Rural Surgical and Obstetrical Networks Project Proposal

Submitted to Joint Standing Committee on Rural Issues, January 23-24, 2017

RURAL SURGICAL AND OBSTETRICAL NETWORKS PROJECT PROPOSAL:

MEETING THE NEEDS OF RURAL POPULATIONS

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Project Overview and Background

The disparity of health outcomes between rural and urban residents has been well documented in BC, Canada and internationally as a consequence of recent rural maternity and surgical program closures. In BC, the consequent widening gap in access to health care has disproportionately disadvantaged First Nations peoples, who already represent some of the province's sickest, poorest, and most vulnerable residents. This proposal offers a solution to enhance the health status of rural British Columbians and the sustainability of the health services in the communities in which they live by stabilizing, supporting and enhancing BC's rural surgical programs, and by extension, its rural obstetrical programs.

Robust local surgery programs are an integral part of rural health care infrastructure and are essential to the sustainability of rural acute care programs. They increase the medical capacity of rural communities by supporting enhanced critical care, emergency and trauma care, and by providing access to surgical first responders and anesthetic staff. In addition, surgical infrastructure enables robust maternity care through access to cesarean section: a key determinant of the proportion of local births the service can support and overall provider sustainability.

The cascade of rural surgical closures in British Columbia since 2000 has been directly linked to the loss of rural cesarean section capacity and the corresponding closure of maternity programs. Case studies in British Columbia have revealed challenges in sustaining stand-alone cesarean section services, primarily due to the low volume of procedures performed at rural sites leading to disproportionate overhead costs, lack of currency of surgical staff and compromise of the team function essential to good service delivery.

There is little disagreement however, over the foundational position of maternity care in rural communities, both for maternal newborn health and for the social vitality of communities.

To this end, Rural Surgical and Obstetrical Networks (RSONs) are proposed as a way to support safe and appropriate surgery, operative delivery and maternity care 'closer to home' in eight local geographical regions of British Columbia. This will be done through support for the coherent integration of five essential mutually-supporting components:

1) *Increased Scope and Volume of Rural Surgery Programs* to achieve levels of surgical volume leading to service sustainability and a reduction in regional wait times.
2) *Clinical Coaching and Training Opportunities* for FPs with Enhanced Surgical Skills (FP ESS), FP Anesthetists (FPA), and OR Nurses through opportunities for rural teams at smaller volume rural sites to maintain and improve their skills sets through collaboration with specialists at regional sites. Clinical coaching further enhances Continuous Quality Improvement for rural surgical care and supports the connections between high quality regional communities of practice. The Clinical Coaching program will be based on the UBC RCPD/RCC*bc* program "Clinical Coaching for Excellence".
3) *Remote Presence Technology* enables teams, separated by distance and by training, to stand shoulder to shoulder and operate together, enable clinical coaching and CQI

activity to be done remotely from either the rural or the regional OR, support timely consultations and interventions during critical events, enable planned collaboration during surgeries whereby rural surgeons can access regional surgical experience and expertise during a surgery, enable physicians to monitor and consult on patients remotely from either the rural or the regional OR, and support non-urgent consults. Additionally, these technologies and learnings associated with the integration of these technologies into practice have potential added benefits in the ER, for trauma and critical care.

4) *Continuous Quality Improvement (CQI) Mechanisms* to ensure ongoing and iterative improvement of local performance at a *team* level, tracking the efficacy of surgical triage and referral and the potential overall effect of surgical services on healthcare in the community.

5) *Evaluation of Networks* through a mixed-methods approach in order to capture both the process of network development and function and surgical outcomes at a community and network catchment level. Primary objectives include the development of a robust data platform to support the evaluation of network functioning and clinical outcomes and conducting of relevant, primary research on patient access to rural surgical services in BC.

The development of networks of care is a key rural health policy directive for both the Ministry of Health and the regional Health Authorities and has been prioritized by professional groups at a regional, provincial, and national level. Further, Rural Surgical and Obstetrical Networks align with the Quadruple Aim, which includes improving the patient and provider experience of care (including quality and satisfaction); improving the health of populations, and reducing the per-capita costs of health care.

This proposal is for funding to support development and sustainability for RSONs serving catchments of 5 – 10,000 people identified as being most at risk of closure. Although the context for each smaller volume rural site is variable, smaller volumes of surgery in rural communities jeopardize the ability to recruit and retain professional teams of surgeons, anesthetists, and OR nursing staff large enough to support the necessary on call responsibilities an effectively approach succession planning.

Key Goals and Objectives

The overarching goal of this project is **to stabilize, support and enhance the delivery of quality surgical and obstetrical care to rural BC populations, particularly First Nations peoples**. Specific objectives include the following:

1) To facilitate a decentralized model of patient care within the mandate of ‘closer to home’;

2) To optimize existing patterns of care provider referral, triage and feedback between rural, regional, and tertiary sites to support optimal patient care thereby reducing time away from work, family, and community for rural patients, especially parturient and postpartum women;

3) To optimize regional distribution of resources to ensure that location of care matches clinical need with available capacity;

4) To enhance the sustainability of rural surgical and obstetrical programs by modelling networked connectivity that effectively nests them as 'rural branches' of the tertiary hospital's surgical programs; and

5) To clarify per capita costs of health care, as measured by an inclusive and comprehensive methodology, focusing on quality and efficiency.

We anticipate that meeting these goals and objectives will lead to increased access to health care choices including screening procedures for BC's rural communities enabling obstetrical and maternity care that is 'closer to home';

- Increased sustainability of smaller volume rural surgical and obstetrical services through increased ability to recruit and retain providers;
- Increased provider satisfaction;
- A greater understanding of the holistic/comprehensive cost-efficiencies of rural surgical networks in meeting surgical demand;
- A greater understanding of the efficacy of networks on rural health care outcomes and their ability to reduce wait times throughout the province; and
- Enhanced quality of rural health services for rural citizens through the development of a multi-professional CQI system appropriate to the privileging of rural smaller volume generalist, surgical and perinatal services.

We also anticipate that meeting these goals and objectives will lead to increased interprofessional support for evidence-based networks of rural surgical and obstetrical care that reflect the needs, resources and opportunities of BC's rural communities. It will also lead to increased support for the relationships between caregivers (an enabler of networked care) and increased continuing professional development opportunities.

Rationale for A Networked Model of Care

The network model positions surgical care, including obstetrical care, as a regional rather than institutional phenomenon, where small operating rooms are connected into a network, linked with the core referral hospital programs; whereby care can be provided through a well-integrated and balanced surgical team, including outreach surgeons and local surgical providers. The network model recognizes the desire for surgical procedures to be provided in the closest operative facility to the patients' residence, respecting the complexity of the procedure, the risk status of the patient, and the availability of surgical providers with procedural competency. Further, it allows surgical providers to be used to the extent of their competencies, where possible, and practice within supportive interdisciplinary teams. These core principles underscore an effective, efficient and sustainable network model of collaborative rural surgical care.

Pre-Implementation Consultation

This proposal includes an outreach and consultation phase prior to the initiation of network funding with the aim of solidifying regional relationships. A key objective of this phase will be to provide a forum for relevant specialist surgeons to partake in the dialogue about small site surgical services. Visiting each network referral site (Kamloops, Prince George, Terrace, Williams Lake, and Cranbrook) to engage specialists and Health Authority administrators (both site and central) in focused conversations will be a necessary step to meeting this objective.

Outputs and Conditions of Success of Rural Surgical and Obstetrical Networks

The intended outputs of each of the local networks are to integrate rural and regional surgical and operative delivery programs into regional departments, underscored by authentic relationships. This will involve engaging with the Health Authorities and the local Medical Staff in a collaborative commitment to a rural surgical and operative delivery program and enhancing the opportunities for robust CQI programs for all the professional stakeholders in the rural and referral sites, the delivery and to documentation of best surgical practices and the opportunities for rigorous evaluation.

Conditions for success include:

1) Interest by the local surgeons, anesthetists, and nurses to collaborate in a rural-regional network of care model;
2) Interest by regional surgeons, anesthesiologists, and nurses to support a rural surgery program through outreach efforts, clinical coaching, and remote presence technology. This could include the acceptance of an integrated regional Department of Surgery;
3) Interest by the Health Authority to see the local rural surgery program supported and enhanced by some or all of the 5 pillars;
4) Collaboration between the Health Authority, their IT leadership, and the local network, in order to assure RPT innovation is compatible with systemic IT organization elsewhere in the region;
5) The interest and aptitude for RPT amongst the local and regional staff; and
6) Sufficient organizational capacity to implement the key components of the network at both participating rural and regional sites.

Implementation

The project will be administered by the Rural Coordination Centre of BC (RCC*bc*) and Executive Provincial Medical Leadership will also be housed at RCC*bc*. Within the RCC*bc*, the project will be overseen by the Rural Surgical and Obstetrical Network Committee. The RSON Committee will have the dual function of ensuring adequate coordination across the "network of networks" within the proposal and will also be a resource to support the local teams in the development of their particular plans for the five components within their own networks. A Project Manager will be hired to work with the RSON Committee to assist in administering the project.

Local Working Groups

Communities interested in accessing funding to create a RSON will engage *(or* create) a local Working Group composed of local clinical leads, administrative leads and representatives of the Health Authority. The local Working Group will develop their network. A local Network Coordinator will then develop project plans and timelines for selected project components of the network and submit an application to the Project Manager and the RSON Committee.

