

# Add to cart?

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Imagine a grocery store where none of the items has a price tag. When you ask the cashier about the prices, he suggests you ask the manager. The manager advises you to write a letter to head office, where they confess that the actual cost of the items is a little uncertain. At some point you might decide to shop elsewhere ... except you cannot because this is the only shop in town. If you were trying to responsibly manage your household grocery budget, you would find it quite difficult.

A recent attempt to compare the costs of some simple laboratory tests proved to be equally frustrating. Not to be deterred, I decided to compile my own reference list of costs for frequently ordered investigations (Tables 1 and 2).<sup>1</sup> I wrestled with naming “true” costs, which is far more complicated than it initially appears. Just as the cost of groceries can vary depending on where you buy them (eg, an apple might cost a lot more if you buy it in Nunavut than southern Ontario), the cost of a simple complete blood count (CBC) could be anywhere from \$5.00 to \$50.00 or more depending on a number of variables including the size of the facility, the method of analysis used, the funding model (fee-for-service or global funding), and how far the specimen is transported. Ordering only 1 test at a time costs more per test than ordering several, as there can be a separate fee (\$15.62)<sup>1</sup> for each blood draw. Provincial guides to fees, where they exist, probably represent the simplest method for practitioners to learn about *relative* costs; however, even these prices are only negotiated values rather than true costs (Dr Chris Naugler, written communication, March 2013).

## Transparency and awareness

Increasing transparency and awareness of the cost of investigations among providers and patients is important if we are to be effective gatekeepers. Physicians recognize that their knowledge about the cost of tests is poor and report that better knowledge would likely change their ordering habits.<sup>2</sup> Costs of investigations are increasing out of proportion to other health care costs,<sup>3</sup> in part owing to an estimated 30% to 40% of all tests (and 20% to 95% of selected tests) being ordered unnecessarily.<sup>4</sup> In one study, ordering inappropriate tests led to a mean (SD) unnecessary cost of \$66.53 (\$66.76) per periodic health maintenance visit.<sup>5</sup> It is estimated that £1 billion is spent annually on unnecessary tests in the United Kingdom.<sup>6</sup>

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Every day physicians go on multiple blind shopping sprees, racking up health care expenses with little awareness of the costs to the system. Simply ordering a “routine” CBC (\$10.96+\$15.62=\$26.58) costs almost as much as the

**Table 1. Sample costs for radiology investigations**

INVESTIGATION	COST, \$	
	PROVINCIALY INSURED	PRIVATE INSURANCE
<b>X-ray films</b>		
• Plain films, single view	33.76	73.00
• Additional views	17.02	36.75
• Cervical spine	40.42	89.20
• Lumbar spine	51.07	110.00
• Additional spine views	31.80	68.50
• Skull	51.07	110.00
• Ribs (bilateral)	51.07	110.00
Mammogram (unilateral)	95.71	117.00
Mammogram (bilateral)	134.12	188.00
Hysterosalpingogram (excluding injection)	82.24	184.00
Bone density (hip and spine)	111.47	137.70
Intravenous pyelogram with voiding cystourethrogram	100.00	220.00
<b>Computed tomography (not including interpretation and facility cost fees)</b>		
• Head (contrast)	61.81	159.00
• 1 region (contrast)	97.75	247.00
• 1 region (without contrast)	88.44	225.00
• 2 regions	133.63	334.00
<b>Magnetic resonance imaging (not including interpretation and facility cost fees)</b>		
• Standard 2 plane	721.00	NA
• Additional sequence or plane	299.00	NA
<b>Ultrasound</b>		
• Echocardiography	99.90	230.00
• Breast (unilateral)	66.05	117.00
• Additional side	33.30	58.00
• Abdomen	105.24	228.00
• Renal	82.86	212.00
• Obstetric (≥ 14 wk)	105.22	218.00
• Obstetric (< 14 wk)	78.95	177.00
• Intrauterine device localization	52.87	117.00
• Pelvis	105.22	228.00
• Nuchal translucency	121.38	288.00
• Extremity	59.98	123.00
• Carotid Doppler	116.99	230.00
• Neck	65.74	140.00

NA—not available.

