

Measuring Maternal Mortality and Morbidity in Canada

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Abstract

Maternal mortality and severe maternal morbidity are devastating for women, their families and care providers. International efforts have been made to develop and to implement data collection, management and surveillance systems that capture pregnancy-related information that can be assessed and used to improve health and system outcomes. At present, Canada does not have a national enquiry process to review maternal deaths, severe morbidity and near misses, and has not set targets for maternal mortality reduction.

Maternal mortality rates are critical measures of maternal health and provide important information for analysis of trends and priorities among and within countries. Information about near misses as well as maternal morbidity is crucial to truly understand and to prevent maternal mortality.

Canadian experts must work together with governments, provinces and territories to determine key indicators, measurement and meaningful data analysis strategies. These data and their comparisons will form the foundation of evidence to guide programs, policies, priorities and interventions that will ultimately improve the health of mothers and their children.

Key Words:

Maternal_morbidity, maternal_mortality, pregnancy, surveillance

Introduction

Maternal mortality is among the most devastating losses a family can endure. Canada has long prided itself on an enviably low rate of maternal mortality, but recent reports have shown some worrisome trends. Non-obstetric causes of death are emerging in Canada and across the developed world, as significant contributors to maternal deaths. [1] Further analysis reveals discrepancies in outcomes between regions and population groups within Canada. Canada does not have a nationwide ongoing confidential enquiry system to review maternal deaths, near misses and severe morbidity, and has not set hard targets for maternal mortality reduction. This paper will review the current state of surveillance in Canada, and make recommendations for a process to address deficiencies.

The World Health Organization (WHO) defines maternal mortality as “*The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes*”. [2] In turn, maternal morbidity is defined as “*any health condition attributed to and/or aggravated by pregnancy and childbirth that has a negative impact on the woman’s wellbeing*”. [3] The definition is now being extended to include the first year post-partum, to ensure that causes due to mental health, violence and accidents are captured. Both direct and indirect causes of maternal mortality are used as an important indicator to evaluate the quality of maternity care. [4]

The maternal mortality ratio differs between developing and developed countries. In 2015, statistics confirmed 239 per 100,000 live births in developing countries versus 12 per 100,000 live births in developed countries. [5]

Among North American countries, Canada demonstrates the lowest maternal mortality rate. Potential contributory factors include universal coverage of physician services, women's education, their perinatal care and access to birth control. [6] During 1999/2000 to 2014/2015, the Public Health Agency of Canada (PHAC) reported variation in pregnancy related mortality between 5.1 and 11.9 per 100,000 deliveries. [7]

The Canadian Institute for Health Information's discharge abstract database reports that (excluding Quebec), severe maternal morbidity peaking in 2013/14 at 16.4/1,000 hospital deliveries and was last reported as 14.2/1,000 in 2014/15 [7], with the most common severe maternal morbidities being blood transfusion (800/100,000 hospital deliveries), blood transfusion with comorbidities (565.3/100,000 hospital deliveries) and post-partum hemorrhage and blood transfusion (453.9/100,000 hospital deliveries). PHAC reports that (excluding Quebec), severe maternal morbidity, peaking in 2013/2014, was 7.4 deaths per 100,000 pregnancies. [7] Vital statistics data differ slightly, but not significantly in recent years.

In 2010, the WHO reported an assessment, based on Statistics Canada data, indicating an increase in the maternal mortality rate in Canada. Upon re-analysis of the data, it appeared that the reported increase in the Canadian maternal mortality rate was not an actual increase in the number of maternal deaths, but was proposed to be the result of improvement in vital statistics registration data and due to the switch from ICD9 to ICD10. This re-evaluation revealed some existing gaps in vital statistic registration data, such as faulty assignment of maternal mortality as other causes of death. [8] The re-analysis also revealed that we have less reason to feel reassured about our outcomes, and must focus on opportunities for improvement. In 2013, the WHO released an evaluation of the maternal mortality ratio, in general, revealing some negative trends.

