



Michael Smith Foundation for
Health Research

Infrastructure Program
Institutional Awards
Analysis of Progress Reports
2003-2005

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Executive Summary

The Institutional Infrastructure Award is one of several initiatives within the Foundation's Infrastructure Program that aims to help create a vibrant and sustainable health research environment in BC; recognized for excellence, responsive to BC's health needs, and contributing to BC's economy.

In 2002, BC's four major universities and four major teaching hospitals were invited to submit funding proposals for research infrastructure:

- British Columbia Cancer Agency¹
- Children's and Women's Health Centre of British Columbia
- St Paul's Hospital/Providence Health Care
- Simon Fraser University
- University of British Columbia
- University of Northern British Columbia
- University of Victoria
- Vancouver Coastal Health Research Institute

Following a formative review by an external panel, each institution was awarded a four-year MSFHR Institutional Infrastructure Award commencing July 1, 2003. The award amounts varied across institutions, depending on several factors including the magnitude and excellence of existing and planned health research as determined by the formative review panel.

The purpose of this report is to assess the impact of the Institutional Infrastructure Awards on the infrastructure support provided to health researchers by the eight institutions. The report draws on three key documents provided by the institutions: the original funding proposal; and the two annual progress reports submitted for 2003-04 and 2004-05. The findings in this report are intended to stimulate review and evaluation of the program to date, and also provide feedback to the funded institutions. While MSFHR has invested considerable energies in developing and launching various funding programs to date, increasing attention is now being given to increased accountability for the use of such funds. The limitations of this report include its reliance primarily on reporting by the institutions and on internal MSFHR resources for analysis. It should be noted that review panel feedback and a full range of stakeholder viewpoints are not reflected in this report.

At the end of two completed years of infrastructure funding to the institutions (July 2003 to June 2005), MSFHR had paid a total of \$7.42 million, of which \$5.55 million had been spent. Institutions were holding a combined total of \$1.87 million in unspent funds as at June 30, 2005, representing 25% of the total allocated funds. The majority of spent funds were used to pay for personnel. Other expenditures covered items such as information technology and associated staff, internal research funding programs, office renovations, space rental, furniture, and travel costs. Over the two years of funding, most institutions had spent some proportion of funds on unapproved items, some of which are eligible expenses under the terms of the MSFHR Institutional Infrastructure Award, while others are ineligible including a small number of items that had been

¹ The British Columbia Cancer Agency is a legislated entity, and has been assigned the status of a teaching hospital/treatment centre.

specifically rejected at the proposal stage. Across the two years, 2003-05, a total of \$685,346 had been spent on non-approved budget items, representing 12% of the total funds spent by the eight institutions.

The progress reports submitted by the eight funded institutions for the two years 2003-05 provide numerous examples of new and expanded research support funded directly by the MSFHR Institutional Infrastructure Award. This was achieved primarily through the employment of additional personnel, who tended to be assigned either to specific research areas serving specific types of research, or part of a central office providing more generic services across the institution. Indeed, four of the eight institutions had used MSFHR funding to create new dedicated research support offices that provided a range of services including research/grant facilitation, training in various research-related subjects; and research dissemination. In some cases, services were targeted at new investigators and/or research trainees, raising questions about whether the more established researchers were obtaining benefits from these offices and MSFHR institutional infrastructure funding. Nonetheless, these offices appear to have become well-established and well-accepted. At least two have indicated that the demand for services is already exceeding supply, and have alluded to the need for additional funding. However, there is no evidence that internal funding is being committed by the institutions themselves to support expanded services and operations by these offices despite the reported benefits they have reported.

Notwithstanding investments in such research supports, there was little consistent information from the institutions about changes in researcher productivity, for example, on conventional indicators such as research funding, publications, patents and other technology transfer measures. Even when the institutions reported against these measures, the interpretation of the results at an institutional level is not straightforward, especially when trying to link these outputs directly to the MSFHR Institutional Infrastructure Award. MSFHR infrastructure funding therefore should be viewed as a valued contribution to a larger pool of funds that, collectively, contributes to the research work and outcomes of each institution.

The role of the institutions in other aspects of research support, such as collaborations and partnerships appears limited. No institution reported having established a strategic relationship with another university or teaching hospital nationally or internationally, for example. Most research collaborations, including those with industry partners, appeared to be driven by individuals. In the area of knowledge translation (KT), the institutions described various initiatives and plans in their funding proposals, but the progress reports provided little evidence that such activities had been undertaken. The bulk of reported KT activities were, in fact, research dissemination, although most institutions also reported examples of technology transfer and/or spin-off companies. Interestingly, no institution provided examples of research translation activities directed at the health system, including the four funded teaching hospitals. It is nonetheless possible that such activities do exist, and/or may be supported by funding other than the MSFHR infrastructure award.

On the basis of our analysis we propose the following recommendations:

1. Strategic review of the Institutional Infrastructure Award

That MSFHR refer the issues identified in this report to the panel undertaking a strategic review of MSFHR's infrastructure funding programs in Fall, 2006, including the interrelationship between existing infrastructure awards, and the specific characteristics of the institutional infrastructure program including potential applicants, funding levels and eligible expenses.

2. Staged funding payments

That MSFHR consider releasing funds under the Institutional Infrastructure Award in a staged way, with a smaller amount awarded in the first year.

That MSFHR require that institutions provide timeframes for expenditure of the Institutional Infrastructure Award to facilitate timely release of funds.

3. Strengthened accountability

That MSFHR review existing accountability processes and consult with award recipients to strengthen procedures, in particular with regards to the use of MSFHR funds and seeking approval for significant changes.

That MSFHR determine and implement consequences for unapproved expenditures and other failures to adhere to required procedures and processes, including but not limited to deductions or reductions in funding.

4. Better targeted reporting requirements

That MSFHR develop, in collaboration with funded institutions, more streamlined and consistent methods for capturing information about research infrastructure support and research activity.

That MSFHR consider the implications of the problem of attribution for its various funding programs and associated performance monitoring processes.

5. Sharing results with stakeholders

That MSFHR make the findings of this report available to the eight institutions and other stakeholders, as a basis for dialogue about the current program and opportunities for improvement in the future.

Introduction

The Institutional Infrastructure Award is one of several initiatives within the Foundation's Infrastructure Program that aims to help create a vibrant and sustainable health research environment in BC; recognized for excellence, responsive to BC's health needs, and contributing to BC's economy.

