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Diagnostic Imaging Data: the Good, the Bad, and the Potential

MANITOBA CENTRE FOR HEALTH POLICY

Summary by RJ Currie
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based on the report:
*Diagnostic Imaging Data
in Manitoba: Assessment
and Applications*,
by Greg Finlayson,
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A child gets an X-ray to determine if a fall has fractured an arm. An expectant mother has an ultrasound to check on the health of her fetus. A man with suspected heart problems has an angiogram to assess his arteries. Diagnostic Imaging plays a vital part in the health of Manitobans. It also costs the province over \$45 million dollars a year.

That's right. Over \$45 million. And that doesn't include the millions spent buying equipment. Consider some recent purchases, like \$7.5 million for six CT scanners—three in Winnipeg and one each in Portage la Prairie, Steinbach and Selkirk—and \$200,000 for imaging systems in Neepawa. Now add to that the Province's plans to expand outpatient diagnostics, to broaden the use of rural diagnostic equipment, and to buy new equipment across the province. It all adds up to a major financial impact.

Not surprisingly, given the importance of diagnostic imaging (DI) from both a health and cost perspective, Manitoba Health would like to know how these services are contributing to the health of Manitobans.

But some of these DI services are relatively new. Bone Mineral Density testing (BMD), for example, has been around a fairly short time. It follows that the systems for collecting data on the use of these services are also fairly new. Moreover, technology driven as they are, DI services are constantly evolving, and so should the information services that sup-

port them. So MCHP was asked to assess available data on all diagnostic imaging. Having good data not only helps understand patterns of health care, it also contributes to the effective management of health care systems.

So what questions might be answered using DI data? Here are some examples:

- Calculating the access to and use of DI from a *population-based* perspective (according to where individuals live, not where they received the test). Do residents of some areas have limited access to services?
- How do patterns of use differ across age groups (important in planning for demographic changes)?
- Where do people receive DI? Do people from one region need to travel to another region for these services?
- Given the practice guidelines set out for physicians, are the usage patterns a lot higher or lower than might be expected?

In our report we divided DI services into several subcategories: general X-ray, ultrasound, CT scan, mammography, MRI, angiography, BMD and nuclear medicine. This subdivision made it easier to make comparisons and easier to target where data is useable (good data) and where it is not (bad data).

The best way to test the data was to take it for a "test-drive." Actually, three test-drives, as we used the data in three



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trial studies.* Are some sources of data more complete than others? If so, what is lacking in the less complete sources? What can be done to improve the data?

About the data: the good, the bad

Much of MCHP's DI data is kept in the Population Health Research Data Repository—a.k.a. the *Repository*. Like all MCHP data, these records are anonymous; prior to transfer, Manitoba Health encrypts all personal identifiers and removes all names and addresses. For this study, DI data came from a few main sources. Each had benefits; each had particular problems.

Table 1. The Useability of Diagnostic Imaging In Manitoba for Research Purposes

Type of DI	Data is good for research purposes	
	<i>Province-Wide</i>	<i>Wpg-Brandon</i>
General X-ray	No	Yes
Ultrasound	No	Yes
CT Scan	No	Yes
Mammography	Yes for screening No for diagnostic	Yes
MRI	Adult only	Adult only
Angiography	Yes	Yes
BMD	Yes	Yes
Nuclear Medicine	No	No

Mammography is divided into *diagnostic tests*, to focus on a breast lump at the request of a physician, and *screening mammography*, a provincial program to examine women age 50-69 for possible breast cancers.

But before going into that, in cut-to-the-chase fashion, Table 1 shows what we found out about diagnostic imaging data in Manitoba.

Across the province, information for some DI services is more complete than for others.

Simply put, BMD, angiography, adult MRI and mammography screening data are good. But data for other DI services are bad.

Why this discrepancy? Well in the case of mammography screening (good data), it's part of a provincial program of preventive care, for which the Province keeps individual records. MCHP can access anonymized versions of these records. As for the rest, let's look at some key DI data sources, and then at their strengths and weaknesses.