Once this process is complete and their application has been approved, the Working Group will be able to request funds be transferred for site-specific costs. Each community's project team, under the supervision of the Working Group will then be responsible for managing funds, tracking expenses, and reporting back to the RCC*bc via* the Network Coordinator, Project Manager and the RSON Committee. The RCC*bc* will provide financial and project reports to the JSC twice a year. Each of the local RSONs, will form a management structure to support the goals and objectives of the RSON.

Funding

Initial funding for each RSON will be for two years and can be extended annually. If a community chooses to implement the components separately, components can be integrated into the project after commencement, with a timeline proposed within the original plan or added as needed.

The project includes funding to support an annual meeting of the full Provincial Network (RSON Committee, Sub Committees and community working groups). This meeting will provide a venue for Networks to collaborate on combined projects and work through difficulties as they arise.

RURAL SURGICAL AND OBSTETRICAL NETWORKS PROJECT PROPOSAL

PROJECT OVERVIEW

This proposal is designed to support the effectiveness of rural surgical and obstetrical networks throughout BC in order to enhance the health status of rural British Columbians and the sustainability of the health services in the communities in which they live.

Rural residents have the lowest level of disability-free lifespan of any Canadians and lower health status than their urban counterparts[xl]. Rather than narrowing this disparity, two decades of rural maternity and surgical program closures, increasing centralization of service delivery, and the reduction in scope of rural physicians have dramatically widened the gap. Across rural British Columbia, First Nations peoples, who already represent some of the province's sickest, poorest, and most vulnerable residents are disproportionately affected.

This project proposal offers a series of interventions delivered over five years that will stabilize, support, and enhance BC's rural surgical programs, and by extension, its rural obstetrical programs. Specifically, the project will further enhance Rural Surgical and Obstetrical Networks (RSONs) to support safe and appropriate surgery, operative delivery and maternity care 'closer to home' in eight local geographical regions of British Columbia.[*]

The development of networks of care is a key rural health policy directive for both the Ministry of Health and the regional Health Authorities[xli xlii xliii xliv]. The interprofessional consensus endorsing a networked model of care for rural surgical and obstetrical care has opened the door to a remarkable amount of innovative and collaborative activity, both at a local community level and at a regional, provincial, and national level.

This project proposes the development of Rural Surgical and Obstetrical Networks (RSONs) to be built on the coherent integration of five essential mutually-supporting components:

1) Increased Scope and Volume of Rural Surgery Programs;
2) Clinical Coaching and Training Opportunities;
3) Remote Presence Technology;
4) Continuous Quality Improvement (CQI) Mechanisms; and
5) Evaluation of Networks.

Specifically, this project supports the further development of RSONs for smaller rural programs, serving catchments of 5 – 10,000 people that the published evidence shows are most at risk of

[*] It is possible that if there were an anticipated need for a new rural surgical program that aligned with the strategic priorities of the Health Authority, then support could be considered within this project proposal.

closure. These programs[†] were identified, visited, and analyzed in the JSC report: Sustaining Small Rural Surgical Services in British Columbia (2013)[xlv]. From this report, and from other published research, we know that these programs are staffed mostly, but not exclusively, by Family Physicians with Enhanced Surgical Skills (FP ESS) and/ or a solo General Surgeon[xlvi xlvii xlviii]. Their operating rooms are open 2 days per week or less. Notably, the smaller volumes of surgery in these rural communities jeopardize their ability to:

1) Recruit and retain professional teams of surgeons, anesthetists, and OR nursing staff large enough to support the necessary on call responsibilities; and
2) Effectively approach succession planning.

During the exploratory and relationship development phase of this research it became evident that the context for each smaller volume rural site is variable, both in terms of personnel and the relationships between communities and their relevant Health Authorities. Furthermore, parallel work over the last 4 years to address the attrition of rural health services has clearly outlined the complexity of the task we are undertaking.

As such, for the purpose of this proposal the primary focus will be on eight smaller volume rural communities that have been identified as most at risk of closure. We recognize that if we *start* with too many programs the process may suffer the usual outcome of insensitivity to the inherent context specificity of each site and an overall failure to build the foundation necessary for supportive system change. Nonetheless, the proposal envisions opportunities for related collaborations of a geographic and/or service-specific nature. This "environmental sentinel/collaboration building" responsibility is nested in the Provincial RSON Committee as detailed below.

KEY GOALS AND OBJECTIVES OF THE RURAL SURGICAL AND OBSTETRICAL NETWORKS PROJECT

The overarching goal of this project is **to stabilize, support and enhance the delivery of quality surgical and obstetrical care to rural BC populations, particularly First Nations peoples**. Specific objectives include the following:

1) To facilitate a decentralized model of patient care within the mandate of 'closer to home';
2) To optimize existing patterns of care provider referral, triage and feedback between rural, regional, and tertiary sites to support optimal patient care thereby reducing time away from work, family, and community for rural patients, especially parturient and postpartum women;
3) To optimize regional distribution of resources to ensure that location of care matches clinical need with available capacity;

[†] Programs identified were Lillooet, Revelstoke, Golden, Fernie, Creston, 100 Mile House, Hazelton and Fort Nelson; One of these programs, Fort Nelson, has closed. To this list we have added 3 northern communities with slightly larger volume but otherwise similar profiles (Vanderhoof, Smithers, Kitimat).

4) To enhance the sustainability of rural surgical and obstetrical programs by modelling networked connectivity that effectively nests them as 'rural branches' of the tertiary hospital's surgical programs; and
5) To clarify per capita costs of health care, as measured by an inclusive and comprehensive methodology, focusing on quality and efficiency.

We anticipate that meeting these goals and objectives will lead to the following primary outcomes:

1) Increased access to health care choices for BC's rural communities;
2) Increased 'closer to home' access to surgery and obstetrical services for patients in rural communities;
3) Increased sustainability of rural health care programs particularly those with smaller volume surgical and obstetrical services;
4) Increased ability to recruit and retain health care providers for BC's rural communities;
5) Increased provider satisfaction;
6) Increased access to screening procedures for BC's rural communities;
7) A greater understanding of the holistic/comprehensive cost-efficiencies of rural surgical networks in meeting surgical demand;
8) A greater understanding of the efficacy of networks on rural health care outcomes and their ability to reduce wait times throughout the province;
9) Enhanced quality of rural health services for rural citizens through the development of a multi-professional CQI system appropriate to the privileging of rural smaller volume generalist, surgical and perinatal services;

We anticipate that meeting these goals and objectives will lead to the following secondary outcomes:

1) Increased support for evidence-based networks of rural surgical and obstetrical care that reflect the needs, resources and opportunities of BC's rural communities;
2) Enhanced collaboration between Rural Family Medicine, OB GYN, and General Surgery, of the type that led to the Joint Position Paper[xlix]. This will require expanding key stakeholders to include rural communities, BC Health Authorities (including FNHA), the Ministry of Health, the academic institutions with healthcare mandates and others with a vested interest in, and responsibility for, rural health care;
3) Increased support for the relationships between caregivers: an integral foundation of networked care;
4) Increased development of organizational and interprofessional continuing professional development networks that support all of the above.
5) Increased examination of population based surgical outcomes based on individual practitioners, specific sites and catchment populations.

These outcomes contribute to the provincial mandate of supporting "access to specialist consultation and support for rural communities through regional, and where appropriate,

provincial networks of specialized teams… to support primary and community care practices across rural and remote communities"[l].

BACKGROUND

Robust local surgery programs are an integral part of rural health care infrastructure and are essential to the sustainability of rural acute care programs. They increase the medical capacity of rural communities by supporting enhanced critical care, emergency and trauma care, and by providing access to surgical first responders and anesthetic staff. In addition, surgical infrastructure enables robust maternity care through access to cesarean section: a key determinant of the proportion of local births the service can support[li] and overall provider sustainability[lii]. This does not imply that communities without immediate C-section capability should not be delivering babies—rather that they need to be part of a local network with reasonable access to intervention if required. Indeed, it is such communities, currently supported by nearby access, that are most affected when services close. Failure to recognize and deal with this fact can be a source of false reassurance about the closure of services. It has particular expression in cultural aspects of birth and the added risks of ***not*** delivering closer to home.

The attrition of smaller volume rural surgical programs and the corresponding loss of health human resources has significantly diminished care and led to increased adverse outcomes [liii]for those without local access to surgical care; especially at risk, are vulnerable rural populations, particularly First Nations peoples.

There is considerable evidence that increased volume is required to sustain rural surgical programs[liv lv]. The need for increased volume to sustain rural sites aligns well with the provincial priority to decrease surgical wait times for index procedures: offering more procedures locally supports rural surgical teams, while increasing OR time for visiting specialists at rural sites creates opportunities to reduce waitlists at regional sites[‡]. The additional benefit of regional alignment is its ability to enable surgical care for rural patients to take place 'closer to home' greatly reducing their time away from work, life, and family.

Enabling Rural Maternity Care

More than two decades of research and attendant policy direction has supported the importance of women in Canada delivering 'close to home'[lvi lvii lviii lix]. Evidence suggests rural women who live in communities without local access to maternity care have worse outcomes than those who have access to limited (no cesarean section) services[lx]. Despite emerging international evidence on the safety of these services, data has demonstrated there is a lack of sustainability where no local or proximal cesarean section services exist [lxi].

[‡] Examples of this exist already and the detailed evaluation and feedback plan within this proposal will allow us to better quantify these gains when intentionally integrated into service delivery plans.