In 2002, BC's four major universities and four major teaching hospitals were invited to submit funding proposals for Institutional Infrastructure Awards. These proposals were tailored by each of the institutions to address their particular needs and circumstances. Following formative review by an external panel, all eight institutions were awarded four-year MSFHR Institutional Infrastructure Awards commencing July 1, 2003. The award amounts varied across institutions, depending on several factors including the magnitude and excellence of existing and planned health research, and the recommendations of the external panel.

Research infrastructure support can include salaries and supplies for research support staff (e.g., administrative assistants, grant facilitators, technicians), costs associated with governance and accountability mechanisms,² communications and research-related information technology infrastructure, mentoring and development programs, and research training. The funding is not intended to be used for general administration, audiovisual costs, capital purchases, maintenance and repairs, general security, facility operations, cleaning, etc. (see Appendix A).

The purpose of this report is to assess the impact of the Institutional Infrastructure Awards to date on the infrastructure support provided to health research by these eight institutions. The report is based on an analysis of annual progress reports submitted by the award recipients. The intention is not to evaluate each institution individually. The report is meant to provide an aggregated view of the funded institutions.

The present analysis is based on three key documents provided by the institutions:

- the original funding proposal submitted by each institution in 2002, which includes a Research Development Plan and identifies the intended use of the MSFHR infrastructure funds; and
- the two annual progress reports submitted by each institution for Years 1 and 2 (2003-04 and 2004-05) of the four-year award.

This analysis is primarily limited to these three documents. Thus, this analysis does not capture issues that might be identified by other external stakeholders including unfunded institutions. Furthermore, it does not fully incorporate feedback from the review panel, nor from all current and historical program documents. Finally, the analysis has been prepared by MSFHR staff and may not reflect the views of all stakeholders regarding the program. The report should be read with these limitations in mind.

² Examples include convening and supporting an external board or advisory committee,

This report is structured to answer nine key questions:

1. Which institutions receive MSFHR infrastructure funding?
2. How do institutions use the infrastructure funding we provide?
3. What outcome measures have institutions reported?
4. Has researcher productivity increased?
5. Have institutions enhanced the research support they provide?
6. Have institutions facilitated increased research collaboration?
7. Are institutions facilitating the transfer of research results to improve health care services and/or pursue economic development opportunities?
8. What are some of the issues and challenges for institutions?
9. What are some of the issues and challenges for MSFHR?

The report concludes with recommendations for MSFHR to consider.

This report has been written to encourage review and evaluation of the Institutional Infrastructure program by MSFHR, and to provide feedback to funded institutions.

The following additional points should be noted when considering the findings in this report. MSFHR specified the reporting requirements for the annual progress reports submitted by the institutions in 2004 and 2005. The reporting requirements were also changed in 2005 to improve information collection, yet with the side-effect of limiting some opportunities for comparisons of trends over time. To date, MSFHR has not reviewed the accumulated institutional progress reports in a systematic way and therefore some of the issues that have emerged in this current report might have been identified earlier. There has also been a significant shift in the broader research funding environment towards increased accountability and strengthened reporting requirements. The 'gaps' in reporting identified in this report may not have been considered gaps two or three years ago. Information that we might now consider desirable may be lacking because we did not ask for it.

The ability to directly link the MSFHR Institutional Infrastructure Awards to changes in research productivity and output is also complicated by the fact that MSFHR infrastructure funding represents but a small proportion of the operating funds of the institutions, and its relative contribution to the overall research performance of the institutions is comparatively small.

This problem of attribution was also identified and discussed in an earlier report that examined the impact of MSFHR Research Unit Awards on 25 research groups funded in 2003 and 2004 (www.msfr.org/docs/Research_Units_Analysis.pdf). As was the case with the Research Units, institutional senior administrators have commented that the value of MSFHR infrastructure funding is more than the dollar value of the awards, particularly because of the uniqueness and flexibility of the funds. Nonetheless, determining the specific impact of MSFHR funding on research productivity and quality remains a challenge. One approach suggested to address this challenge is to consider 'plausible association', defined as "a reasonable person, knowing what has occurred in the program and that the intended outcomes actually occurred, agrees that the program contributed to those outcomes".³ For MSFHR, specific questions we could ask include:

³ Henricks M. (1996). Performance Monitoring: How to Measure Effectively the Results of Our Efforts. Presented at the American Evaluation Annual Conference, Atlanta, November 6.

- (a) Did the specified outcomes appear after our efforts began?
- (b) Did these outcomes appear at different locations and with different people?
- (c) Did the greatest outcomes appear where we did the most (for example, where we provided the most funds)?
- (d) Did outcomes only appear when and where MSFHR funds were introduced?

1. Which institutions receive MSFHR infrastructure funding?

In 2002, MSFHR invited BC's four major universities and four major teaching hospitals to submit funding proposals for Institutional Infrastructure Awards. The decision to limit funding to these eight institutions was based on the funding envelope that was available at the time. The Foundation intended to re-evaluate the list of potential applicants if further funding was confirmed beyond 2006.⁴

The eight institutions submitted proposals that outlined current research capacity and activities, research development plans, research trainee recruitment and support, knowledge translation activities, and requested infrastructure funding. Following formative review by an external panel, all eight institutions were awarded four-year MSFHR Institutional Infrastructure Awards commencing July 1, 2003. The award amounts varied across institutions, depending on several factors including the magnitude and excellence of existing and planned health research, and the recommendations of the external panel (see Table 1).

Table 1: Total funding requested and awarded to the eight recipients of MSFHR Institutional Infrastructure Awards.

MSFHR Institutional Infrastructure Awards	Funding requested	Funding awarded *	Percentage awarded versus requested
British Columbia Cancer Agency	\$3.2 m	\$3.2 m	100%
Children's and Women's Health Centre of British Columbia	\$2.2 m	\$1.8 m	82%
St Paul's Hospital/Providence Health Care	\$2.9 m ^α	\$1.6 m	41% ^β
Simon Fraser University	\$2.0 m	\$1.2 m	60%
University of British Columbia	\$2.2 m ^α	\$2.2 m	75% ^β
University of Northern British Columbia	\$0.8 m ^α	\$1.1 m	100% ^β
University of Victoria	\$3.2 m	\$1.4 m	44%
Vancouver Coastal Health Research Institutes	\$2.7 m	\$2.6 m	96%
TOTAL	\$19.2 m	\$15.1 m	

^α Funding requested for three years only.

* Four-year award, July 1, 2003 to June 30, 2007.

^β Percentage based on funding requested pro rata adjusted to four years.

A separate initiative commenced in 2003 to build capacity in BC's six regional health authorities⁵, with a specific focus on health services and policy research. This initiative, the Health Services and Policy Research Support Network (HSPRSN), was formally launched in January 2004 with a total budget of \$16.0 million. The HSPRSN currently offers three types of funding awards. Operating grants are awarded to support health

⁴ MSFHR Research Infrastructure Support Program Report: Principles and Key Guidelines, June 2002. (www.msfhr.org/docs/MSFHR_Research_Infrastructure_Support_Program_Report.pdf).