Cost data from the *Doctors of BC Guide to Fees*.<sup>1</sup>

**Table 2. Sample costs for chemistry, microbiology, and hematology testing: Each blood draw costs \$15.62 in addition to test cost, regardless of the number of tests done.**

TEST	COST, \$	TEST	COST, \$	TEST	COST, \$	TEST	COST, \$
<b>Chemistry</b>							
Albumin-creatinine ratio	11.41	Cancer antigen 125	22.72	<i>Helicobacter pylori</i> (breath)	36.50	Sex hormone-binding globulin	13.56
Adrenocorticotrophic hormone	36.57	Calcium (serum)	1.55	High-density lipoprotein	7.85	Sodium	1.38
Antidiuretic hormone	113.81	Chloride	1.49	Hemoglobin A <sub>1c</sub>	12.69	Serum protein electrophoresis	34.58
Albumin	1.55	Cholesterol (total)	6.87	Homocysteine	22.97	Testosterone	15.81
Alcohol	20.79	Creatine kinase	1.88	Immunoglobulin E (per allergen)	16.13	Tetrahydrocannabinol	10.92
Aldosterone	170.92	Complement assay	19.63	Lactate dehydrogenase	1.62	Total iron-binding capacity	7.56
Alkaline phosphatase	1.57	Creatinine	1.52	Luteinizing hormone	12.41	Triglycerides	6.59
α-1 Antitrypsin	20.06	C-reactive protein	10.31	Lipase	6.62	Troponin	15.05
Alanine transaminase	1.47	Dehydroepiandrosterone	18.55	Metanephrines (urine)	155.77	Thyroid-stimulating hormone	9.90
Amylase	13.73	Drug screen	42.50	Oxycodone	12.82	Tissue transglutaminase	24.18
Antiendomysial antibodies	94.39	Estradiol	22.46	Potassium	1.39	Uric acid	1.70
Antigliadin antibodies	32.58	Ferritin	10.12	Pregnancy (serum)	14.74	Urinalysis (macro)	7.42
Apolipoprotein B	16.60	Fibrinogen	28.68	Progesterone	14.86	Urinalysis (micro)	7.17
Aspartate transaminase	1.73	Free triiodothyronine	9.35	Prolactin	13.49	Urine drug screen	39.00
Bicarbonate	2.37	Free thyroxine	12.12	Parathyroid hormone	17.52	Vitamin B12	14.38
Bilirubin (total)	1.61	Follicle-stimulating hormone	13.13	Quantitative β-human chorionic gonadotropin	16.30	Vitamin D	61.32
B-type natriuretic peptide	42.56	Glucose	3.53	Semen analysis postvasectomy	26.98		
Blood urea nitrogen	1.57	Glucose tolerance test (gestational)	15.84	Semen analysis (full)	82.34		
<b>Microbiology</b>							
Acid-fast bacilli	24.13	Fungus culture	21.41	Hepatitis B surface antigen	10.40	Trichomonas antigen	18.75
Antistreptolysin O	11.73	Genital culture	25.28	Hepatitis C	NA	Urine culture	19.57
Blood culture	36.08	Gonorrhea	4.76	Pinworm ova	43.94	Vaginal swab (first)	11.63
<i>Clostridium difficile</i> toxin	16.64	Group B streptococcus	15.40	Sensitivity (per organism)	11.61	Viral serology	36.83
Chlamydia (urine)	25.18	Hepatitis A immunoglobulin M antibodies	18.42	Stool for ova and parasites	46.93		
Chlamydia (urogenital)	24.09	Hepatitis B core antibodies	10.85	Streptococcus rapid test	13.02		
Fungus (potassium hydroxide)	13.76	Hepatitis B surface antibodies	11.08	Throat culture	18.18		
<b>Hematology</b>							
ABO typing	40.90	Complete blood count	10.96	International normalized ratio	12.07	Rheumatoid factor	8.41
Anticardiolipin antibodies	24.47	Cyclic citrullinated peptide	29.48	Malaria	61.82	Ristocetin cofactor	77.57
Antinuclear antibody	23.82	D-Dimer	23.27	Mononucleosis	17.10	Sickle cell test	76.41
Antibody screen	81.80	Extractable nuclear antigens	30.60	Packed red blood cells (preparation/unit)	40.10	Von Willebrand factor	107.66
Antiphospholipid antibodies	23.82	Erythrocyte sedimentation rate	10.61	Protein C	51.33	Cross match per unit	40.10
Bleeding time	26.63	Factor V Leiden	76.92	Protein S	38.31		
Complement C3	9.61	Factor VIII assay	51.58	Prothrombin time	42.77		
Complement C4	9.87	Human leukocyte antigens (per antigen)	40.58	Rh typing	34.22		

NA—not available.