The cascade of rural surgical closures in British Columbia since 2000 has been directly linked to the loss of rural cesarean section capacity and the corresponding closure of maternity programs. Case studies in British Columbia have revealed challenges in sustaining stand-alone cesarean section services are primarily due to the low volume of procedures performed at rural sites leading to disproportionate overhead costs, lack of currency of surgical staff[lxii lxiii] and compromise of the team function essential to good service delivery.

There is little disagreement however, over the foundational position of maternity care in rural communities, both for maternal newborn health and for the social vitality of communities. Rural Surgical and Obstetrical Networks (RSONs) are essential to securing currently tenuous maternity programs. By supporting the surgical infrastructure of smaller volume rural programs *via* RSONs, it not only increases the viability of these communities' maternity services but of the programs overall.

This consensus has been published in a newly released White Paper representing the collective efforts of maternity care stakeholders across three western provinces; it identifies clearly the foundational role of rural surgical programs to sustainable maternity care[lxiv].

The Case for a Network Model of Care

In 2015, the professional associations representing the providers of rural surgical and operative delivery care published the Joint Position Paper on Rural Surgery and Operative Delivery (JPP)[lxv]. Collectively, the Canadian Association of General Surgeons (CAGS), the Society of Obstetricians and Gynecologists of Canada (SOGC), the Society of Rural Physicians of Canada (SRPC), and the College of Family Physicians of Canada (CFPC) reviewed the evidence on the challenges facing rural surgical care, including the local availability of cesarean section. Their recommendations prescribe a pathway for nesting sustainable rural surgery programs within a networked regional model of care and a community of practice amongst the rural generalist and regional specialist surgical staff.

The network model positions surgical care, including obstetrical care, as a regional rather than institutional phenomenon, where small operating rooms are connected into a network, linked with the core referral hospital programs; whereby care can be provided through a well-integrated and balanced surgical team, including outreach surgeons and local surgical providers. The network model recognizes the desire for surgical procedures to be provided in the closest operative facility to the patients' residence, respecting the complexity of the procedure, the risk status of the patient, and the availability of surgical providers with procedural competency. Further, it allows surgical providers to be used to the extent of their competencies, where possible, and practice within supportive interdisciplinary teams. These core principles underscore an effective, efficient and sustainable network model of collaborative rural surgical care[lxvi].

Qualities of Networks

Significant work has been done to define networks and identify the key characteristics and qualities that make a network successful[lxvii lxviii lxix]. Integral to defining the formal networks is

the understanding that they are *collaborative structures*, that rely on *trust and reciprocity* for exchange and accountability; as well as being mechanisms for integrating otherwise isolated capacities[lxx]. Networks can be designed for several purposes, including service delivery, knowledge exchange, research collaboration, or community capacity. They also foster knowledge and resource sharing[lxxi].

Barnett et Al (2012) identified six key qualities of a network:

1) *Leadership* or Senior Experts that validate the network and promote collaboration;
2) Sponsorship of the network by multiple key stakeholders (health authorities, services, researchers, clinicians etc.);
3) Clearly defined objectives of the network that are measureable on an individual basis;
4) *Boundary Spanning* or Internal and external connectedness[lxxii];
5) A risk free environment that allows members to internally benchmark and validate their practice against the network; and
6) Discussion about Technology by the members[lxxiii].

Bonks and Gregory (2000) identified several key characteristics that define a Rural Health Network Model including the need for multiple independent actors, clear definition of roles and responsibilities, specification of short and long term and acquisition of resources to achieve expected benefits[lxxiv].

National Initiatives

Following the publication of the *Joint Position Paper on Rural Surgery and Operative Delivery* (2015), there has been a concerted effort to translate the objectives of Rural Surgical and Obstetrical Networks into health services delivery:

1) The Banff Summit on Rural Surgical Services brought together close to 100 national key stakeholders to collectively create an action plan to implement the recommendations from the JPP[lxxv];
2) A national consensus organization, The Canadian Initiative on Rural Surgery and Operative Delivery (CIRSOD), is being developed to provide a venue for wider collaboration and future work;
3) A Network Reference Group drawing from expertise across Canada is working to define and implement RSONs through projects in the western provinces. Representatives from the reference group provide academic leadership for this project that we are proposing;
4) A Consensus Group on Cesarean Section Training, led by the Society of Obstetricians and Gynecologists of Canada (SOGC), is close to releasing a description of a national curriculum and pathway to national training standards for family physicians with enhanced surgical skills;
5) The Canadian Association of General Surgeons (CAGS) has proposed a program to build improved rural trauma care networks focused on training and support for local surgical trauma response, primarily by GPs with Enhanced Surgical Skills; and
6) The Western Provinces' Collaborative on Sustaining Rural Maternity and Surgical Services has drafted a White Paper that clearly identifies robust rural surgery programs

as the foundation for sustainable rural maternity care. These stakeholders have endorsed unequivocally the networked model of care proposed in the Joint Position Paper.

> Prioritizing the development of rural health service delivery networks and communities of practice will enable the distribution of sustainable, safe, and high-quality maternity, surgical, and urgent care services in rural communities. Rural health service delivery networks have been shown to increase access to care, to improve the quality of care delivered, to increase provider satisfaction and retention, and to promote patient care that is responsive to the needs of communities.
>
> *Yeates et al*.

RSON*bc*

Following the publication of the JPP (2015) and the Banff Summit (2016), the RCC*bc* has been home to a provincial consensus effort directed at adopting national recommendations to respond to the specific local needs in British Columbia. This included, among others, senior RCC*bc* leadership, the leads for Family Physicians with Enhanced Surgical Skills (FP ESS), Family Practice Anesthesia (FPA) and Family Practice Obstetrics (FPOB), and the senior leadership from Perinatal Services BC and the Centre for Rural Health Research (UBC). Leadership from two rural communities identified in the 2013 JSC study were recruited to provide input from the local rural surgery programs themselves (Lillooet and Revelstoke). There has been considerable overlap between the stakeholders in the present initiative and the leadership from both the JPP and the Banff Summit.

Since March 2016 this consensus group has been meeting, both face to face and remotely, several times per month. Notably they have played an active role in the recently released White Paper by the Western Provinces' Collaborative on Sustaining Rural Maternity and Surgical Services[lxxvi]. The primary source inputs to this groups planning have been:

1) The JSC report Sustaining of Small Rural Surgical Services in BC (2013)[lxxvii]
2) The published research, all of it Canadian, with a large BC contribution[lxxviii]
3) The Australian experience through face to face meetings with Dr. Murray and a visit there in April 2016.

In August 2016, this consensus group released a two-page description to translate both findings of the 2013 JSC study and the recommendations of the Banff Summit into a proposal for a local BC response. This was widely shared in a consultative process that included one of the HA's that is home to many of these small surgery programs. The Shared Care Committee approved a proof of concept grant, endorsed by IHA, to host a Surgeons' Dinner in Vernon where the concepts of a networked model of rural surgical care as described in the two pager were presented to the General Surgery community from Vernon, Kamloops and Salmon Arm for feedback and input going forward. The dinner drew 16 General Surgeons, members of the IH

senior leadership team, and the President of the Canadian Association of General Surgeons. The concepts of networked care were endorsed enthusiastically.

In November 2016, under the umbrella of a joint meeting between this project and the Rural and Remote Division of Family Practice's Working Group on BC's Small Surgery Programs, the broad strokes of this proposal were finalized. Early drafts, including budgets, were circulated for collaborative input from BC's HA's, including FNHA, the Doctors of BC, and other affected stakeholders.

The RCC*bc* has made a grant of $75,000 in partnership with UBC CPD to support the Clinical Coaching for Excellence program in Revelstoke and Lillooet. The goal is to offer structured coaching relationships between rural surgical teams and specialist surgeons, anesthetists, and OR nurses in their regional referral centres. A primary motivation for this effort is to provide proof of concept and develop a program that can act as a scaffolding on which to build the collaborative relationships in which a network model of care – the basis of this proposal – can flourish.

On another front, Rural and Remote Division of Family Practice has provided sessional funding to help develop embryonic RSON*bc* Networks in both Revelstoke and Lillooet. The combined result of this funding has provided for community input, consultation and design of the present project proposal.

KEY COMPONENTS OF A RURAL SURGICAL AND OBSTETRICAL NETWORKS PROJECT

The primary goal of the Rural Surgical and Obstetrical Networks Project is to stabilize, support and enhance the delivery of quality maternity, surgical, and trauma care to rural BC populations, particularly First Nations peoples. The project plans to achieve this goal by supporting, resourcing and maintaining formal geographically-defined Rural Surgical and Obstetrical Networks, aiming to increase access to care 'closer to home' for the residents of these catchments.

Rural Surgical and Obstetrical Networks align with the Quadruple Aim, which includes improving the patient and provider experience of care (including quality and satisfaction); improving the health of populations, and reducing the per-capita costs of health care.[lxxix]

The Rural Surgical and Obstetrical Networks will be built on the coherent integration of the following essential components:

1) Increased Scope and Volume of Rural Surgical Programs;
2) Clinical Coaching and Training Opportunities;
3) Remote Presence Technology;
4) Continuous Quality Improvement (CQI) Mechanisms; and
5) Evaluation of Networks.