⁵ BC's structure of six Health Authorities was introduced in December 2001 and comprises: Fraser Health; Interior Health; Northern Health; Provincial Health Services Authority; Vancouver Coastal Health; and Vancouver Island Health Authority.

services and policy research in specific priority areas; Investigative Team Awards provide infrastructure support to collaborative teams that link researchers with policy- and decision-makers; and Capacity Building Awards aim to develop health services and policy research capacity within each health authority. In March 2005, MSFHR was delegated with the authority to approve grants from HSPRSN funds. The four teaching hospitals receiving MSFHR Institutional Infrastructure Awards are affiliated with three of the six health authorities. An analysis of the Health Authority Capacity Building awards program will be available on the MSFHR website after it is reviewed by the Steering Council in September 2006.

Since the MSFHR Institutional Infrastructure program was launched in 2002, several other BC universities are seeking to increase health research-related activities, and could potentially benefit from MSFHR infrastructure support. At the same time, a number of research enterprises in BC are receiving MSFHR infrastructure support both through their affiliation with one of the eight funded institutions, one of the six health authorities, and/or through independent MSFHR Research Unit Awards.

Suggestions

- MSFHR should re-evaluate the list of potential applicants for its Institutional Infrastructure Award given that the Foundation's second funding mandate has been confirmed.
- MSFHR should review the interrelationship between the research infrastructure that is supported by its eight Institutional Infrastructure Awards, the infrastructure awards to BC's six Health Authorities, and the various Research Unit Awards, to ensure optimal distribution and use of resources.⁶

2. How do institutions use the infrastructure funding we provide?

Each of the eight institutions receiving an MSFHR Institutional Infrastructure Award commenced funding on July 1, 2003. As described above, the institutions were awarded different levels of funding, based on recommendations of an external Merit Review Panel and approval by the MSFHR Board (see Table 1).

During the first two years of funding (July 1, 2003 to June 30, 2005), MSFHR paid a total of \$7.42 million to the eight institutions. At the end of Year 1, none of the institutions had fully spent their allotted funds; the average spending was 48% of the yearly budget. At the end of Year 2, the average spending was 66% of the available funds (including any carry-forward amounts from Year 1). As of June 30, 2005, the eight institutions were holding a combined total of \$ 1.87 million in unspent funds (see Figure 1). This represented 25% of the total of \$7.42 million allocated over the two-year period, 2003-2005.

⁶ The Review of the Infrastructure Program has been scheduled for Fall, 2006.

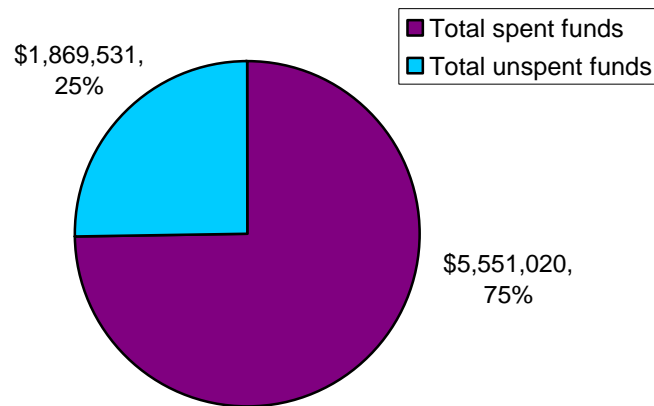


Figure 1: MSFHR Institutional Infrastructure Award funds, 2003-2005.

Institutions indicated that the main reason for unspent funds was difficulties in recruiting personnel. Most institutions planned to hire multiple employees with the MSFHR funds, and it often took the better part of a year to recruit, hire and train the new staff. Positions such as biostatisticians, health economists and highly trained technicians were some of the most difficult to recruit.

Figure 2 provides a breakdown of expenditures by the eight institutions at the end of Year 1 (2003-04), and Figure 3 provides a similar breakdown at the end of Year 2 (2004-05). Of the spent funds, the majority (66% in Year 1, and 75% in Year 2) was used to pay for personnel. Although the institutions did not generally specify personnel in terms of the standard unit of full-time equivalents (FTEs), based on our interpretation of the proposals and annual progress reports, we estimate that 54.3 FTEs were identified in the original proposals, and 35.5 FTEs were recruited by the end of Year 2. The most common types of personnel funded through the institutional awards were grant facilitators, research assistants, community liaison officers, core facility managers, health economists, and biostatisticians. One institution did not hire any new personnel, and instead engaged existing faculty in grants facilitation and other services. While buy-out of release time is an eligible expenditure, the guidelines specifically stated that buy-out funds were intended to allow faculty to spend more time conducting research rather than providing research support.

Three institutions used significant amounts of MSFHR infrastructure funds towards information technology (IT), such as the purchase of hardware, software and/or licensing fees, or the development of databases. For example, one institution requested \$240,478 for IT costs in its first year, accounting for 30% of the requested Year 1 budget. Another institution spent \$60,000 on IT in Year 1, representing 17% of its total expenditure for that year. In addition, several institutions included IT personnel, such as computer specialist managers and database administrators, in their staffing budgets, although these positions were often filled by contractors.

Research-related travel costs were a common eligible expenditure. Other common expenditures across the institutions included renovations, space rental, and furniture which are ineligible expenditures according to the program guidelines (see Appendix A). Moreover, despite the fact that space rental was listed as an ineligible expense, some institutions requested it in their proposals and it appears to have been approved by the review panel. Three institutions used MSFHR Institutional Infrastructure Award funds to create their own internal funding programs. As of June 30, 2005, they had spent \$307,500 on seed grants, trainee awards and other funding programs. Though these awards may augment opportunities for training and existing institutional granting competitions, it is unclear how the institutions go about ensuring a consistent and fair evaluation process, and the extent to which they have adequate resources to conduct multiple, ongoing peer review processes.