This assessment illustrated the increase of maternal mortality ratio in 19 countries, including Canada and the USA. [9]

The Society of Obstetricians and Gynaecologists of Canada (SOGC) reacted to the first WHO's report on the increase of the maternal mortality rate by requesting that the Public Health Agency of Canada (PHAC) review surveillance data related to maternal mortality in Canada. In August 2010, The SOGC had a joint meeting with members from the Canadian Perinatal Surveillance System (CPSS) on Maternal Mortality and Severe Morbidity. The mandate of this committee was to make recommendations to the CPSS, PHAC and the SOGC to improve maternal mortality and severe morbidity surveillance in Canada. The discussions of the Committee focused on outlining the current status of national maternal mortality and severe morbidity surveillance in Canada, describing the activities underway by the Maternal Health Study Group of the CPSS to fill surveillance gaps; identifying a framework and plan of action for improving the national surveillance; and, making recommendations for the next steps. [8]

Maternal Morbidity and Mortality Data Surveillance in Canada

The joint SOGC-CPSS committee clarified that the maternal mortality and morbidity surveillance in Canada is based on using vital statistics data from Statistics Canada and hospitalization data (e.g., the Discharge Abstract Database/DAD) from CIHI, which does not include Quebec hospitalization data. The results are reported primarily through the *Canadian Perinatal Health Report*. Surveillance findings related to specific issues (for example temporal trends in caesarean delivery rates) that might impact morbidity and mortality are published in the peer-reviewed literature. [10] Currently, the main sources of data are administrative databases (e.g., vital statistics, hospitalization data) and population health surveys. The inability for the CPSS to have access to national data in a timely manner is extremely limiting and the most

recent maternal mortality review project in Canada was conducted and published in 2004.

[11]The analysis of maternal mortality requires data collection of non-nominal individual-level case data, such as that assembled from maternal death review committees or Chief Coroners/Medical Examiners across provinces and territories. The CPSS continues to work with existing Canadian maternal mortality data, which is analyzed by PHAC staff and further interpreted in collaboration with CPSS members who are researchers, clinicians or practitioners. The outputs of the CPSS include reports, papers, fact sheets and tools. The SOGC and other national professional associations, as active CPSS members, are in the unique position to further advance the CPSS' dissemination work by making the information available to and engaging the front-line professionals they represent.

Gaps and Challenges in Maternal Mortality Data Surveillance in Canada

Outcomes from the joint SOGC-CPSS meeting in 2010, and a workshop hosted by the SOGC in 2016, identified and outlined gaps and shortcomings in the existing data surveillance. The main issues were related to data access, coverage, timeliness and completeness.

PHAC does not have access to the vital statistic and hospitalization data of the province of Quebec. Approximately one quarter of all births in Canada occur in Quebec, and this should be considered as a major obstacle for a national maternal mortality report. [8] Quality reviews must be timely to lead to appropriate system and practice change. Currently there can be a delay of three or more years between the year a maternal death occurs and the availability of data for analysis and report. [8]

Data collection and reporting is significantly different across Canada, especially for areas where sub-populations are living. [12] More specifically, national data collection tools, like vital statistics, and national hospitalization databases do not collect information on ethnicity (including Aboriginal status). Vital statistics are not precise enough to capture all maternal deaths. Together, these factors likely lead to miscalculation and underestimation of maternal mortality rates in Canada. [8]

Maternal death review committees and their scope varies across provinces/territories of Canada, and is not necessarily aligned with the pregnancy-related questions on the medical death certificate (MDC) of the jurisdiction. Currently, six provinces (Newfoundland and Labrador, Quebec, Ontario, Manitoba, Alberta and British Columbia) and one territory (Nunavut) report having a maternal death review committee.. The remaining provinces (Prince Edward Island, Nova Scotia, New Brunswick and Saskatchewan) and territories (Yukon and The Northwest Territories) do not have official maternal mortality review committees, *per se*, but reviews of maternal deaths do occur in these jurisdictions. All committees are often affiliated with perinatal groups which also investigate and report on perinatal and child deaths within the province/territory.

The lack of consistency among review committees plays a key role in the reliability and quality of the data. The review committees have important implications at the local level, because of their detailed analyses and reporting of maternal deaths and also because of their function in improving the quality of maternal care. As well, national surveillance is impacted, since the data collected by provinces and territories should eventually be rolled up at the national level for periodic reporting. [8]

The Collège des médecins du Québec is working to develop a form to be implant in hospitals with their agreement in an attempt to standardize data collection among all hospitals.