1) Increased Scope and Volume of Rural Surgery

There is considerable evidence that there are threshold volumes of surgical activity that are required to sustain rural surgical programs[lxxx]. This is distinct from volumes of particular procedures on the part of individual practitioners. This project will support the expansion of the scope and volume of rural surgical programs in BC, where needed, by increasing OR time at eight smaller volume rural sites in collaboration with their referral centres and relevant specialists performing surgeries both locally (program scope) and from their wait lists (program volume). The utilization of local capacity for regional wait times will:

1) Provide increased local coaching and other CQI opportunities;
2) Provide increased OR time for OR Nurses, FP ESS and FPAs; and
3) Increase the ability of FP ESS, FPAs and OR Nurses to maintain and enhance competence.

For the smaller surgical programs, where sustainability is fragile, increasing the volume of local procedures through increased scope[§] is foundational[lxxxi]. Without a robust local surgery program of scope and size capable of recruiting and retaining surgical staff, anesthetic staff and nursing staff, the sustainability of the program itself is threatened. Increasing the scope and volume of local surgical programs not only enhances the sustainability of smaller volume surgical programs but also meets the provincial priority of reducing wait times for patients[lxxxii].

2) Clinical Coaching

Rural Surgical and Obstetrical Networks are predicated on trusted relationships between professionals, nested within communities of practice. These relationships are built, in part, through the organization and context of shared clinical encounters within the framework of a coaching program.

The key objectives of clinical coaching are to:

1) Support smaller volume rural surgical and obstetrical programs by providing clinical coaching opportunities for FP ESS, FPAs and OR Nurses;
2) Provide opportunities for rural teams at smaller volume rural sites to maintain and improve their skills sets and to provide opportunities for them to improve communication and engagement within their regional networks;
3) Introduce an innovative CPD Program opportunity for rural physicians and nurses providing surgical and obstetrical care at smaller volume rural programs;
4) Enhance opportunities for Continuous Quality Improvement for rural surgical care; and
5) Enhance and support the connections between high quality regional communities of practice.

The clinical coaching portion of this project is based on the UBC CPD/RCC*bc* program "Clinical Coaching for Excellence". The intent is to provide locally based education tailored to meet the specific needs of participants, and to implement activities that help build/maintain professional

[§] The assumed scope of practice of the rural surgical sites will align with the local community needs and the regional priorities set by the health authorities.

support networks between colleagues[lxxxiii]. The coaching will provide personalized context-specific team based learning to all members of the rural surgical team including the FP ESS, FPAs and OR nurses, with potential to expand to obstetrical providers in future.

The program will also improve communications and engagement within the regional network between the rural participants and their regional specialist and expert nursing colleagues. Supported activities will include creation of Individual Development Plans for the participants, direct observation of practice in the rural community and if desired in the regional centre, and discussion of cases and didactic teaching as requested by the coachees. Once the coaching relationship is established the potential for remote coaching support is enhanced. Remote Presence Technology (RPT) offers, as an adjunct to face to face collaboration within the coaching relationship, the opportunity to expand the frequency, format, and clinical context of these collaborations.

The intent of the proposed program is to provide safe, confidential CPD that is separate from any reporting mechanism to the HA or other agency. Practitioners with smaller volume practices may potentially use their participation in the coaching program to demonstrate their ongoing commitment to competency and patient safety.

Clinical coaching is presently being piloted in two communities for the FP ESS teams[**]. This project would expand the program to eight communities and would involve the recruitment of regional surgical and obstetrical specialists to form similar coaching relationships with the objective of supporting rural operative delivery teams.

The Clinical Coaching program will undergo a rigorous evaluation within UBC CPD of its successes and learnings in accomplishing its own goals and objectives. In addition, it has attracted considerable interest from the Centre for Health Education Scholarship (CHES) for research targeted to measuring the impact of the coaching program as 1) an innovative relevant needs based CPD, and 2) an effective program within which to build the relationships required for effective networked models of rural surgical care.

3) Remote Presence Technology

The Remote Presence Technology (RPT) component is an integral part of addressing the geographical barriers that separate the members of the network. Remote Presence Technology enables teams, separated by distance and by training, to stand shoulder to shoulder and operate together. Presently there are a number of innovative applications of RPT in operating rooms across Canada. Technologies that are currently being employed in a rural surgical context include tablets, videoconferencing carts, exam cameras, self-propelled robots and optical head-mounted displays.

This RSON project anticipates that in a rapidly emerging field, with the ever present possibility of new disruptive technology, this RPT component will be structured to support a range of flexible options for delivering an RPT platform to any single community. It is likely that different

[**] Revelstoke and Lillooet

rural surgery programs will wish to install different platforms. These choices will be influenced local interest and expertise, ease of application, local issues of connectivity and band width, and by cost.

Specifically, through RPT this project strives to:

1) Enable clinical coaching and CQI activity to be done remotely from either the rural or the regional OR;
2) Support timely consultations and interventions during critical events;
3) Enable planned collaboration during surgeries whereby rural surgeons can access regional surgical experience and expertise during a surgery;
4) Enable physicians to monitor and consult on patients remotely from either the rural or the regional OR; and
5) Support non-urgent consults.

Additionally, these technologies and learnings associated with the integration of these technologies into practice have potential added benefits in the ER, for trauma and critical care.

In order to facilitate maximum application of RPT, this proposal will integrate RPT with local telehealth infrastructure enabled by provisions for local technical support capabilities. This capacity will permit the new technology to be leveraged according to community need to connect with other emergent and elective health service delivery networks. The attendant critical mass of RPT/telehealth infrastructure and activity in these networks will be supported by the presence of a part time local IT support person.

4) Continuous Quality Improvement (CQI)

This project will implement Continuous Quality Improvement to ensure ongoing and iterative improvement of local performance at a *team* level, tracking the efficacy of surgical triage and referral and the potential overall effect of surgical services on healthcare in the community[††].

The key objectives of CQI are to:

1) Promote the continued improvement of surgical services in rural sites in an iterative way;
2) Examine the activities of rural sites and the interface between rural and referral sites in real time and be able to course correct if necessary;
3) Evaluate surgical outcomes based on validated quality improvement measures; and
4) Track the efficacy of surgical triage and referral and transport, and the potential overall effect of surgical services on healthcare in rural communities.

The CQI system will be based on modern concepts of context assessment and systems improvement rather than the old “detect the bad apples” concepts of quality assurance. Surgical outcomes will be captured as per the National Surgical Quality Improvement Program (NSQIP) of the American College of Surgeons Protocol (procedure based) or some more

[††] For example, increased survival of trauma patients who face prolonged evacuation timelines, etc.

appropriate methodology for smaller rural contexts. The relevant data will be collected and QI response feedback supported by a 0.5 FTE Nurse at each small site.

The network structure will enable a robust mechanism for CQI to capture individual and confidential practitioner outcomes presented in the context of (a) surgical outcomes for the community and (b) surgical outcomes for the network. This can then be woven into a true CQI response by the network—the essence of modern quality improvement work.

This data will be tracked over time and available at 6 month intervals. The data will be used as the foundation of a network-level virtual interprofessional department, providing opportunities for case review and the identification of CPD and training needs.

5) Evaluation of the Networks

This project presents a plan for clinical surgical and obstetrical outcomes measurement at both a local and regional level, as well as, a process evaluation for RSONs. The primary goal of network evaluation will be to develop and implement a robust framework for reporting key indicators of network health outcomes, experience of care and cost-effectiveness.

The primary objectives of Evaluation of the Networks include:

1) Development of a robust data platform to support the evaluation of network functioning and clinical outcomes; and,
2) Conducting of relevant, primary research on patient access to rural surgical services in BC.

The secondary objectives of Evaluation of the Networks include:

1) Analyzing surgical and patient outcomes by facility;
2) Analyzing surgical and patient outcomes by stratified community;
3) Analyzing patient outcomes for the network population;
4) Analyzing Network process indicators including:
    a) Mode and efficacy of network development
    b) Network sustainability
    c) Patient satisfaction
    d) Provider satisfaction including sustainability of overall health services in small sites;
    e) Quantification of relationship effectiveness;
5) Analyzing the effect of RSONs on wait times for key procedures;
6) Analyzing rates of access to and uptake of diagnostic procedures for rural patients; and
7) Analyzing cost-effectiveness based on regional health services costs in meeting surgical demand.

As Rural Surgical and Obstetrical Networks are an evolving health services model in BC, evaluation of their effectiveness will be an essential part of their introduction. Defining rural and network catchments is a crucial step in creating links between population health and health system accountability as it allows for the assessment of best practices both relative to other services and relative to provincially and federally identified maternal and newborn outcomes.

Networks will be evaluated through a mixed-methods approach in order to capture both the process of network development and function and surgical outcomes at a community and network catchment level. In this way, we will be able to gain a comprehensive understanding of surgical outcomes at a rural facility level, as well as, aggregate surgical outcomes for rural residents at a population level. Clinical measures at a local level will be based on the established, validated and widely-used NSQIP indicators and process, adjusted for relevance to small surgical sites. Administrative data will be used to capture surgical outcomes for rural residents at a population level (aggregated).

Network process measures will be developed to document efficacy of the network structure including sustainability of all sites involved. Network process indicators will include:

1) Mode and efficacy of network development;
2) Network sustainability;
3) Patient satisfaction; and
4) Provider satisfaction including sustainability of overall health services in small sites.