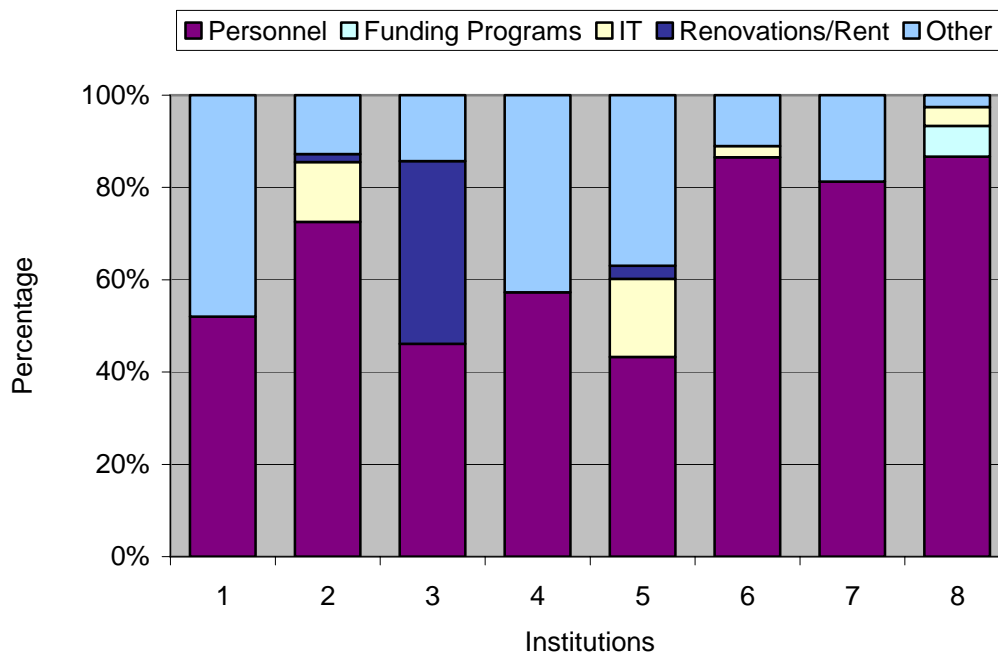


Figure 2: Year 1 expenditures by the eight institutions.

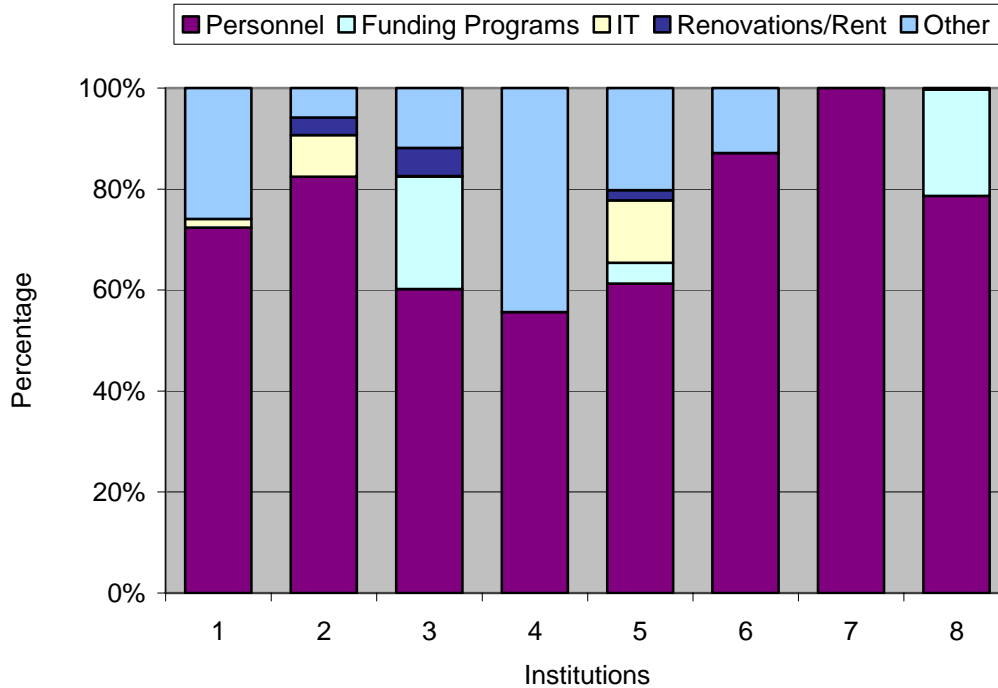


Figure 3: Year 2 expenditures by the eight institutions.

While MSFHR offers some flexibility in the use of infrastructure funding, award recipients are required to notify and seek approval for any major budgetary changes. Our analysis showed that most institutions had spent some proportion of funds on unapproved items. Of the unapproved expenditures, some are eligible expenses under the terms of the MSFHR Institutional Infrastructure Award, although they represented significant variations from the approved budget. Other items are ineligible expenses under the terms of the Award, including a small number of items that had been specifically rejected at the proposal stage. For example, one institution spent \$125,000 on library acquisitions in Year 2 despite this item being rejected by the External Merit Review Panel and removed from the institution's approved budget at the time of the infrastructure award. Figure 4 shows the proportion of approved and non-approved expenditures by the eight institutions at the end of Year 1 (2003-04), and Figure 5 provides a similar breakdown at the end of Year 2 (2004-05). Across the two years, 2003-05, a total of \$685,346 had been spent on non-approved budget items, representing 12% of the total funds spent by the eight institutions. Clearly, there are some inconsistencies in the interpretation and application of eligible expenditures across institutions and also perhaps within MSFHR, particularly in the early stages of the program. For example, although furniture and equipment were included as ineligible expenses, at least two institutions' originally-approved budgets included these items.

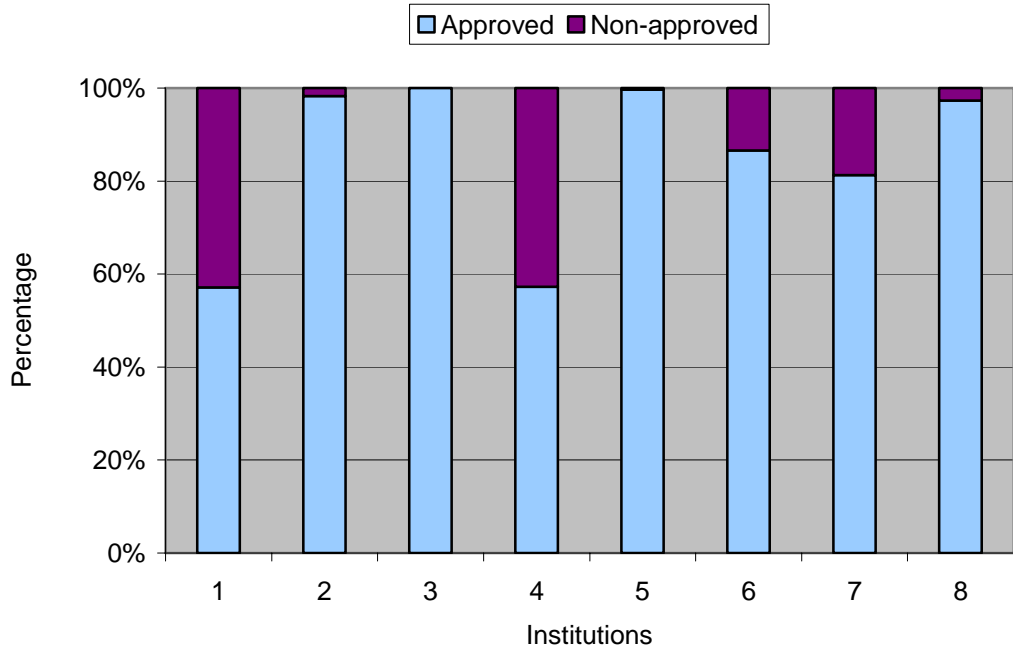


Figure 4: Year 1 approved and non-approved expenditures by the eight institutions.