Physician service claims

A primary source of data in our Repository is *physician service claims*. In Manitoba, most physicians are paid on a "fee-for-service" basis. This requires the physician to submit a physician service claim—essentially a bill—to Manitoba Health that indicates, among other things: the identifiers of both the physician and the patient, the date of the service, a code number for the service provided and an optional code number for the diagnosis. As it relates to DI services, it might tell us, say, that patient X received an angiogram from Dr Z on January 15, 2001 (although again, we don't actually know who patient X and Dr Z are).

These claims are a vital source of data for research purposes. But there is a problem: not all physicians are paid on a fee-for service basis. The same is true for radiologists, the physicians that interpret most diagnostic images. Some may be on salary, or have a contractual agreement, or some form of payment for which they don't have to submit claims. The result is gaps in the data.

In theory, this should be offset somewhat by *shadow claims*—even when physicians are paid through a contract, some (but not all depending on their agreement with Manitoba Health) are still supposed to submit records of the services they provided so Manitoba Health can keep track. But in truth, without the fee incentive, the filing is incomplete.

Table 2 illustrates how the lack of claims causes gaps in data. We looked at how many general X-rays had been done on people living

* One study looked at bone densitometry; the second at socioeconomic factors and the use of specific DI tests; the third at coronary artery procedures. For full details, download the complete report at: www.umanitoba.ca/centres/mchp/reports/pdfs/imaging.pdf.

in Brandon and Winnipeg in 2001/02. Since health care needs are arguably similar across the province, we should—with good data—find that a similar proportion of people had X-rays (expected numbers) in regions outside of Brandon and Winnipeg. We find quite the opposite: Parkland reporting only 16% as many general X-rays as expected, Nor-Man only 23%, and so on. In short, major underreporting is apparent.

Table 2. Number of General X-Rays in Manitoba: Reported vs. Expected: 2001/02

RHA	Reported	Expected	% Likely unreported
Assiniboine	14,465	51,560	72%
Burntwood	17,438	20,392	14%
Central	20,601	61,279	66%
Churchill	270	518	48%
Interlake	22,617	48,933	54%
Nor-Man	3,109	13,583	77%
North Eastman	11,852	24,574	52%
Parkland	4,857	31,200	84%
South Eastman	23,393	32,394	28%

Hospitals and other data sources

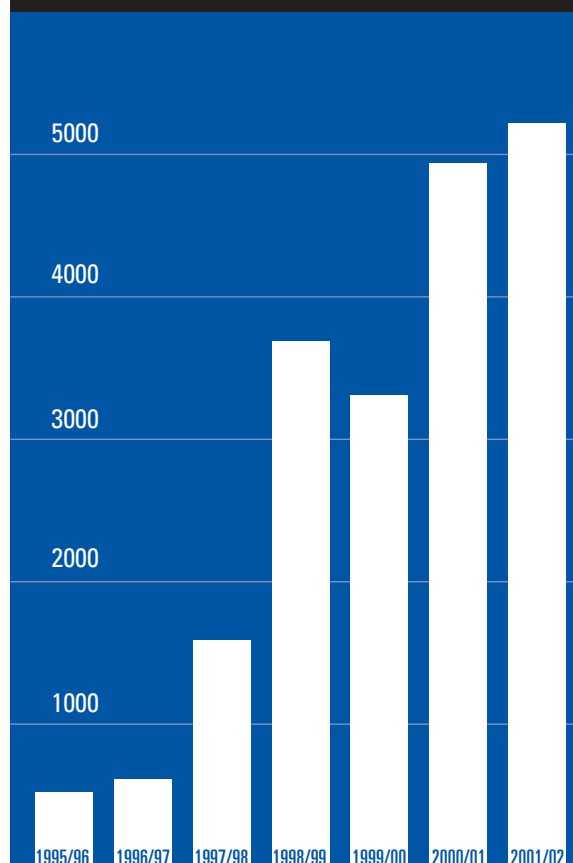
A second source of data is hospital files, which are created when a patient is discharged from hospital or has outpatient surgery. These discharge records include information on the patient's diagnosis and treatment. But hospital DI service reporting is unreliable. Across the province, hospital discharge records can be used to look at angiography (more on that next paragraph), but for all other DI imaging they may or may not be included.