RSON Specialist Consultation: An Opportunity for Interprofessional Collaboration

The ability of RSONs to support clinical activity relies greatly on the productive and effective socio-political relationships between rural and referral sites. As such, this proposal has included an outreach and consultation phase prior to the initiation of network development with the aim of solidifying these relationships. The primary goal of the outreach and consultation phase will be to create opportunities for dialogue and discussion about the best way to meet the surgical needs of rural residents in BC. Specifically, a key objective of this phase will be to provide a forum for relevant specialist surgeons to partake in the dialogue about small site surgical services. Visiting each network referral site (Kamloops, Prince George, Terrace, Williams Lake, and Cranbrook) to engage specialists and Health Authority administrators (both site and central) in focused conversations will be a necessary step to meeting this objective.

Outputs of these conversations will be summarized in written form and returned to participants to ensure accuracy of understanding. Consultations will also be summarized in aggregate to document themes that may be consistent across the province and benefit from a provincial response. By providing these opportunities the RSON committee will have a better ability to understand and potentially address the interprofessional challenges of implementing networks in rural sites across BC.

DEVELOPMENT OF RURAL SURGICAL AND OBSTETRICAL NETWORKS

Introducing Increased Scope and Volume, Clinical Coaching, RPT, CQI, and Evaluation of Networks will require significant administrative support and leadership. As such, the RSON project will need to support a context specific locally derived team or 'Working Group' in each local network. How this is configured will depend upon the timing of when the various pillars are advanced, the sequence, and intensity. Each local Working Group will be able to link up with other members of the overall initiative, not as an added burden but rather in order to

provide a facilitative feedback loop that builds on existing relationships. Network coordination staff will provide the administrative structure that will allow practitioners to focus on their clinical roles while ensuring the collective goals of the project are attended too.

Clearly, local networks will vary according to what experience and personnel are already on the ground and the budget is designed to reflect this. The budget also seeks to reflect the need for clinical leadership, space for the team, and funding for administrative overhead.

Outputs of Local Networks

Within the context of pursuing the goals of the Quadruple Aim, the intended outputs of each of the local networks are:

1) To integrate rural and regional surgical and operative delivery programs into their regional departments;
2) To foster a community of practice within and between the health professionals in the rural and regional surgical programs, recognizing the importance of relationships underscoring seamless health care delivery;
3) To engage with the Health Authorities and the local Medical Staff in a collaborative commitment to a rural surgical and operative delivery program;
4) To enhance the opportunities for robust CQI programs for all the professional stakeholders in the rural and referral sites;
5) To enhance the delivery and to documentation of best surgical practices; and
6) To enhance the opportunities for rigorous evaluation.

CONDITIONS REQUIRED FOR NETWORK SUCCESS

There are several necessary conditions that need to be in place for a Rural Surgery and Obstetrical Network to succeed.
These conditions include:

7) Interest by the local surgeons, anesthetists, and nurses to collaborate in a rural-regional network of care model;
8) Interest by regional surgeons, anesthetists, and nurses to support a rural surgery program through outreach efforts, clinical coaching, and remote presence technology. This could include the acceptance of an integrated regional Department of Surgery;
9) Interest by the Health Authority to see the local rural surgery program supported and enhanced by some or all of the 5 pillars;
10) Collaboration between the Health Authority, their IT leadership, and the local network, in order to assure RPT innovation is compatible with systemic IT organization elsewhere in the region; and
11) The interest and aptitude for RPT amongst the local and regional staff; and
12) Sufficient organizational capacity to implement the key components of the network at both participating rural and regional sites.

IMPLEMENTATION

The project will be administered by the Rural Coordination Centre of BC (RCC*bc*). RCC*bc* has the experience working with the JSC to conduct one time projects as well as be the organization flow of funding for other networked groups (i.e. UBC Rural CPD and the Rural Health Services Research Network of BC). Executive Provincial Medical Leadership will also be housed at RCC*bc*.

RSON Committee

Within the RCC*bc*, the project will be overseen by the Rural Surgical and Obstetrical Network Committee. This Committee will be characterized by a generalist and integrative manner of working and will link at their request with each of the local teams. The RSON Committee will have the dual function of ensuring adequate coordination across the "network of networks" within the proposal and will also be a resource to support the local teams in the development of their particular plans for the five components within their own networks. This RSON Committee will have an additional function of interrelating with relevant parallel activities such as the development of nascent RSONs beyond the eight initial listed communities. In addition, the RSON Committee will have an ongoing surveillance function for changes in the broader service delivery environment that may impact, positively or negatively, on the overall RSON Project. A Project Manager will be hired to work with the RSON Committee to assist in administering the project.

Local Working Groups

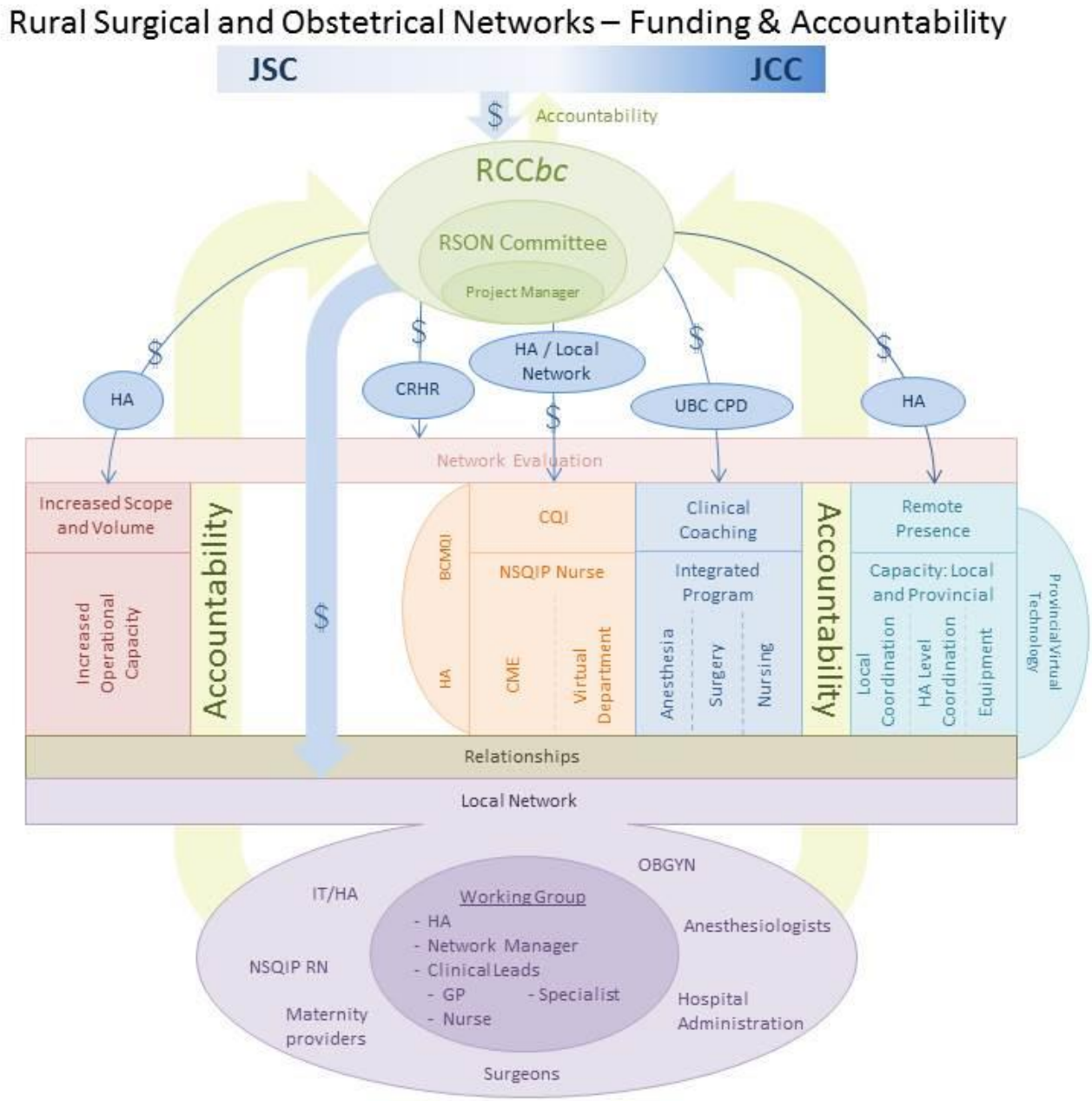
Communities interested in accessing funding to create a RSON will engage *(or* create) a local Working Group composed of local clinical leads, administrative leads and representatives of the Health Authority. The local Working Group will develop their network. A local Network Coordinator will then develop project plans and timelines for selected project components of the network and submit an application to the Project Manager and the RSON Committee.

Once this process is complete and their application has been approved, the Working Group will be able to request funds be transferred for site-specific costs. Each community's project team, under the supervision of the Working Group will then be responsible for managing funds, tracking expenses, and reporting back to the RCC*bc via* the Network Coordinator, Project Manager and the RSON Committee. The RCC*bc* will provide financial and project reports to the JSC twice a year. Each of the local RSONs, will form a management structure to support the goals and objectives of the RSON.

Funding

Initial funding for each RSON will be for two years and can be extended annually. If a community chooses to implement the components separately, components can be integrated into the project after commencement, with a timeline proposed within the original plan or added as needed.

The project includes funding to support an annual meeting of the full Provincial Network (RSON Committee, Sub Committees and community working groups). This meeting will provide a venue for Networks to collaborate on combined projects and work through difficulties as they arise.