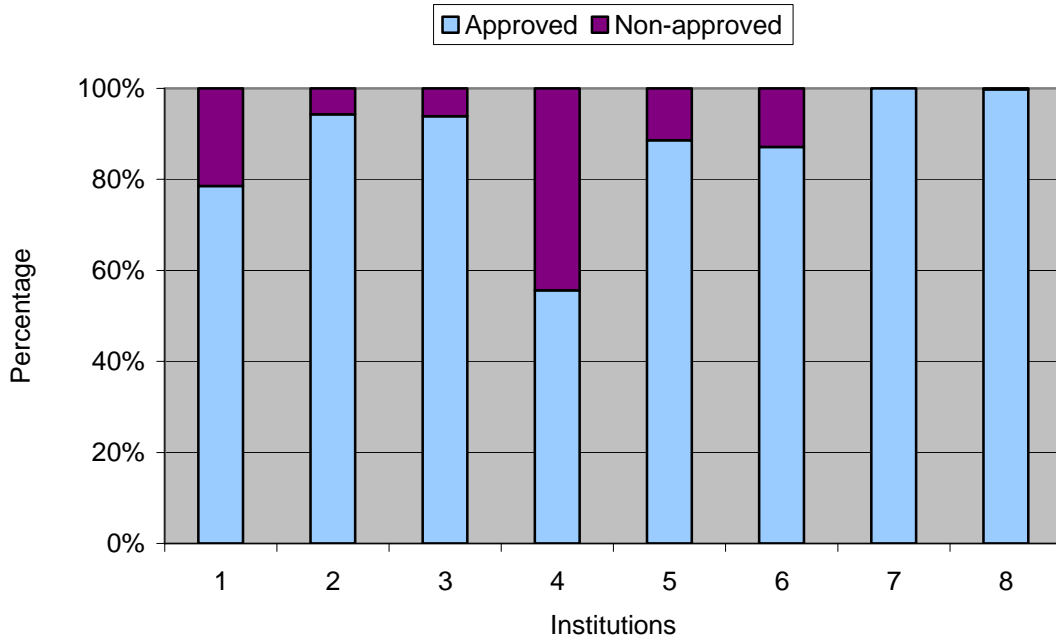


Figure 5: Year 2 approved and non-approved expenditures by the eight institutions.

Suggestions

- MSFHR should consider the opportunity costs of unspent funds and explore alternate funding options. For example, funds could be released to institutions on a sliding scale with a smaller amount in the first and last year of the award, and the bulk of the money being disbursed in the second and third years.
- MSFHR should require that institutions provide timeframes for expenditure of the Institutional Infrastructure Award to facilitate timely release of funds.
- Information about the new staff positions created by MSFHR infrastructure funding needs to be captured in a more consistent manner (for example, the number of FTEs) in order to assess the impact of funding on job creation and its contribution to research capacity and economic development.
- MSFHR should consult with institutions about institution-run funding programs that use MSFHR infrastructure funds.
- MSFHR should ensure that only approved, eligible expenditures occur with respect to its award programs.
- MSFHR should address and resolve known ineligible expenditures by institutions against the infrastructure awards.

3. What outcome measures have institutions reported?

The funding proposals submitted by the institutions required the inclusion of outcome measures that could be associated with the MSFHR infrastructure funding. Most of the institutions specified a limited number of goals or groups of measurable outcomes, usually including one or more of the following:

- quality of researchers;
- amount of research funding;
- creation of new knowledge;
- scientific or clinical objectives;
- new collaborations or partnerships;
- technology transfer;
- knowledge translation;
- recruitment;
- building capacity;
- development of new programs; and
- research awards administration and facilitation.

Many of the measures identified by the institutions were, in fact, outputs rather than outcomes, and tended to reflect specific activities or services that would be delivered as a result of MSFHR infrastructure funding. All institutions recognized a need for both quantitative and qualitative approaches to outcome measures. Interestingly, although there was some overlap across institutions in the kinds of personnel they proposed to recruit, and the types of activities they proposed to deliver, there was little consistency in the outcome measures specified.

In the subsequent annual progress reports provided by the institutions for Years 1 and 2, the original outcome measures appeared to be largely forgotten by most of the institutions. Two institutions did not report any outcomes in their Year 1 reports. In most other cases, institutions tended to include highly-selective examples of success and/or

one or more well-established academic indicators associated with research productivity, competitiveness and institutional capacity-building, such as:

- increased number of grant proposals;
- increased number of collaborative grant proposals;
- increased number of funded grants;
- new research projects initiated;
- increased number of abstracts, and publications;
- increased invitations to speak at national and international conferences
- increased number of students and post-doctoral fellows trained;
- increased number of student scholarships;
- increased number of patents;
- increased revenue generation; and
- number of new faculty recruited.

While these latter measures point to researcher productivity, they cannot be attributed solely to MSFHR Institutional Infrastructure funding; rather they reflect a wide range of factors at the institutional, departmental and individual researcher levels.

A small proportion of reported outcomes were directly linked to the MSFHR award. Two institutions had used MSFHR infrastructure funding to establish research support offices, and included the creation of these offices and the delivery of specific services by them as measurable outcomes. Two institutions linked all of their outcome measures directly to the budget items they had requested under the MSFHR award. In both cases, the outcomes were output oriented, and had largely been achieved by the second year of funding. Another institution reported outcomes in terms of the personnel who had been hired with MSFHR funds and the specific activities and services they had provided, for example:

- facilitating and acquiring health research infrastructure, including technology;
- fostering a stronger orientation to health research and building research capacity;
- compiling research information and distribution lists;
- facilitating new approaches to purchasing and quotation processes;
- liaising with health researchers;
- facilitating research collaborations;
- acting as primary liaison and facilitator for research proposals; and
- participating as research review committee members.

