (–2% to 3%) during the postintervention period.
- **Conclusions:** Simple restructuring of a computerized order form significantly reduced the number of laboratory tests suspected of being unnecessary or redundant. When overutilization of laboratory resources is suspected, managers should evaluate the efficiency of the organization's current ordering procedures before implementing resource-intensive interventions.
- (*Am J Manag Care.* 2009;15(3):173-176)

Utilization Management in a Large Urban Academic Medical Center

A 10-Year Experience



- *Ji Yeon Kim, MD, MPH, Walter H. Dzik, MD, Anand S. Dighe, MD, PhD, and Kent B. Lewandrowski, MD*

Table 1
Examples of Blood Bank Utilization Management Interventions at the Massachusetts General Hospital, Boston, Resulting in an Estimated Cost Savings/Avoidance of ~\$1.735 Million Annually

Product, Clinical Setting	Type of Utilization Problem	Intervention	Result
IVIgG for patients after bone marrow transplantation and with other conditions, eg, TEN	Guidance for appropriate use of high-unit-cost product	Policy to restrict routine use in bone marrow transplant recipients to patients with hypogammaglobulinemia; elimination of routine use of IVIgG in treatment for TEN	Restrained use of IVIgG per hospital guidelines; ~\$500,000 annually
Off-label use of recombinant factor VIIa	Non-evidenced-based use of high-cost product	Added consultant-gatekeeper (transfusion medicine physician)	Reduced off-label use by 10-fold compared with comparable institution; estimated cost-avoidance of \$400,000 annually
Universal leukoreduction of blood components	Non-evidenced-based use of technology applied to high-volume blood component	Prospective randomized controlled trial to obtain appropriate evidence	Savings of ~\$50 per RBC and pooled platelet transfusion; cost avoidance of ~\$835,000 annually

IVIgG, intravenous IgG; TEN, toxic epidermal necrolysis.

Can we change clinician behaviour?



- Miller RA, Waitman LR, Chen S, et al. The anatomy of decision support during inpatient care provider order entry(CPOE): empirical observations from a decade of CPOEexperience at Vanderbilt. *J Biomed Inform.* 2005;38:469-485.
- Bates DW, Kuperman GJ, Rittenberg E, et al. A randomized trial of a computer-based intervention to reduce utilization of redundant laboratory tests. *Am J Med.* 1999;106:144-150..
- Neilson EG, Johnson KB, Rosenbloom ST, et al. The impact of peer management on test-ordering behavior. *Ann Intern Med.* 2004;141:196-204.

Cost Saving



- Vit D NL- \$500K (in study)
- Springdale- over utilized-CBC, Vit B 12, Ferritin, Folate
- Recent Alberta Study- 50% of referred out tests above 20\$ cancelled- \$430K in a three month period
- Mass General- Pediatric genetics group- \$400Kper year
- Veterans Affairs Connecticut Health Services- Algorithms for 4 genetic tests \$100K

Test utilization should be defined as a strategy for performing appropriate laboratory and pathology testing with the goal of providing high-quality, cost-effective patient care

Overutilization and the Patient



- s/e of procedure
- 5% False Positive rate
- Upstream testing
- Prolonged hospital stay
- Increased physician visits
- Psychological stress
- *There is no evidence connecting the amount of investigative work done and the quality of care.*

False positive-The Ulysses syndrome



- A complication of false-positive diagnostic tests that trigger a complete and aggressive diagnostic work-up to elucidate the nature of what is, in fact, a non-disease, before the pt can return to an original state of health
- it 's surprising that it doesn't occur *more* often: results of many lab tests are placed on a standard Gaussian curve of distribution and any value > 2 standard deviations—SD above or below a mean is considered statistically abnormal (not biologically abnormal);
- 1 in 20 of any normal population will be > 2 SD from the mean of a value, and therefore, abnormal; 1 in 400 normal subjects will be statistically abnormal in 2 tests and so on
- ▶ *Ulysses, who fought in the Trojan war, required 20 years for the return leg of the journey; all of the harrowing detours were unnecessary*

False Positives



- ▶ Prostate, Lung, Colorectal, and Ovarian (PLCO) screening trial
- ▶ 68,436 participants
- ▶ CA-125, PSA
- ▶ X-ray, scopes, DRE
- ▶ After 14 tests, the cumulative risk of having at least one false-positive screening test was 60.4% for men and 48.8% for women
- ▶ cumulative risk of undergoing an invasive diagnostic procedure prompted by a false-positive test was 28.5 for men and 22.1% for women

CADTH Role



- New tests to Canadian Menus
- About 400 new tests come on the horizon each year
- Similar to new drug review

CADTH Role



- National guidelines on test use
- Evidence informed algorithms and knowledge transfer
- Different approaches depending on cost and value of the testing

Cost vs. Value



- High cost, high-value interventions
 - BRCA1,2
 - Hemochromatosis
 - Coagulation studies
- Low cost, high value
 - liver function tests
 - Electrolytes
 - CBC

Low Value



- High cost, low value
 - Vitamin D
 - ?Oncotype DX
- Low cost, low value (usu. Low costs tests misused)
 - yearly PAPs
 - routine preoperative laboratory tests
 - routine cancer screening for patients with limited life expectancies without signs or symptoms
 - Screening for cervical cancer in low-risk women aged 65 or older and in women who have had a total hysterectomy

Role of CADTH



- Control high value testing
- Control high cost testing
- Develop Algorithms for HCHV and LCHV
- Develop strategies limiting/eliminating HCLV and LCLV
- Knowledge transfer to stakeholders

ENJOY NL!



- Questions/Comments