BUDGET

Item	Year 1: 2017-2018 Total	Year 2: 2018-2019 Total	Year 3: 2019-2020 Total	Year 4: 2020-2021 Total	Year 5: 2021-2022 Total	Years 1-5: Totals
Program Administration, Leadership, and Oversight	$ 405,252.80	$ 409,165.33	$ 413,116.98	$ 417,108.15	$ 421,139.23	$ 2,065,782.49
Local Network Support	$ 530,463.91	$ 445,860.61	$ 624,068.98	$ 595,896.29	$ 596,614.55	$ 2,792,904.35
Pre-Network Consultation	$ 100,686.00					$ 100,686.00
Clinical Coaching	$ 555,867.00	$ 509,791.00	$ 646,997.00	$ 593,758.00	$ 594,058.00	$ 2,900,471.00
Remote Presence Technology	$ 840,896.40	$ 139,990.85	$ 378,843.19	$ 190,406.22	$ 192,310.28	$ 1,742,446.93
Continuous Quality Improvement	$ 472,559.52	$ 476,300.10	$ 640,104.01	$ 645,191.52	$ 650,329.83	$ 2,884,484.99
Increased Scope and Volume	$ 1,800,000.00	$ 1,818,000.00	$ 2,448,240.00	$ 2,472,722.40	$ 2,497,449.62	$ 11,036,412.02
Network Evaluation	$ 267,873.52	$ 267,618.14	$ 268,834.80	$ 270,063.62	$ 271,304.74	$ 1,345,694.82
Annual Total	$ 4,973,599.15	$ 4,066,726.02	$ 5,420,204.96	$ 5,185,146.21	$ 5,223,206.26	$ 24,868,882.60
10% Contingency	$ 497,359.92	$ 406,672.60	$ 542,020.50	$ 518,514.62	$ 522,320.63	$ 2,486,888.26
Total over 5 years						**$ 27,355,770.86**

See attached for full budget.

BACKGROUND DOCUMENTATION

More complete descriptions of various aspects of this project can be found at the following links:

Context and Structure for the Rural Surgical and Obstetrical Networks Proposal

The National Context
An Integrated Approach to Rural Surgical and Obstetrical Networks
The Form and Function of Rural Surgical and Obstetrical Networks
Frequently Asked Questions

Components of Rural Surgical and Obstetrical Networks

Increased Scope and Volume
Clinical Coaching and Training
Remote Presence Technology
Continuous Quality Improvement
Evaluation

REFERENCES

Brown, V.A., Harris, J.A., Russell, J.Y. *Tackling wicked problems through the transdisciplinary imagination.* New York, NY: Earthscan.

De Leeuw, S. (2016). The missing of mums and babes: addressing Canada's rural maternity care crisis. *Canadian Family Physician*, 62(7), 580-583.

Grzybowski S, Kornelsen J, Cooper E. Rural maternity services under stress: The experiences of providers. Canadian Journal of Rural Medicine. 2007;12(2),89-94.

Grzybowski, S., Stoll, K., & Kornelsen, J. (2011). Distance matters: a population based study examining access to maternity services for rural women. *BMC Health Services Research*, *11*, 147. http://doi.org/10.1186/1472-6963-11-147

Iglesias, S., Kornelsen, J., Woollard, R., Caron, N., Warnock, G., Friesen, R., Miles, P., Haines, V.V., Batchelor, B., Blake, J., Mazowita, G. (2015). Joint position paper on rural surgery and operative delivery. *Can J Rural Med*, *20*(4), 129-38.

Kornelsen, J., Friesen, R. (2016). Building rural surgical networks: an evidence-based approach to service delivery and evaluation. *Healthcare Policy, 12*(1), 37-42.

Kornelsen, J., Iglesias, S., Woollard, R. (2016). Sustaining rural maternity and surgical care, lessons learned. *Canadian Family Physician*, 62(1), 21-23.

Kornelsen, J., McCartney, K. (2015). *The safety of rural maternity services without local access to cesarean section.* Applied Policy Research Unit, Centre for Rural Health Research, Vancouver. Retrieved from: https://centreforruralhealthresearch.files.wordpress.com/2015/11/apru_the-safety-of-rural-maternity-services-without-local-access-to-c-section_2015.pdf

Kornelsen, J., McCartney, K., McKeen, M., Frame, C., Fleming, C., Garton, K., Yang, P., O'Sullivan, M. (2014) *Optimal perinatal surgical services for rural women: A realist review.* Applied Policy Research Unit, Centre for Rural Health Research, Vancouver. Retrieved from: https://centreforruralhealthresearch.files.wordpress.com/2014/06/optimal-perinatal-surgical-services-for-rural-women_a-realist-review2.pdf

Ravelli, A., Jager, K., de Groot, M., Erwich, J., Rijninks-van Driel, G., Tromp, M., Eskes, M., Abu-Hanna, A. and Mol, B. (2011). Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands. *BJOG: An International Journal of Obstetrics & Gynaecology, 118*(4), 457–465. http://doi:10.1111/j.1471-0528.2010.02816.x

Woollard, R. F. (2006). Caring for a common future: medical schools' social accountability. *Medical Education*, *40*(4), 301-313. http://dx.doi.org/10.1111/j.1365-2929.2006.02416.x

END NOTES

[xl] (Laurent, 2002)
[xli] *Setting Priorities for the BC Health System. British Columbia Ministry of Health,* February 2014. Retrieved from http://www.health.gov.bc.ca/library/publications/year/2014/Setting-priorities-BC-Health-Feb14.pdf November 27, 2016.
[xlii] Rural Health Services in BC: A Policy Framework to Provide A System of Quality Care. *British Columbia Ministry of Health,* February 2014. Retrieved from http://www.health.gov.bc.ca/library/publications/year/2015/rural-health-policy-paper.pdf November 27, 2016.
[xliii] *Delivering a Patient-Centred, high performing and sustainable health system. British Columbia Ministry of Health,* February 2014. Retrieved from http://www.health.gov.bc.ca/library/publications/year/2015/delivering-patient-centred-health-BC.pdf November 27, 2016.
[xliv] Future Directions for Surgical Services in British Columbia. Retrieved from http://www.health.gov.bc.ca/library/publications/year/2015/surgical-services-policy-paper.pdf November 27, 2016.
[xlv] Grzybowski S, Kornelsen J The Sustaining of Small Rural Surgical Services in British Columbia: A report commissioned by the Joint Standing Committee on Rural Issues 2013 http://ess.rccbc.ca/wp-content/uploads/sites/5/2014/12/JSC-Report-Feb-1.pdf
[xlvi] Iglesias S ,Jones L. Rural Surgery Programs in Western Canada. *CJRM 2002;7(2):103-7* http://epe.lac-bac.gc.ca/100/201/300/cdn_jrn_of_rural_medicine/2002/cjrm_7-2/0103.htm
[xlvii] Humber N Frecker T **Rural surgery in British Columbia: Is there anybody out there? Can J Surg, Vol. 51, No. 3, June 2008** http://ess.rccbc.ca/wp-content/uploads/sites/5/2014/12/Rural-surgery-in-British-Columbia.pdf
[xlviii] Humber N,Frecker T **Delivery models of rural surgical services in British Columbia (1996–2005): Are general practitioner–surgeons still part of the picture? Can J Surg, Vol. 51, No. 3, June 2008**
[xlix] Iglesias, S., Kornelsen, J., Woollard, R., Caron, N., Warnock, G., Friesen, R., Miles, P., Haines, V.V., Batchelor, B., Blake, J., Mazowita, G. (2015). Joint position paper on rural surgery and operative delivery. Can J Rural Med, 20(4), 129-38.
[l] Rural Health Services in BC: A Policy Framework to Provide A System of Quality Care. *British Columbia Ministry of Health,* February 2014. Retrieved from http://www.health.gov.bc.ca/library/publications/year/2015/rural-health-policy-paper.pdf November 27, 2016.
[li] Grzybowski, S., Stoll, K., & Kornelsen, J. (2011). Distance matters: a population based study examining access to maternity services for rural women. *BMC Health Services Research*, *11*, 147. http://doi.org/10.1186/1472-6963-11-147
[lii] Grzybowski S, Kornelsen J, Cooper E. Rural maternity services under stress: The experiences of providers. *Canadian Journal of Rural Medicine*. 2007;12(2),89-94.
[liii] Robinson M, Slaney GM, Jones GI, Robinson JB: GP Proceduralists: "the hidden heart" of rural and regional health in Australia. *Rural Remote Health* 2010, 10(3):1402
[liv] Dooley J, Kelly L, St Pierre-Hansen N, Antone I, Guilfoyle J, O'Driscoll T: Rural and remote obstetric care close to home: program description, evaluation and discussion of Sioux Lookout Meno Ya Win Health Centre obstetrics. *Can J Rural Med* 2009, 14(2):75–9.
[lv] Grzybowski, S and Kornelsen, J. The Sustaining of Small Rural Surgical Services in British Columbia: A Report Commissioned by the Joint Stand Committee on Rural Issues, 2012 (retrieved November 16 2016 from: Future Directions for Surgical Services in British Columbia. MOH policy paper http://www.health.gov.bc.ca/library/publications/year/2015_a/surgical-services-policy-paper.pdf
[lvi] Miller KJ, Couchie C, Ehman W, et al. Rural maternity care. *J Obstet Gynaecol Can* 2012;34:984-91.
[lvii] Iglesias S, Grzybowski S, Klein MC, et al. Rural obstetrics. Joint position paper on rural maternity care. *Can Fam Physician* 1998; 44:831-43.