Further details of the outcomes achieved by the institutions are provided below in Sections 4-7.

Suggestions

- MSFHR should work with funded institutions to review and better target outcome measures, and to develop more consistent and effective methods for reporting against them.
- MSFHR should invite funded institutions to reconsider their outcome measures when funding levels are modified.
- MSFHR should encourage funded institutions to link outcome measures more directly to MSFHR infrastructure funding. These outcomes should be sufficiently challenging to achieve yet attributable, to some degree, to the funds provided.

4. Has researcher productivity increased?

With some exceptions, there is a surprisingly little information addressing researcher productivity in the reports even though research support is one of the primary foci of the institutional infrastructure funding program. Details of the productivity of the institutions are summarized below, in terms of funding, publications, patents and other technology transfer measures. It is noteworthy that even though the institutions reported against these conventional academic measures, the interpretation of such measures at an institutional level is not straightforward.

Funding

Of the various measurable outcomes identified by the institutions, grant funding success was the one measure reported by all. Every institution reported an increase in grant funding levels in their progress reports for Years 1 and 2 compared with the levels reported in their funding proposals. However, the methods used to capture and report on this measure varied across the eight institutions. For example, three institutions reported all funding from all sources, including peer-reviewed and private sector funding. One institution achieved its measurable outcome of an increase in peer-reviewed funding by the second year of reporting while another institution limited its reported funding success to successful CIHR operating grants, and yet another reported only grants of “significant value” (in the millions of dollars). One institution restricted its reported funding success to that achieved by full-time faculty only.

Publications

Only two institutions tracked the number of publications from the proposal stage through to Years 1 and 2 of the MSFHR infrastructure funding award, and both reported increases ranging from 5-20% per annum. Due to publishing time-lags, the infrastructure award may have impacted the number of publications in Year 2, but it is unlikely to have influenced publications in Year 1. A third institution, which had attempted to capture publication information, noted considerable challenges in tracking and reporting on publications, and concluded that the available figures were not accurate and not reflective of its researchers' accomplishments.

Patents and Spin-off Companies

Most institutions had established units to facilitate technology transfer, and which provided services such as assessing and filing patent applications, negotiating material transfer agreements, and identifying industry partners as collaborators and investors. In total, the economic productivity of the researchers in these three institutions over the two years 2003-05 included (approximately) 288 material transfer agreements, 55 provisional or filed patents, 101 technology/invention disclosures, 8 licensed technologies and 1 trademark.

Two other institutions mentioned patents and spin-off companies in their proposals but did not provide any further information in their Year 1 and 2 progress reports. The remaining institutions made no mention of patents and spin-off companies.

Suggestions

- MSFHR should ensure that outcome measures reported by institutions include appropriate measures of researcher productivity that can be reliably tracked and reported. Some specificity is required regarding how such outcomes should be defined and measured, to ensure consistency across institutions.
- MSFHR should explore with institutions strategies to consistently capture and report on economic activities, particularly those with potential to generate revenue including filing of patents, signing of material transfer agreements and licensing of technologies.

5. Have institutions enhanced the research support they provide?

The progress reports submitted by the eight institutions for Years 1 and 2 provide extensive examples of new and expanded research support funded directly by the MSFHR Institutional Infrastructure Award. As reported in Section 2, the primary use of MSFHR infrastructure funding was to employ additional personnel. Three types of personnel were most commonly funded by the institutional awards:

- research staff (e.g., research/grant facilitators, research coordinators, project managers, research liaison officers, administrative support);
- technical staff (e.g., laboratory managers, animal technicians, instrumentation technicians, microscopy technician, tissue array technologist, imaging technologist, bioinformatics analyst); and
- staff with other specific expertise (e.g., epidemiologists, health economists, statisticians, data managers/analysts, ethics coordinator, IT/network manager, webmaster).

These staff tended to be assigned to specific research areas serving specific types of research, or part of a central office providing more generic services across the institution. In fact, four of the eight institutions have created new centralized research offices with MSFHR funding. These offices generally provide the following types of services:

- research/grant facilitation (identifying funding opportunities, assisting with grant proposal preparation, linking new investigators with more experienced mentors, undertaking/coordinating internal reviews of proposals);
- training in subjects such as grant writing, manuscript writing, presentation skills, ethics, research design, statistical analysis, and knowledge translation;
- seed and other targeted funding opportunities;
- research dissemination by hosting or promoting research presentations, seminars, meetings and conferences.

In some cases, services have been targeted towards new investigators and/or research trainees and students, raising questions about whether the more established researchers are obtaining any benefits from these offices and the MSFHR institutional infrastructure funding. One institution has questioned the relative value of its use of MSFHR infrastructure funding for seed and other funding awards which tend to benefit only a small number of individuals, compared with other wider uses, although it has continued such award offerings. On the other hand, another institution which provides

funding awards for clinician scientists to promote the research/clinical practice interface regards this type of award positively.

All offices have reported various successes as a result of the above services, including increased funding proposal success rates, increased amounts of CIHR funding, and enhanced research capacity particularly for new investigators. The issue of attribution should be considered, and the possibility that some of these successes may have resulted without the support of these offices and/or because of other factors. Nonetheless, these offices appear to have become well-established and well-accepted. At least two have indicated that the demand for services is already exceeding supply, and have alluded to the need for additional funding.

One issue that emerges from the progress reports is the apparent use of MSFHR institutional infrastructure funding for some 'core institutional services' in addition to services specific to health research. The extent to which this occurs varies across the eight institutions but is present in all of them, and is especially prevalent in the area of IT infrastructure.

Suggestions

- MSFHR should work with funded institutions to identify, and promote the use of, those infrastructure resources and services that are most beneficial to trainee researchers, new investigators, clinician scientists, and/or more experienced researchers.
- MSFHR should follow up with institutions on the use of infrastructure funding for core institutional services.

6. Have institutions facilitated increased research collaboration?

At the proposal stage, the eight institutions described a wide range of regional, national and international collaborations. Though presented differently and in varying levels of detail, most of the collaborations were at the level of individual researchers, groups of researchers, or specific projects, and involved academics in other universities, various organizations such as Genome BC, or the BC Ministry of Health, and/or private sector companies. The four funded universities also had various relationships with teaching hospitals and health authorities including sharing some infrastructure resources or jointly hosting workshops and other events. No institution reported collaborations at an institutional level.

In the progress reports, the collaborations most often mentioned were with regional or national research groups, industries and agencies, but again these relationships tended to be initiated by individual researchers within the institutions. For example, one institution reported on two of its researchers who had initiated collaborations with IBM. Two institutions gave examples of partnerships with organizations in other provinces, but these links were not inter-institutional, and rather specific to a research project or program. However, for the most part, it is very difficult to attribute the collaborations mentioned to the infrastructure support provided by MSFHR.