Why? Well, for one, even though there is room for 12 treatment-related codes on a hospital discharge abstract, they are ranked from most to least invasive. And since DI tests usually rank low in terms of invasiveness, if a patient's record has more than 12 codes, DI isn't reported. Second, Manitoba Health doesn't require it except for a few things (like angiography). Since reporting of DI isn't required, why would busy hospitals make more work for themselves?

Discharge abstracts aside, another hospital-related problem is "batch-billing," which some hospitals do when they have radiologists working in the hospital. Let's say a hospital's radiologists read 1,000 X-rays in January. A claim isn't sent in for each patient that had an X-ray. The hospital simply sends in one bill for the 1,000 X-rays performed. This makes it impossible to answer a number of useful patient-based questions. For instance, some patients have more than one X-ray, so how many patients in total had X-rays? Most X-ray dollars are spent for which illnesses? age groups? regions of Manitoba?

A third source of data comes from the facilities that perform the DI tests: MRI clinics, BMD clinics and individual hospitals within

Figure 1. Bone Mineral Density Scans Reported by Manitoba BMD Clinics



the different RHAs. MRI clinical data, about the kinds of MRI exams patients have received, is fairly new. So initially, it was one of the things we really wanted to look at.

At the time of this study, all Manitoba MRIs were performed at Health Sciences Centre (HSC) or St. Boniface Hospital. Since physicians perform MRIs, we hoped to use the data these clinics collected to validate our physician claims data. In other words, if we had 1,000 individual physician claims for MRIs over a given period, we should have seen a total of 1,000 MRIs from the clinics.

We ran into two problems. First, fee-for-service physicians perform only adult MRIs, not children's. So we have no paediatric claims data. Second, HSC stopped collecting MRI data after 1999. So we were able to use the clinics' data up to 1999 to validate our physician claims data for adult MRIs (Table 1). But from there on, half of the data is missing.

Which brings us to BMD testing. Since it is batch-billed in Winnipeg, we worried it would offer no useful data. However, BMD testing facilities in Winnipeg and Brandon keep separate databases (outside of billing) that track BMDs on a patient-by-patient basis. We are able to link their data (Figure 1) with other data in the Repository.

Another potential source of data might have been Regional Health Authorities and their hospitals throughout the province. Early in this project, we asked them to provide the diagnostic imaging data they collect. These databases are separate from discharge abstracts and physician services claims. Here again was a source of data we hoped to use to validate our own. If a hospital says they performed, say, 1,000 X-rays in one month, then we should find 1,000 corresponding individual claims.

Unfortunately, differences in *classification* systems made this impossible. What this means basically is that hospitals use different codes for their own data collecting than the codes used by Manitoba Health. In fact, even between hospitals there can be differences in codes or the way they are defined (for example,

one hospital's *lower extremity X-ray* might be another hospital's *knee X-ray*).

The potential

Now having read all this, some of you are probably wondering why there isn't more standardization. Why isn't it mandatory for all physicians to submit a record whenever a DI test is performed, regardless of how the physician is paid? Related to that, why are hospitals required to report only angiograms, while other expensive DI tests may or may not show up on a patient's record? And why can't all hospitals use the same codes and have them defined the same way? Why is MRI data no longer collected at one of the two MRI facilities in the province?

These are good questions, which we can't answer. But they are at the heart of a list of recommendations to come out of this report.

There is some good news DI data-wise on the horizon. Consideration is being given to the implementation of Radiology Information Systems—or RIS—across the province. RIS is a computerized system for tracking patients and the DI procedures they receive: scheduling, reporting and billing. There is also talk of PACS (Picture Archiving and Communications Systems), a digital system for storing and distributing diagnostic images over a network. Both these systems should enhance data collecting.

As it stands, if we were to grade diagnostic imaging data in Manitoba we'd give it a C+ at best. The news is fairly good in Winnipeg and Brandon, where much of the data can be used to answer questions about the use of DI services. Unfortunately, outside of those centres, the opposite is true.

But that could change. If some of our recommendations are acted on, DI data would be more complete. The same might be true if RIS/PACS can go from consideration to realization. More complete data would lead to improved understanding of the role DI plays in health. That improved understanding should lead to better health for all Manitobans.

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