[lviii] College of Family Physicians of Canada, Society of Rural Physicians of Canada, Society of Obstetricians and Gynaecologists of Canada. Joint position paper on training for rural family practitioners in advanced maternity skills and cesarean section. *Can Fam Physician* 1999; (45):2416-22.
[lix] British Columbia Royal Commission on Health Care and Costs. Closer to home: the report of the British Columbia Royal Commission on Health Care and Costs. Vol. 1. 1991.
[lx] Grzybowski S, Stoll K, Kornelsen J: Distance matters: a population based study examining access to maternity services for rural women. *BMC Health Serv Res* 2011, 11:147.
[lxi] Grzybowski et al. The safety of Canadian rural maternity services: a multi-jurisdictional cohort analysis. Health Services Research (2015) 15:410 DOI 10.1186/s12913-015-1034-6
[lxii] Grzybowski S, Kornelsen J. *The sustaining of small surgical services in British Columbia. A report commissioned by the Joint Standing Committee on Rural Issues*. Vancouver (BC): Centre for Rural Health Research; 2013.
[lxiii] Iglesias S, Caron N, co-chairs. *Proceedings from the Invitational Meeting on Rural Surgical Services*; 2007 June 22–23; Vancouver, BC. Available: http://ess.rccbc.ca/wp-content/uploads/sites/5/2014/12/GPSSymposiumProceedings.pdf (accessed 2015 Sept. 6).
[lxiv] Yeates (2016), White Paper on rural surgical programs as the foundation of Maternity Care
[lxv] Kornelsen, J., Iglesias, S., Woollard, R. (2016). Sustaining rural maternity and surgical care, lessons learned. *Canadian Family Physician*, 62(1), 21-23.
[lxvi] Iglesias, S., Kornelsen, J., Woollard, R., Caron, N., Warnock, G., Friesen, R., Miles, P., Haines, V.V., Batchelor, B., Blake, J., Mazowita, G. (2015). Joint position paper on rural surgery and operative delivery. *Can J Rural Med*, *20*(4), 129-38.
[lxvii] Barnett, S., Jones, S. C., Bennett, S., Iverson, D., & Bonney, A. (2012). General practice training and virtual communities of practice - a review of the literature. *BMC Family Practice*, *13*, 87.
[lxviii] Bonk, Gregory. Principles of Rural Health Network Development and Management. Washington, D.C.: Alpha Center, 2000. Retrieved December 14, 2015, from Characteristics of a Rural Health Model
[lxix] Woodland, R., & Hutton, M. (2012). Evaluating Organizational Collaborations: Suggested Entry Points and Strategies. *American Journal of Evaluation,* 366-383. Retrieved December 18, 2015, from http://aje.sagepub.com.proxy.lib.sfu.ca/content/33/3/366.full.pdf html
[lxx] Innovation and Progress: The Role of Networks. Consensus Statement of the Fourth Networks Leadership Summit (NLS IV). Banff, Canada, January 14, 2009.
[lxxi] Innovation and Progress: The Role of Networks. Consensus Statement of the Fourth Networks Leadership Summit (NLS IV). Banff, Canada, January 14, 2009.
[lxxii] Katz and Lazer
[lxxiii] Barnett, S., Jones, S. C., Bennett, S., Iverson, D., & Bonney, A. (2012). General practice training and virtual communities of practice - a review of the literature. *BMC Family Practice*, *13*, 87.
[lxxiv] Bonk, Gregory. Principles of Rural Health Network Development and Management. Washington, D.C.: Alpha Center, 2000. Retrieved December 14, 2015, from Characteristics of a Rural Health Model
[lxxv] Jan 2016 http://ess.rccbc.ca/wp-content/uploads/sites/5/2016/10/Final-Report-on-the-Banff-Summit-on-Rural-Surgery-and-Operative-Delivery-2.pdf
[lxxvi] Yeates (2016), White Paper on rural surgical programs as the foundation of Maternity Care
[lxxvii] The JSC report Sustaining small rural services
[lxxviii] See especially reports at https://crhr.ca/publications/apru-reports/
[lxxix] Bodenheimer, T and Sinsky, C. From Triple to Quadruple Aim: Care of the Patient Requires Care of the Provider Ann Fam Med November/December 2014 vol. 12 no. 6 573-576.
[lxxx] Grzybowski S, Kornelsen J. *The sustaining of small surgical services in British Columbia. A report commissioned by the Joint Standing Committee on Rural Issues*. Vancouver (BC): Centre for Rural Health Research; 2013.
[lxxxi] Grzybowski S, Kornelsen J. *The sustaining of small surgical services in British Columbia. A report commissioned by the Joint Standing Committee on Rural Issues*. Vancouver (BC): Centre for Rural Health Research; 2013.
[lxxxii] *Future Directions for Surgical Services in British Columbia*, 2015
[lxxxiii] (Jarvis-Selinger et al., 2009)

Rural Surgical and Obstetrical Networks Project Budget Summary

Item	Year 1: 2017-2018 Total	Year 2: 2018-2019 Total	Year 3: 2019-2020 Total	Year 4: 2020-2021 Total	Year 5: 2021-2022 Total	Years 1-5: Totals
Program Administration, Leadership, and Oversight	$ 405,252.80	$ 409,165.33	$ 413,116.98	$ 417,108.15	$ 421,139.23	$ 2,065,782.49
Local Network Support	$ 530,463.91	$ 445,860.61	$ 624,068.98	$ 595,896.29	$ 596,614.55	$ 2,792,904.35
Pre-Network Consultation	$ 100,686.00					$ 100,686.00
Clinical Coaching	$ 555,867.00	$ 509,791.00	$ 646,997.00	$ 593,758.00	$ 594,058.00	$ 2,900,471.00
Remote Presence Technology	$ 840,896.40	$ 139,990.85	$ 378,843.19	$ 190,406.22	$ 192,310.28	$ 1,742,446.93
Continuous Quality Improvement	$ 472,559.52	$ 476,300.10	$ 640,104.01	$ 645,191.52	$ 650,329.83	$ 2,884,484.99
Increased Scope and Volume	$ 1,800,000.00	$ 1,818,000.00	$ 2,448,240.00	$ 2,472,722.40	$ 2,497,449.62	$ 11,036,412.02
Network Evaluation	$ 267,873.52	$ 267,618.14	$ 268,834.80	$ 270,063.62	$ 271,304.74	$ 1,345,694.82
Annual Total	$ 4,973,599.15	$ 4,066,726.02	$ 5,420,204.96	$ 5,185,146.21	$ 5,223,206.26	$ 24,868,882.60
10% Contingency	$ 497,359.92	$ 406,672.60	$ 542,020.50	$ 518,514.62	$ 522,320.63	$ 2,486,888.26
Total over 5 years						**$ 27,355,770.86**

Rural Surgical and Obstetrical Networks Project Budget Details

Item	Notes	Year 1: 2017-2018 Budget	Year 1: 2017-2018 Total	Year 2: 2018-2019 Budget	Year 2: 2018-2019 Total	Year 3: 2019-2020 Budget	Year 3: 2019-2020 Total	Year 4: 2020-2021 Budget	Year 4: 2020-2021 Total	Year 5: 2021-2022 Budget	Year 5: 2021-2022 Total
Program Administration, Leadership, and Oversight			**$ 405,252.80**		**$ 409,165.33**		**$ 413,116.98**		**$ 417,108.15**		**$ 421,139.23**
Medical Leadership											
Stipend	2 days/week * 50 weeks at sessional rates	$ 88,890.00		$ 89,778.90		$ 90,676.69		$ 91,583.46		$ 92,499.29	
Travel and Meals		$ 10,000.00		$ 10,000.00		$ 10,000.00		$ 10,000.00		$ 10,000.00	
Project Manager											
Salary	1.0 FTE	$ 125,000.00		$ 126,250.00		$ 127,512.50		$ 128,787.63		$ 130,075.50	
Travel and Meals		$ 4,000.00		$ 4,000.00		$ 4,000.00		$ 4,000.00		$ 4,000.00	
Admin support											
Salary + Benefits	0.5 FTE at UBC AAPS Grade 4: midpoint salary $55,791 + 18% benefits	$ 32,917.00		$ 33,246.17		$ 33,578.63		$ 33,914.42		$ 34,253.56	
RSON Management Committee											
Stipend	4 physicians, 1 session per week * 50 weeks	$ 88,890.00		$ 89,778.90		$ 90,676.69		$ 91,583.46		$ 92,499.29	
Meetings											
Full Network	annual meeting, 40 people										
Physician stipends	22 physicians at 2 sessions	$ 19,555.80		$ 19,751.36		$ 19,948.87		$ 20,148.36		$ 20,349.84	
Travel and meeting costs	30 travelling, $1200 for travel, accom, meals, catering each	$ 36,000.00		$ 36,360.00		$ 36,723.60		$ 37,090.84		$ 37,461.74	
Local Network Support			**$ 530,463.91**		**$ 445,860.61**		**$ 624,068.98**		**$ 595,896.29**		**$ 596,614.55**
	subtotal		$ 482,239.92		$ 405,327.83		$ 567,335.44		$ 541,723.90		$ 542,376.86
10% admin overhead	For Division of Family Practice or other organization to manage program (central costs)		$ 48,223.99		$ 40,532.78		$ 56,733.54		$ 54,172.39		$ 54,237.69
Community Network Coordinator	0.5 FTE $75000/year	$ 37,500.00		$ 37,500.00		$ 37,500.00		$ 37,500.00		$ 37,500.00	
Physician Leadership stipend	1 GP session per week in first year developmental, 2 sessions per month maintenance thereafter		$ 138,668.40		$ 64,640.81		$ 111,325.84		$ 86,187.74		$ 86,187.74
Network meetings	Quarterly	$ 9,841.92		$ 9,921.17		$ 10,001.20		$ 10,082.02		$ 10,163.64	
Travel and Meals		$ 1,000.00		$ 1,000.00		$ 1,000.00		$ 1,000.00		$ 1,000.00	
Workspace in hospital		$ 4,000.00		$ 4,000.00		$ 4,000.00		$ 4,000.00		$ 4,000.00	
Computers	2 per community (NSQIP Nurse and Network Manager), $1500/yr+tax lease	$ 3,360.00		$ 3,360.00		$ 3,360.00		$ 3,360.00		$ 3,360.00	
Phones	2 per community one time $250+tax each		$ 3,360.00		$ -		$ 1,120.00		$ -		$ -
Administrative supplies		$ 1,000.00		$ 1,000.00		$ 1,000.00		$ 1,000.00		$ 1,000.00	
Community Multiplier		6		6		8		8		8	
First year multiplier		6		0		2		0		0	
Pre-Network Consultation			**$ 100,686.00**								
Travel	Flights, Car rental, Accommodation	$ 14,670.00									
Meeting costs											
Phase one dinner with Surgeons	2800*5 communities	$ 14,000.00									
Phase one sessional fees	one session * 8 participants * 5 communities	$ 20,720.00									
Research Assistance	0.5 FTE	$ 30,576.00									
Investigator Sessional Fees		$ 20,720.00									