International collaborations seemed to be fairly limited and mostly concentrated in the United States. Though some international universities and research groups were mentioned, for the most part collaborations were not described in detail and the relevance to the institutions' research themes mentioned in their funding proposals was not obvious.

Most institutions included the hiring of research or grant facilitators in their funding proposals, some of whom appeared to be involved in collaborative activities such as organizing and managing networking events and other researcher interactions. Nonetheless, subsequent progress reporting did not reveal an abundance of new collaborative initiatives. It should be noted that the Year 1 progress report did not specifically ask for details on the institutions' collaborative efforts, but the Year 2 report did.

Suggestions

- MSFHR should work with the funded institutions to develop more consistent methods for capturing information on collaborations that are directly related to MSFHR institutional infrastructure support.
- MSFHR should consult with institutions to better understand what opportunities exist for institution-wide strategic collaborations.

7. Are institutions facilitating the transfer of research results to improve health care services and/or pursue economic development opportunities?

All eight institutions identified knowledge transfer (KT) activities in their funding proposals as one of their measurable outcomes, and several included rather ambitious programs. However, in the subsequent progress reports for Years 1 and 2, the reported KT activities were modest at best. For the purposes of this report, KT activities were assigned to one of four types: Academic; Health System; Community; and Economic. As shown in Table 2, most KT activities described by the institutions were academic and oriented towards researchers sharing their work with other researchers and/or academic peers. Interestingly, no institution provided examples of research translation activities in the health system, including the four funded teaching hospitals. It is nonetheless possible that such activities do exist, and/or may be supported by funding other than the MSFHR infrastructure award.

Table 2: Type of KT activities reported by institutions in Years 1 and 2 combined.

Type of KT	Number of institutions
Academic	8
Health System	0
Community	2
Economic	6

Academic KT

All institutions provided examples of conventional research dissemination activities targeting researchers and/or academics, such as scientific presentations, research seminars and workshops, journal publications, student research days, and weekly colloquia. Two institutions mentioned using centralized resources to coordinate such events, while in most other cases such activities were arranged by individual departments or research groups rather than the institutions per se.

Health System KT

As mentioned above, no institution reported research translation activities aimed at health system changes or improvements in clinical practice.

Community KT

Only two institutions provided specific examples of knowledge translation activities targeted at members of the wider community. One institution reported links with patient advocacy groups, and the other described two types of events respectively aimed at high school students and the general public.

Economic KT

Four of the eight institutions referred, in their funding proposals, to spin-off companies that had already been launched to commercialize biotechnology- or technology-based research results. One of these four quantified the dollar investment and dollar return on its commercial ventures. However, none of the four institutions provided further information on these commercial activities in their subsequent progress reports. Three institutions (including one of the four above) reported on annual numbers of patent applications, material transfer agreements, and invention disclosures. Two institutions provided no information about spin-off companies or patents, transfer agreements, disclosures, etc.

Suggestions

- MSFHR should work with institutions to develop more consistent methods for capturing information on KT activities in order to assess the impact of research on scientific and health innovations, and economic development over time.
- MSFHR should consult with institutions to better understand what opportunities exist for more institution-led KT activities, particularly the translation of research into health system policy and practice.

8. What are some of the issues and challenges for institutions?

On the basis of our analysis of the institutions' proposals and progress reports, three issues emerged as posing challenges for institutions: recruitment of research-related staff; role definition in research infrastructure support; and funding sustainability.

Recruitment

As noted previously, the institutions spent a significant proportion of MSFHR infrastructure funding on new personnel, including research staff, technical staff and other research-related staff. Several institutions reported recruitment difficulties, and they were the most frequently cited reason for the under-spending of infrastructure funds

in Year 1. Interestingly, in our analysis of the research units receiving MSFHR infrastructure funding awards, recruitment difficulties were also identified as a major problem. This would suggest opportunities for a broad-based and shared solution.

Role definition in research infrastructure support

At the present time, MSFHR provides infrastructure funding awards to eight institutions as well as 29 research units (located in these and several other organizations). From our earlier analysis of 25 of the 29 research units, and the present analysis of the eight institutions, some duplication in the types of expenditures reported by both types of award recipients is apparent. A lack of clarity also exists about what activities and services might be more effectively led centrally by the institution, and those activities and services that should be driven closer to the ground by research units and individual researchers, for example, in areas such as research collaborations, research skills training, proposal development support, and research dissemination. There are also activities that appear to be not well-addressed by either the institutions or the research units, for example, research knowledge translation into the health system, which certainly merits attention. Finally, several of the institutions have specifically targeted the delivery of services and activities towards new investigators and trainees, raising questions about what benefits more experienced researchers are receiving from the institutional infrastructure awards.

Funding sustainability

In 2002, MSFHR invited eight institutions to submit funding proposals for Institutional Infrastructure Awards. These awards have a fixed four-year term. The decision to limit funding to these eight institutions was based on the funding envelope that was available at the time. The Foundation is undertaking a review of its infrastructure funding programs in Fall 2006, and will be re-evaluating the lists of potential applicants for each of its infrastructure awards. Nonetheless, at this time, the ability of the eight currently-funded institutions to sustain the personnel that have been recruited and the services that have been established with the existing MSFHR infrastructure awards appear totally dependent on continued MSFHR funding. Several institutions have also flagged that demand for their newly created research services is exceeding supply, and that additional funding is needed. At the same time, the institutions appear to be using MSFHR research infrastructure funding to meet the costs of some core institutional expenses. These factors should be considered by the review.

Suggestions

- Discussions should be held with the funded institutions (and research units) to explore opportunities for alleviating some of the recruitment challenges.
- The Fall 2006 review of MSFHR's infrastructure programs should include consideration of the relative roles and responsibilities of institutions and research units in the provision of research infrastructure support, the use of MSFHR infrastructure funding by institutions and research units particularly with regards to duplication and/or overlap, and the ongoing sustainability of such funding.

9. What are some of the issues and challenges for MSFHR?

In addition to the issues discussed above, our review of the eight institutions has raised the following three key issues: reporting requirements; problem of attribution; and funding.

Reporting requirements

In recent times research funding organizations across Canada have placed increased emphasis on 'back end accountability', that is, ensuring that distributed funds are used as requested and that related goals and objectives are being met. Opportunities also exist for MSFHR to strengthen and streamline current reporting requirements for funded institutions, and to ensure greater consistency in the information provided across institutions and over time. Efforts should also be made to identify those research outputs and outcomes best reported at the institutional level versus those reported by research units and/or individual researchers. In addition, some measures may not be indicative of MSFHR infrastructure funding per se but important indicators of research activity, for example, peer-reviewed publications and knowledge translation initiatives (see Problem of attribution below).