Cost data from the *Doctors of BC Guide to Fees*.<sup>1</sup>

physician visit itself. A simple, but often unnecessary, urine “R&M, C&S” [routine and microscopy, culture and sensitivity] will cost \$61.39. A serum pregnancy test is \$30.36. Blood type and antibody screening, often repeated several times during each pregnancy, costs \$138.32.<sup>1</sup>

“Often physicians order tests, treatments and procedures despite strong evidence that they may not help, and may even harm, patients.”<sup>7</sup> Ordering investigations is quicker and easier than doing a thorough history and physical. It provides us (and patients) with the sense that something is being done and it gives time for many self-limited conditions to resolve. Although studies report no correlation between volume of tests ordered and malpractice suits, many physicians continue to assume that by ordering more tests, the risk of “missing something” will decrease.<sup>7</sup> Academic environments, where practice patterns are learned, can subtly reinforce inappropriate ordering behaviour by rewarding trainees perceived as being “thorough.”<sup>8</sup> These hard-to-change habits, coupled with patient expectations, lead many completely healthy patients to undergo annual batteries of 20 or more laboratory tests, even though evidence-based screening guidelines recommend very few, if any, routine investigations. More and more, disease-specific guidelines recommend earlier screening, diagnosis of “pre-disease,”<sup>8</sup> routine “monitoring” (not necessarily evidence-based) for those “diagnosed,” and even incentives for doctors who comply, whether or not the patient will actually benefit from the tests.<sup>7</sup>


## Improving ordering practices

Incorporating costs of tests into laboratory requisitions or electronic medical records has been shown to reduce rates of investigations by 27% to 36%.<sup>9,10</sup> Electronic medical records could incorporate an “Add to Cart” feature that could tally costs being incurred during a visit as tests are ordered. This might be particularly effective if combined with other strategies that have been shown to help physicians translate evidence-based recommendations into ordering practice. One of the most promising of these appears to be point-of-ordering, electronic clinical decision support systems, which can reduce inappropriate ordering by up to 28%.<sup>6,11</sup> Restrictive guidelines dictating appropriate timing and indications for such investigations as vitamin D (\$61.32), prostate-specific antigen (\$32.95), and erythrocyte sedimentation rate (\$10.61) measurements are another strategy. In Ontario, it was predicted that simply restricting the use of vitamin D testing would save \$64 million per year.<sup>12</sup> Although some physicians dislike such regulation because it is perceived as a threat to autonomy, others believe that it does “relieve family doctors from many debates with patients about services with high costs but no clinical benefit.”<sup>13</sup> Audit and feedback

programs have also had some success,<sup>7</sup> such as in British Columbia, where physicians are provided with practice profiles comparing them with their peers in terms of rates of investigations, referrals, and so on. The now widely promoted Choosing Wisely program is an excellent educational resource for clinicians and patients. For family physicians, Choosing Wisely recommends

... avoiding routine pre-op CXRs [chest x-rays], head CTs [computed tomography] for headaches, imaging for low back pain without red flags, Pap smears except in target age group 21-65, unnecessary labour inductions, EKGs [electrocardiograms], exercise stress tests and daily monitoring of CBCs and chemistries in hospital.<sup>8</sup>

## Tremendous opportunity

While Canadians bemoan the ever increasing and apparently unsustainable costs of health care, physicians should remember that virtually all of these costs, beyond the patient-initiated visit, are physician driven. This gives each one of us a tremendous opportunity to control costs without negatively affecting patient care. By becoming more knowledgeable about investigations and their cost implications and carefully considering each click, we can be more confident that each item we “add to cart” will be appropriate. 

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### Competing interests

None declared

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**The opinions expressed** in commentaries are those of the authors. Publication does not imply endorsement by the College of Family Physicians of Canada.

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