Rural Surgical and Obstetrical Networks Project Budget Details

Item	Notes	Year 1: 2017-2018 Budget	Year 1: 2017-2018 Total	Year 2: 2018-2019 Budget	Year 2: 2018-2019 Total	Year 3: 2019-2020 Budget	Year 3: 2019-2020 Total	Year 4: 2020-2021 Budget	Year 4: 2020-2021 Total	Year 5: 2021-2022 Budget	Year 5: 2021-2022 Total
Clinical Coaching	**Administered by Rural CPD Program at UBC CPD**		**$ 555,867.00**		**$ 509,791.00**		**$ 646,997.00**		**$ 593,758.00**		**$ 594,058.00**
Program											
Program Leadership		$ 25,980.00		$ 26,240.00		$ 26,502.00		$ 26,767.00		$ 27,035.00	
Staff		$ 90,240.00		$ 90,240.00		$ 124,080.00		$ 124,080.00		$ 124,080.00	
Evaluation / Research		$ 35,200.00		$ 35,200.00		$ 36,700.00		$ 36,700.00		$ 36,700.00	
Accreditation		$ 1,130.00		$ 1,130.00		$ 1,130.00		$ 1,130.00		$ 1,130.00	
Working groups		$ 43,262.00		$ 43,262.00		$ 30,000.00		$ 20,000.00		$ 20,000.00	
Faculty Development and Community Engagement		$ 68,400.00		$ 27,000.00		$ 49,800.00		$ 12,000.00		$ 12,000.00	
Admin (12%)		$ 31,705.00		$ 26,769.00		$ 32,185.00		$ 26,481.00		$ 26,513.00	
Site Visits											
Coaches		$ 180,000.00		$ 180,000.00		$ 240,000.00		$ 240,000.00		$ 240,000.00	
Coachees		$ 39,000.00		$ 39,000.00		$ 52,000.00		$ 52,000.00		$ 52,000.00	
Admin (8%)		$ 10,950.00		$ 10,950.00		$ 14,600.00		$ 14,600.00		$ 14,600.00	
Annual Rural Surgery Obstetrical Network	Clinical Coaching Interprofessional Development Day	$ 30,000.00		$ 30,000.00		$ 40,000.00		$ 40,000.00		$ 40,000.00	
Number of communities subscribed		6		6		8		8		8	
Remote Presence Technology			**$ 840,896.40**		**$ 139,990.85**		**$ 378,843.19**		**$ 190,406.22**		**$ 192,310.28**
HA-level Project Manager	0.5 FTE, first year only, one for each of IHA & NHA	$ 57,752.00	$ 115,504.00								
Travel		$ 10,000.00	$ 20,000.00								
Community telehealth support year 1	0.5 FTE for first year in each community	$ 57,752.00	$ 346,512.00	$ 58,329.52	$ -	$ 58,912.82	$ 117,825.63		$ -		$ -
Community telehealth support year 2	0.2 FTE subsequently	$ 23,100.80	$ -	$ 23,331.81	$ 139,990.85	$ 23,565.13	$ 141,390.76	$ 23,800.78	$ 190,406.22	$ 24,038.79	$ 192,310.28
Telehealth Cart		$ 15,163.21	$ 90,979.26	$ 15,163.21	$ -	$ 15,163.21	$ 30,326.42				
Exam camera		$ 9,650.19	$ 57,901.14	$ 9,650.19	$ -	$ 9,650.19	$ 19,300.38				
Other technology	Could include google glass, robots, ipads, cameras	$ 35,000.00	$ 210,000.00	$ 35,000.00	$ -	$ 35,000.00	$ 70,000.00	$ 35,000.00		$ 35,000.00	
Community Multiplier Year 1		6		0		2		0		0	
Community Multiplier Year 2 ->		0		6		6		8		8	
Total Communities		6		6		8		8		8	
Continuous Quality Improvement			**$ 472,559.52**		**$ 476,300.10**		**$ 640,104.01**		**$ 645,191.52**		**$ 650,329.83**
NSQIP											
Program Subscription	Small & Rural cost $10K USD	$ 13,500.00		$ 13,500.00		$ 13,500.00		$ 13,500.00		$ 13,500.00	
Data Collection OR Nurse	0.5 FTE assuming 108836/year	$ 54,418.00		$ 54,962.18		$ 55,511.80		$ 56,066.92		$ 56,627.59	
Quarterly Meetings											
Time paid		$ 9,841.92		$ 9,921.17		$ 10,001.20		$ 10,082.02		$ 10,163.64	
Food		$ 1,000.00		$ 1,000.00		$ 1,000.00		$ 1,000.00		$ 1,000.00	
Community Multiplier		6		6		8		8		8	
Increased Scope and Volume			**$ 1,800,000.00**		**$ 1,818,000.00**		**$ 2,448,240.00**		**$ 2,472,722.40**		**$ 2,497,449.62**
Additional OR time	Staffing: OR Nurse, OR booking clerk, Medical Device Reprocessing, housekeeping, admissions Operative equipment and supplies	$ 300,000.00		$ 303,000.00		$ 306,030.00		$ 309,090.30		$ 312,181.20	
Community Multiplier		6		6		8		8		8	

Rural Surgical and Obstetrical Networks Project Budget Details

Item	Notes	Year 1: 2017-2018 Budget	Year 1: 2017-2018 Total	Year 2: 2018-2019 Budget	Year 2: 2018-2019 Total	Year 3: 2019-2020 Budget	Year 3: 2019-2020 Total	Year 4: 2020-2021 Budget	Year 4: 2020-2021 Total	Year 5: 2021-2022 Budget	Year 5: 2021-2022 Total
Network Evaluation	**Administred by Centre for Rural Health Research**		**$ 267,873.52**		**$ 267,618.14**		**$ 268,834.80**		**$ 270,063.62**		**$ 271,304.74**
Evaluation Coordinator	UBC AAPS Research and Facilitation Level B	$ 82,961.52		$ 83,791.14		$ 84,629.05		$ 85,475.34		$ 86,330.09	
Data Analyst	Population Data BC data	$ 20,000.00		$ 20,000.00		$ 20,000.00		$ 20,000.00		$ 20,000.00	
Population BC Data Collection costs		$ 20,000.00		$ 20,000.00		$ 20,000.00		$ 20,000.00		$ 20,000.00	
GIS Geographer	3 months @ 1.0 FTE @ $50/hr	$ 25,000.00		$ 25,000.00		$ 25,000.00		$ 25,000.00		$ 25,000.00	
Health Economist	0.5 FTE Post-Doc (based on $75,000/year)	$ 37,500.00		$ 37,875.00		$ 38,253.75		$ 38,636.29		$ 39,022.65	
Site Visits + Community Focus Groups		$ 59,152.00		$ 59,152.00		$ 59,152.00		$ 59,152.00		$ 59,152.00	
Communication	Phones, skype	$ 600.00		$ 600.00		$ 600.00		$ 600.00		$ 600.00	
Equipment	Software, audio, laptop	$ 1,460.00									
Administrative expenses		$ 21,200.00		$ 21,200.00		$ 21,200.00		$ 21,200.00		$ 21,200.00	
Annual Total			**$ 4,973,599.15**		**$ 4,066,726.02**		**$ 5,420,204.96**		**$ 5,185,146.21**		**$ 5,223,206.26**
10% Contingency			**$ 497,359.92**		**$ 406,672.60**		**$ 542,020.50**		**$ 518,514.62**		**$ 522,320.63**
Total over 5 years	**$ 27,355,770.86**										