In order to evaluate each maternal mortality event, these review committees must have access to all related records, including hospitalization and ante-natal records, coroner's reports, criminal reports, and community source records. There is currently no stablished mechanism for sharing data across multiple jurisdictions and departments, and privacy restrictions further complicate timely sharing and analysis of records.

Severe maternal morbidity is more common than mortality, and is an important source of information for quality surveillance and improvement. Data surveillance for severe morbidity is even more challenging than for mortality. Lack of precise and standardised maternal morbidity data surveillance and coverage make it difficult to produce valid and reliable analysis. There is no agreed national framework and dataset for collecting maternal morbidity-related data. This results in inconsistency in collected data and, in turn in analysis of the results. It is important to emphasize that hospitalization data the utility of hospitalization data varies across health conditions and procedures, and privacy legislation can be a significant barrier to sharing important case details. [12]

Mental health, addictions, and obesity are other factors related to maternal mortality and morbidity that are increasingly important with advancing maternal age, with increasing rates of obesity diabetes, and with increasing prevalence of chronic illness such as hypertensive disorders. These causes increase as a proportion of maternal mortality and morbidity as the traditional direct obstetrical causes become less common.

Collecting and surveillance of this data must be standardized within a well-defined framework. “Near miss” reporting and data surveillance can lead to vital recommendations that can contribute to decreasing the maternal mortality and morbidity rate. However, the lack of a standard framework, centralized dataset and tools to collect related data are major gaps in this respect. [13]

Not having access to data that is integrated with police and coroner’s reports, compromises the ability to determine the role of violence and criminal acts in maternal mortality and morbidity rate. [13]

Current Surveillance in Canada

Death investigation is the responsibility of each individual Canadian province and territory—there is no overarching federal authority. As a result, each province and territory has developed their own system and legislation to fulfill the mandate of investigating deaths that are unexpected, unexplained, or as a result of injuries or drugs. Two different death investigation systems have developed in Canada: the Coroner's system and the Medical Examiner's system. The Coroner's system is used in the majority of provinces and territories. It is a system that is centuries old and originated in Great Britain. It is found throughout the world in countries that were former British colonies, including Canada. The Medical Examiner's system (used in Alberta, Manitoba, Nova Scotia, and Newfoundland and Labrador) is just over one century old and originated in the United States. Although there are some differences between the two systems, the ultimate goal of each is the same—to investigate certain types of deaths defined by legislation and establish the identity of the deceased together with the cause of death and the manner of death.

Almost all Canadian Coroner and Medical Examiner systems have some provision for going beyond an investigation of the death to a public "inquisitional" hearing, referred to as an Inquest or Public Inquiry. One of the primary purposes of this type of hearing is to develop recommendations for the prevention of similar deaths in the future without making any findings of fault.

Although data surveillance practices and tools vary among provinces and territories, there is a current foundation and some tools that can be used as the basis to develop a robust, reliable and integrated process to better capture information about maternal mortality and morbidity data surveillance in order to identify suboptimal care, preventable issues and system-based remedies. Some examples are illustrated below.

Ontario

Ontario's Better Outcomes Registry & Network (BORN) is a model that can be enhanced for producing and managing timely, accurate and complete maternal mortality and morbidity data surveillance. BORN was established in 2009 to provide data surveillance and collection on pregnancy, birth and childhood in Ontario. BORN can use its data to interpret and share with stakeholders, while still protecting critical data. BORN's established connection to the hospitals, midwifery practice groups and birth centers make the timely collection of perinatal data possible. Registration of accurate, timely and trusted perinatal information provides the healthcare system with all the required information to analyze and implement a timely and accurate response for the public health issues. [14]

Alberta

In Alberta, health information is collected and managed by the Alberta Perinatal Health Program (APHP). Collection, storage, management and disclosure of health information are handled in accordance with privacy legislation approved by the Government of Alberta. [15]

Hospitals administrative data and data obtained from registered midwives who deliver out of hospital are the primary source of APHP perinatal data resources. Transfer of perinatal information to APHP is through paper records, electronic files, or direct data entry at the birth centers. APHP benefits from a complete perinatal database, which is a combined provincial data in PeriLinkAB. [15]