Problem of attribution

The MSFHR Institutional Infrastructure Awards represent a small proportion of the operating funds of the funded institutions. It is therefore a significant challenge to try and measure the unique contributions of the Institutional Infrastructure Award (or any other award) on research activity and productivity in these institutions. Several of the institutions have established discrete research offices with MSFHR award funds, which would allow the reporting of specific outputs and outcomes over time. However, even in these cases, it will be difficult for the institutions to demonstrate that many of the outputs and outcomes are directly and solely attributable to these offices.

Funding

The individual funding levels for the infrastructure awards to the eight institutions were based on several factors including the scale and quality of existing and planned health research, and the recommendations of the external review panel. Only three of the eight institutions were awarded funding at, or close to, the levels originally requested. The remaining institutions were awarded less funding, and had to adjust their proposed budgets and infrastructure development plans accordingly. Several institutions appeared to have difficulties doing so initially. However, over the two years of funding, 2003-05, all eight institutions deviated from their approved funding plans. While MSFHR infrastructure awards offer considerable flexibility, including funding items not readily funded from other sources, and allowing unspent funds to be carried forward from one year to the next, it is a condition of all infrastructure awards that approval be sought from MSFHR for major budget variations. None of the eight institutions did so, and several have used MSFHR funds for ineligible expenses. Clearly the institutions' obligations as award recipients, and particularly with regards to funding compliance, need to be addressed. The institutions' diverse uses of MSFHR infrastructure funding also offer opportunities for evaluating more effective and less effective uses of these funds.

Suggestions

- MSFHR should review the reporting requirements for infrastructure award recipients to make them more stream-lined and more consistent in terms of the information that is captured.
- MSFHR should consider the implications of the problem of attribution for its various funding programs and associated performance monitoring processes.
- MSFHR should follow-up with all funded institutions about their obligations as award recipients, particularly with regards to funding compliance.
- MSFHR should refer to the panel undertaking the review of infrastructure programs in Fall, 2006 the issues of infrastructure funding to institutions including eligible uses of funding.

Recommendations

On the basis of the above findings, we propose the following recommendations:

1. Strategic review of the Institutional Infrastructure Award

That MSFHR refer the issues identified in this report to the panel undertaking a strategic review of MSFHR's infrastructure funding programs in Fall, 2006, including the interrelationship between existing infrastructure awards, and the specific characteristics of the institutional infrastructure program including potential applicants, funding levels and eligible expenses.

2. Staged funding payments

That MSFHR consider releasing funds under the Institutional Infrastructure Award in a staged way, with a smaller amount awarded in the first year.

That MSFHR require that institutions provide timeframes for expenditure of the Institutional Infrastructure Award to facilitate timely release of funds.

3. Strengthened accountability

That MSFHR review existing accountability processes and consult with award recipients to strengthen procedures, particular with regards to the use of MSFHR funds and seeking approval for significant changes.

That MSFHR determine and implement consequences for unapproved expenditures and other failures to adhere to required procedures and processes, including but not limited to deductions or reductions in funding.

4. Better targeted reporting requirements

That MSFHR develop, in collaboration with funded institutions, more streamlined and consistent methods for capturing information about research infrastructure support and research activity.

That MSFHR consider the implications of the problem of attribution for its various funding programs and associated performance monitoring processes.

5. Sharing results with stakeholders

That MSFHR make the findings of this report available to the eight institutions and other stakeholders, as a basis for dialogue about the current program and opportunities for improvement in the future.

Appendix A: Eligible and Ineligible Expenses

The eligible and ineligible expenditures for the institutional award were outlined in the guidelines for the program. The information below is taken directly from the 2003 competition document, Appendix A: Eligible and Ineligible Expenses

Eligible and Ineligible Expenses

Costs of providing common services to researchers that enhance the research environment, increase productivity, build critical mass or improve integration are eligible for support. Funding is intended to augment current infrastructure funding not replace it or to take the place of funding that otherwise would be allocated to support health research infrastructure in the absence of MSFHR funding.

Funding is not intended to duplicate funding opportunities from the Canada Foundation for Innovation. Where CFI may consider the capital and other costs of acquiring infrastructure items, MSFHR will consider the cost of maintaining the infrastructure.

Below is a list of **examples** of eligible and ineligible items (it is not meant to be all-inclusive). Requests for support of certain items must be appropriate for the size and location of the Research Institution. The MSFHR will determine eligibility on an individual basis for any items requested that do not appear on this list of eligible and ineligible expenses.

Eligible Expenses

- Salaries of staff supporting research
- Salaries of secretarial staff
- Salaries of administrative assistants
- Costs of a research support office (translation, statistical consulting, survey design consulting, grant facilitation, etc.)
- Costs relating to the hiring of researchers
- Communication costs: mail, long distance telephone, fax, audiovisual, library, stationery, photocopying and document reproduction, network or internet access and management
- Costs relating to the dissemination of scientific knowledge, including participation in conferences
- Costs relating to the transfer of technologies to industry and of knowledge to clinical practice, policy makers and other users of the health research
- Costs relating to common services such as research staff, specialty animal facilities, culture medium preparation, database management and access to specialized facilities outside the institution or province.
- Costs related to buying release time from clinical, teaching or administrative duties so that a researcher may spend more time doing research related to the Research Institution's overarching theme or one of its sub-themes.
- Support for research training in a defined training program developed by the Research Institutions or for training that is essential/important for Institution productivity but is only available external to the institution.

Ineligible Expenses

- General administrative costs for research: costs inherent in managing human resources, finances, supplies, laundry, etc. (normally from hospital or university administration).
- Documentation costs: basic cost for managing a library (except for resources used exclusively for research activities).
- Audiovisual costs: basic infrastructure required for producing audiovisual documents (excluding those costs associated solely for a research activity).
- Liability, fire and other insurance: costs for the institution
- Publicity and representation costs
- Maintenance, security and operating cost
- Maintenance and repairs to facilities: cost for areas, furniture and equipment allocated to research activities. (This excludes service contracts for state-of the art scientific facilities exclusively used for research, which are considered direct costs.)
- Costs of operating the facilities: heating, ventilation, air conditioning, water, electricity, etc. for areas, furniture and equipment allocated to research activities.
- Cleaning
- Institution's expenses for clinical care such as: laundry, uniforms, bedding, dishes and meals, etc.