Efficient and High Quality Care via EMR/EHR Interface to Inform Physicians of Test Cost in Real Time

**Goal** – The goal of the proposed intervention is to improve efficiency and quality of care by equipping physicians to make effective resource management decisions when ordering diagnostic tests. The intervention harnesses the power of Electronic Medical Records (EMR) to provide physicians with data on the costs of diagnostic tests at their fingertips, as they enter orders in real time. With effective access to this data, physicians will be equipped to reduce the number of inappropriate diagnostic tests, which will save the system money and save patients from undergoing unnecessary tests.

**Rationale** – For the Canadian healthcare system to remain sustainable, healthcare resources must be managed effectively at both at the system level and on the front lines. In our healthcare system, physicians are responsible for resource management in front-line delivery of care. Physicians, however, are often not equipped with the necessary tools to manage resources effectively. The result, as studies cited below suggest, is that physicians unintentionally order some unnecessary tests, incurring costs on the healthcare system that can be avoided. Since diagnostic testing comprised 10.4% of total hospital expenditures in Canada in 2004/2005, there is significant opportunity for cost savings.  

Research suggests that physicians on the front lines are not aware of the true costs of diagnostic tests. A Canadian study of emergency room physicians revealed that they have limited knowledge of the costs of the diagnostic tests they order every day, and tend to significantly underestimate the costs of diagnostic imaging. A systematic review of physician knowledge of diagnostic testing costs found accuracy of physician estimates to be low, with fully 50% of the estimates ranging from 50% to 200% of true costs. The review found accuracy to be unaffected by country, year of study, level of training, or specialty.

Further research has demonstrated that educational programs raise physician awareness of the cost of diagnostic testing, producing a reduction in the frequency of unnecessary tests. A study in Israel examined laboratory testing habits of physicians at a single hospital for one year following an education course on costs of diagnostic testing. The study showed an overall reduction of 19% in laboratory tests performed at the hospital in the year following the educational program. Another Israeli study involved a form-based system for ordering tests for an internal medicine department, with notes on the order form for laboratory costs and diagnostic accuracy for blood testing. The study showed significant reductions in tests per visit, with no difference in the readmission rate or in the number of diagnoses of conditions based primarily on blood tests, between the study group and the control groups. A Swedish study showed similar results in a primary care setting.

There is also evidence that changes to EMR systems can have an effect on physician ordering. One American study incorporated practice guidelines for routine laboratory and chest radiographic testing directly into the electronic ordering system of a cardiac care unit, and provided education on these guidelines to house staff and nurses. The
study showed an estimated reduction in expenditures for "routine" blood tests and chest radiographs of 17%, with no significant changes in length of stay, readmission to intensive care, hospital mortality, or ventilator days.\textsuperscript{vii}

**Intervention** – Our proposal is to integrate the costs of laboratory testing and diagnostic imaging into the electronic ordering systems of EMRs across Canada. When a primary care or hospital-based physician goes to order a test electronically, the cost should be clearly displayed, so that the physician has the necessary information to make an informed decision on whether the test in question is appropriate. To maximize the effect of the intervention, this program should be accompanied by a cost-awareness educational program for all physicians.

**Future Interventions** – EMRs have the potential to put powerful information at physicians’ fingertips. The use of laboratory testing and diagnostic imaging could be further improved through more advanced EMR based interventions, which could employ data from a patient’s EMR chart to calculate patient-specific values for factors such as the specificity, sensitivity, positive and negative predictive values for specific tests. Also, this intervention could be expanded to electronic ordering in EHRs for any allied health, such as nurse practitioners, who are granted prescription privileges.

**Risk** – The key risk associated with this intervention is that by making physicians more aware of the costs of tests, physicians may refrain from performing necessary tests, and that quality of care will suffer as a result. While the research evidence cited above does not support this concern, the risk should be managed by initiating a number of pilot projects across the country that would gather data on both the efficacy of the proposal as well as any potential effects on quality of care.

**Barrier** – The chief barrier to the successful rollout of this strategy is the existence of multiple vendors for EMRs in Canada. This barrier could be overcome through stipulations by provincial bodies responsible for EMRs, and through the introduction of targeted development grants by Canada Health Infoway.

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\item CIHI. *The Cost of Acute Care Hospital Stays by Medical Condition in Canada*, 2004-2005.
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