A Maternal Mortality Working Group (MMWG) of the Provincial Perinatal Quality Assurance Subcommittee (PPQA-SC) has been initiated to review and ascertain maternal mortality and morbidity events. Deaths occurring during pregnancy, childbirth or in the first year after birth are accurately and promptly reviewed and examined by this committee. All maternal mortality events including direct or indirect obstetric, late maternal, accidental or unspecified deaths are reported and analyzed. Analysis determines the main causes of the death, highlights the possible preventable actions to strengthen best practices and shares the lessons learned. Outcomes of the review by PPQA-SC determine the feasibility of expanding and improving the scope of monitoring, surveillance and quality assurance related to review of maternal mortality in Alberta. [15]

British Columbia

British Columbia also has a process for collecting and managing perinatal data via their BC's Perinatal Data Registry (BCPDR). In BC, collection and surveillance of perinatal data is

managed by Perinatal Services BC (PSBC) through the British Columbia Perinatal Data Registry (BCPDR). All clinical information related to all births in obstetrical facilities in the province of British Columbia is collected and maintained in BCPDR's high quality database. This database is heavily depended upon by health policy makers, leaders, managers and researchers as a comprehensive and reliable data source. [16]

BCPDR data surveillance is managed by PSBC by timely data analysis, trend reporting,, highlighting geographic variations among perinatal indicators at hospitals, regional and provincial levels. The PSBC data surveillance team produces and publishes diverse reports of all findings and analysis. [16]

The BC Perinatal Mortality Review Committee has been responsible for reviewing, analyzing, and ascertaining perinatal mortality events. However, this committee became inactive for a number of years following an Order of Council in 1998. In 2004, after the release of the Health Canada's special report on Maternal Mortality and Severe Morbidity in Canada, the provincial health leaders and policy makers re-emphasized the importance of the work of this committee toward achieving comprehensive perinatal mortality data analysis and surveillance. This led to a request to amend the Order of Council on July 21, 2006. [17]

By re-activation of the BC Perinatal Mortality Committee, collection of accurate maternal mortality data is achieved by cooperation among the BC Perinatal Database Registry, the Office of the Chief Coroner in BC, and BC Vital Statistics. [17]

In order to manage and facilitate the review of maternal mortality and morbidity cases, the BC Perinatal Mortality Committee has initiated a data collection tool based on the Maternal Mortality Form as part of the chart review of identified maternal mortality cases. [17]

As a method for surveillance of maternal mortality and morbidity, the BC Perinatal Mortality Review Committee proposed utilizing the Harvard Adverse Outcome Index which uses three indicators (the adverse outcome index (AOI), the weighted adverse outcome score (WAOS) and the severity index (SI) and delivery, which includes maternal death and severe maternal morbidity) to describe the frequency and severity of perinatal events. This method revealed the inconsistency in rates and severity of adverse events captured by Health authorities and hospitals. These findings helped to calibrate and modify the review processes. [17]

The BC Perinatal Mortality Review Committee is also responsible to assist local Perinatal Mortality Committees in holding robust reviews of maternal deaths. The committee established a process for the collection of BC Perinatal Mortality data and reviews the causes of potentially preventable stillbirths and early neonatal deaths. Finally, the committee produces reports analyzing potentially preventable causes of direct and indirect maternal deaths.

Manitoba

Review and reporting of maternal morbidity and mortality in Manitoba occur through the College of Physicians & Surgeons of Manitoba's Subcommittee on Maternal and Perinatal Health Standards, which receives funding from the Government of Manitoba. The committee attempts to maintain and improve the quality of medical practice as related to maternal and perinatal health through peer review and analysis and functions as a public advocate. This subcommittee makes recommendations on any matter pertinent to the monitoring and improvement of the quality of obstetrical and neonatal care in Manitoba.

The Subcommittee receives cases after review by the hospital and rural standards committees, for re-review by a medical consultant. Additional information may be sought, leading to re-classification. Controversial cases are brought to the Subcommittee and educational activities are implemented to prevent future cases.

Nova Scotia

In Nova Scotia, collection and surveillance of the perinatal data is managed by the Nova Scotia Atlee Perinatal Database (NSAPD), administered by the Reproductive Care Program (RCP) of Nova Scotia. This comprehensive database includes all demographic variables, perinatal data, interventions, and all maternal mortality and morbidity data occurring in Nova Scotia Hospitals since 1988. Hospitals are provided with timely reports describing mortality and morbidity and selected outcomes for their population. Provincial reports are also released regularly highlighting the data analysis, results and trends. [18]

The process of data collection and surveillance are periodically reviewed to ensure that the Nova Scotia Atlee Perinatal Database collects and contains all perinatal data for the events occurring in

Nova Scotia as well as in the New Brunswick health facilities where Nova Scotia residents receive health services. [19]

International Best Practices

Considering the gaps and challenges in Canadian maternal mortality and morbidity data surveillance and comparing these to similar situations in other developed countries, we can learn from some of the best practices of our International colleagues.

The United Kingdom's Confidential Enquiry into Maternal Death

The UK's Confidential Enquiry into Maternal Death (CEMD) is a widely respected approach that nationally necessitates the report of maternal mortality events for confidential reviews in UK and Wales since 1952. [2,20] In the presence of a civil registration and vital statistics (CRVS) system, CEMD is an appropriate tool for investigation of misclassified/underreported cases of maternal deaths. [2] This approach reviews the nationwide collected data from obstetricians, midwives, coroners, vital statistic records, the media, members of public, and linked birth-death records on a timely basis. The result of this approach is reliable and timely data. These data contain all the required information related to each maternal mortality event describing all the social and clinical context of the event. Kazakhstan and South Africa have also started using CEMD to study maternal deaths and as a result were able to find 29% and 40% more maternal deaths, respectively, compare to the records in their CRVS system. [2]

In order to include near-miss morbidity cases reviews in CEMD, different severe morbidities are identified through the UK Obstetric Surveillance System (UKOSS), a research platform set up in 2005, to study uncommon pregnancy complications. Implementing this program leads to identification of the risk factors, incidence, care, and the outcomes of the complications in

pregnancy in different specific severe cases. Topics for morbidity reviews are chosen based on national priorities and a different topic is covered each year. [20]

Implementing best practices for reducing maternal mortality and morbidity is dependent upon UKOSS, which is a well-established data collection system, used in all obstetric units in the UK. UKOSS requires collection of data related to pregnancy complications, especially severe cases including near-miss morbidities. Data collected through this system is very detailed and tailored compared to routine hospital data, enabling the system to identify the probable recommendations and responses to avoid the same incidents in the future. UKOSS completes the maternal mortality and morbidity data surveillance. [20]

California's Pregnancy-Associated Mortality Review (CA-PAMR)

The significant increase in the maternal mortality ratio between 1999 to 2008 (from 8 to 14 deaths per 100,000 live births) in the United States, and the existence of major racial gaps in maternal mortality (3 to four times higher for African-American women), triggered special efforts to be taken to address this emerging issue. The California Department of Public Health's (CDPH), Maternal, Child and Adolescent Health (MCAH) Division established the CA-PAMR, through a partnership with Stanford University's California Maternal Quality Care Collaborative (CMQCC) and Public Health Institute (PHI) with the mandate of establishment of an enhanced data collection and surveillance, using a scientific method to review all the maternal deaths cases and all related medical records in a multidisciplinary committee, determination of the causes of the maternal mortality ratio increase, and provision of recommendations to reduce maternal mortality rates. [21]

This initiative resulted in enhanced data surveillance with a quality improvement strategy.

Reviewing all the medical records in maternal death cases led to collection and analysis of data that cannot be found in usual vital statistics and databases. This, in turn, explored the preventable maternal mortality cases. For example, the committee determined that cardiovascular disease was the main contributor to maternal mortality in California. These findings have influenced the recommendations related to women's health during pregnancy. California statistics demonstrate a decline in maternal mortality from 14 deaths per 100,000 live births in 2008 to 7.3 deaths per 100,000 live births in 2013. [21]

Maternal Death Surveillance and Response

Another tool for improving data collection, introduced by the WHO, is the Maternal Death Surveillance and Response (MDSR). The MDSR system is a process of identifying and monitoring maternal death cases, starting at the health facility level and collecting all data at the national level. MDSR, in the areas with lack of civil registration and vital statistics (CRVS), is a comprehensive data collection tool. [2] MDSR requires timely identification and report of maternal mortality events. District authorities have the responsibility of identification and reporting to the national level. [22]

Maternal Death Review (MDR) by a multidisciplinary committee is also a part of MDSR. The MDR report containing the medical reasons of the death, all possible contributing and avoidable factors is saved in a database. Aggregate data is used to classify the causes of death, probabilities of occurrence, cohorts at highest risk, trends and prioritization of health issues to inform and to guide the public health response. [20]

In order to implement MDR, a guideline at a national level must be developed with clear procedures at each level. In response to MDSR, the health system identifies prioritized

measurable actions with clearly delineated timelines; the recommendations are be integrated into the public health plan. [22]

Conclusion

The burden of maternal morbidity and mortality is an important indicator of health in a population. [3] The makeup of the Canadian maternal population is changing with the influence of emerging infections and diseases, conflict, migration, health system governance and demographics. [23] Data confirm that there is a shift in worldwide trends of influential non-obstetrical causes, including young and advanced maternal age pregnancy, primi and grand multi parity, socioeconomic status, violence and living in rural areas. [23] The contributions of poor maternal health including diabetes, mental health, and hypertensive disorders [3,24] are also more prevalent than we initially thought. [13] The first step to decrease maternal mortality cases is to have a precise view at details of mortality cases from different aspects [25], which requires infrastructure and process for review of the circumstances, data capture, analysis, reporting and dissemination.

With increasing recognition of the importance of returning birth to communities, particularly First Nation, Inuit and Metis communities, the importance of understanding the modifiable risk factors for poor outcome is particularly urgent.

In order to capture and understand the true health and system-related factors that contribute to maternal morbidity and mortality, there is a critical need for Canada to implement a national timely reliable and robust system for data collection, review and surveillance. Such a system must centre around a detailed clinical audit that examines the circumstances surrounding each

death and each near miss. This type of in-depth clinical review would be to identify suboptimal care, preventable issues and system-based remedies to be identified and addressed.

Other countries are improving their ability to capture data and report on direct obstetrical causes of maternal death [2] and the Lancet has recently recognized Canada's under-reporting of our own data. [24] We do recognize the challenges that must be overcome.

Provinces/territories should identify maternal death reviews a priority and there must be a mechanism established for such provincial reviews that has adequate support. Canada's data reports must be more timely, and need to include missing population-level data and data from Quebec. Data fields that provide information on the underlying cause of death in hospitalization data should include information that will allow for analysis of the sequence of events and the "story" of health, procedures, the system and their interactions.

Canada has committed to address the Sustainable Development Goals, including addressing needed gaps in our own countries. Canada has not yet followed the footsteps of other countries by setting quality targets to reduce severe maternal morbidity and mortality and as a result, we are missing opportunities (that we are not even aware of) to save mothers and to save children. Why is Canada not taking the initiative to routinely review and report on maternal deaths and how can we work together to change this?

With our small population, strong health system and established collaborations, Canada should be an International leader with respect to maternal morbidity and mortality data surveillance, but we continue to fall short and a number of hurdles must be overcome. Challenges with privacy laws and policies, jurisdictional ownership of data, issues related to fault finding and litigation, and also privacy restrictions of the Canadian Institute of Health Information (CIHI) are

significant challenges which will need to be considered and addressed while building a robust system. Timeliness of our data continues to lag behind the rest of the world, with the last national report being published 4 years ago. [7]

Without the data, and without a collaborative effort between government agencies, professional bodies and clinicians and communities, progress will not be possible.

That said, Canada does have strengths and opportunities to improve processes, to generate meaningful outputs and to make a difference.

The SOGC, the CPSS and the Public Health Agency of Canada have worked together to identify limitations in existing data and data collection processes and infrastructure in a formal way on a number of occasions. They have identified approaches that could be national in approach and cross-jurisdictional, while respecting privacy. It is time to catalyze the process and to put ideas into action.

There are some best practice models that exist which can be scaled up and/ expanded/adapted to provide essential partnerships, access, infrastructure and processes For example, the United Kingdom's successful confidential enquiry approach involves partnership between the Royal College of Obstetricians and Gynaecologists, the National Health Service, and Oxford University. The SOGC is in an ideal position to lead the implementation of a similar model by bringing the provinces and territories to the table together with CIHI, Statistics Canada, policy makers, key academic institutions, vital statistics, representatives from maternal mortality review committees and International experts. This should be the first step.

The next step(s) will be to agree on indicators, a pilot process for data collection, surveillance and reporting and governance.

The SOGC and the Association of Academic Health Professionals in Obstetrics and Gynaecology have recently made a commitment to form coalition. This extends the academic reach and involvement of the SOGC and brings the research findings that influence practice and policy to our fingertips – an arrangement that will catalyze efforts related to maternal surveillance.

This is a large undertaking across jurisdictions, but Canada has no choice. Without the data, and without a collaborative effort between government agencies, professional bodies and clinicians and communities, progress will not be possible. Working together with partners across Canada including provinces/territories, Indigenous and other partners to adopt, validate and to implement a standard practice for data collection and reporting on maternal morbidity and mortality will lead to enhanced maternal mortality data surveillance, which will provide essential information to guide maternal health policy makers in their daily efforts for better understanding issues related to maternal morbidity and mortality, for quality care service planning and for the ultimate improvement in maternal and child health.

Collecting analyzing and disseminating findings a critical initial step, in order that we can then commit to eliminating the tragedy of preventable maternal death by methodically identifying and addressing gaps in our systems and health practices. Although this was agreed upon in 2011 and there was a commitment to address challenges and move toward a national system, efforts have not led to fruition despite the fervor and commitment of Canadian experts.

Conclusion

Maternal mortality rates are critical measures of maternal health and provide important information for analysis of trends and priorities among and within countries. Information about near misses as well as maternal morbidity is crucial to truly understand and to prevent maternal mortality.

A number of systems currently exist that capture, analyse and report on information related to maternal morbidity, although there is no standard process for data collection and there is no standard set of indicators. Deciding on indicators and their definitions, collecting information in a standardized manner, analyzing and reporting using the same denominators across systems is the only way that the true burden of maternal morbidity can be understood. These data and their comparisons will form the foundation of evidence to guide programs, policies, priorities and interventions.

Together with governments, experts should work together to determine key indicators and their measurement process as well as a data-sharing and analysis approach that will provide meaningful information. Canada's provinces and territories will need to be engaged in an overarching strategy.

Data collection and surveillance related to severe maternal morbidity and mortality is extremely complex, but the timing for Canada to develop processes and an infrastructure is critical.

Routine reporting of maternal mortality in Canada has been traditionally based on death registrations with occasional reports from the Canadian Perinatal Surveillance System providing a comprehensive review. The last such comprehensive report was published in 2004. More recently, the Canadian Perinatal Surveillance System has had to use hospitalization data from

national databases to monitor rates of maternal death. Unfortunately, such database surveillance fails from a preventive standpoint as the clinical and social context of maternal deaths is neither available nor addressed.

There is an urgent need for accurately ascertaining the underlying cause of death and preventable cases of maternal death in Canada. Hospitalization records as accessed from large databases and related digital information, as currently available for maternal mortality surveillance in Canada (and the United States), lack detail with regard to the clinical and social context, and the temporal sequence of events leading to maternal death. This issue is particularly concerning as a substantial fraction of maternal deaths result from suboptimal care (as the Confidential Enquiry from the United Kingdom shows). Although a case can be made for abandoning maternal mortality audits in favour of severe maternal morbidity surveillance (given the relatively small number of maternal deaths), maternal death audits and severe maternal morbidity surveillance are complementary activities. The audit of a single maternal death or severe morbid event can lead to system-wide changes that prevent severe maternal morbidity and future cases.

Surveillance alone can never be a substitute.

Deciding on indicators and their definitions, collecting information in a standardized manner, analyzing and reporting using the same denominators across systems is the *only way* that the true burden of maternal morbidity can be understood. These data and their comparisons will form the foundation of evidence to guide programs, policies, priorities and interventions that will ultimately guide practice and improve the lives of our mothers, our children and our families.

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