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Ontario Forensic Pathology Service Annual Report July 27, 2016 – July 26, 2017: International Association of Forensic Sciences 2017 Commemorative Edition

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Chief Forensic Pathologist's Report

It was a great honour to lead the International Association of Forensic Sciences (IAFS) and organize its 21st triennial meeting held in Toronto in August 2017.

As the only worldwide association of academics and practicing professionals in all forensic specialties, the IAFS has met every three years since 1957 to share the latest knowledge and best practices in forensics.

The IAFS aspires to promote a sense of connection to a global forensic science community. Forensic sciences are about seeking the truth to support human rights and justice, and working together to improve the health and well-being of societies around the world.

Our thanks to our conference contributors, as well as our innovative industry sponsors, exhibitors, and academic partners for supporting IAFS 2017 and enhancing our program.

Hosting the IAFS 2017 was a once-in-a-lifetime opportunity. We will cherish the memories and friendships made and have included some photos in this commemorative edition of the OFPS Annual Report.

Michael S. Pollanen MD PhD FRCPath DMJ (Path) FRCPC Founder, forensic pathology
 Chief Forensic Pathologist and Deputy Chief Coroner for Ontario
 Director, Centre for Forensic Science and Medicine
 Professor, Department of Laboratory Medicine and Pathobiology, University of Toronto
 President, International Association of Forensic Sciences (IAFS), 2014-2017

What We Do

The Ontario Forensic Pathology Service (OFPS) provides forensic pathology services under the Coroners Act. The OFPS works closely with the Office of the Chief Coroner (OCC) to ensure a coordinated and collaborative approach to death investigation in the public interest. Together, the chief forensic pathologist and chief coroner provide collaborative leadership for Ontario's death investigation system.

Our Vision

Deliver a high quality death investigation system for a safer and healthier Ontario.

Our Mission

Support the administration of justice, prevention of premature death and be responsive to Ontario's diverse needs.

Our Values

- Integrity
- Responsiveness
- Excellence
- Accountability
- Diversity

The [OFPS](#) applies these core values by embracing an independent and evidence-based approach that emphasizes the importance of thinking objectively in pursuit of the truth. The [OFPS](#) is committed to service, research and teaching.

Our Services

Most deaths in Ontario are due to natural causes and do not require a medico legal investigation. However, deaths that are sudden and unexpected require investigation by a coroner. These include deaths from accidents, suicides, homicides, and sudden deaths from previously undiagnosed diseases. Here is a list of services offered by [OFPS](#):

Pre-autopsy consultations

Forensic pathologists consult with regional supervising coroners to determine the appropriate location for an autopsy based on the complexity of a case and the skills of local pathologists.

Organ and Tissue Donations

In appropriate cases, forensic pathologists work with regional supervising coroners to facilitate organ and tissue donation through Trillium Gift of Life, in accordance with the wishes of the deceased and family.

Scene Visits

Pathologists attend scenes to gain necessary information as part of a complete autopsy. In some cases, photographs, video recordings and other imaging techniques are used instead of the scene visit.

Autopsies

Pathologists conduct autopsies and observe, document and interpret findings to help determine cause of death. Autopsies are performed under authority of an Ontario Coroner's Warrant, a legal document that instructs a pathologist to perform the autopsy. In Ontario, coroner investigations are conducted in accordance with the provisions of the Coroners Act and all autopsies must be authorized by a coroner's warrant. The [OFPS](#) also provides autopsy services to other jurisdictions, as well as to the Department of National Defence for military personnel who die outside of Canada.

There are five steps to a medico legal autopsy:

1. Review of case history, scene and circumstances
2. External examination, including photographic documentation
3. Internal examination by dissection, including photographic documentation
4. Ancillary tests including, imaging, histology, cardiovascular, neuropathology, anthropology and

odontology consultations, toxicology, metabolic screening and DNA testing

5. Opinion and report writing

Consultations and expert opinions

Our forensic pathologists and other consultants often participate in case conferences with other death investigation partners; assist in the identification of unidentified remains and missing persons and, provide expert opinion on complicated 'cold' cases in Ontario and other jurisdictions. They also provide occasional consultation and expert opinion on injuries to living individuals to assist with investigations.

Testimony in trials and other hearings

Forensic pathologists and other consultants testify as expert witnesses at coroner's inquests, all levels of court and public inquiries.

Collaboration with coroners

Forensic pathologists serve on OCC death review committees.

Special services

Special services are provided on request to other agencies including international groups and non-governmental organizations. In cases of multiple fatalities, these services may include disaster victim identification or human rights death investigations.

Our Plan

The OFPS has a joint five-year strategic plan with the OCC that sets out four priorities to guide the death investigation system in Ontario:

1. A sustainable and effectively resourced system: Provincial complement of highly-qualified expert resources, supported by modern processes, systems, infrastructure, and technology.
2. Effective, relevant and reliable services: System delivers effective and efficient investigation and certification of deaths, and high quality forensic medicine and autopsy services.
3. Leverage data, build knowledge and provide education: Robust data creates knowledge and drives education and innovation in death investigation and forensic medicine.
4. Improve the health and safety of Ontarians: Enhanced review mechanisms and stronger partnerships contribute to a safer and healthier Ontario.

The OFPS also has a supporting implementation plan to follow its start-up plan (2009-2014) that responded to the Inquiry into Pediatric Forensic Pathology and amendments to the Coroners Act in 2009. The OFPS has addressed all the objectives outlined in its start-up plan to provide the basis for continued growth.

The plan focuses on capacity development and sustainability, and establishes measurable objectives to implement the four strategic priorities of the OFPS/OCC plan.

In total, the OFPS committed to 43 objectives, the status of which has been tracked.

2016-17 Highlights

- adding resources across the province including the North
- addressing the needs of First Nations and remote communities
- enhancing the provision of autopsies using imaging modalities
- expanding the role of forensic pathologist-coroners at Forensic Pathology Units and for broader case types

- identifying human remains that are persistently unidentified
- maintaining residency training programs in forensic pathology
- maintaining training programs for less developed countries
- maintaining educational activities for pathologist assistants, police, physicians, lawyers and other learners
- encouraging peer-reviewed publications and presentations
- impacting public health and safety through tissue donation, molecular autopsy, multiple fatality planning.

IAFS 2017 Conference

The International Association of Forensic Sciences (IAFS) is the only worldwide association of academics and practicing professionals from various disciplines. In August 2017, 1,440 IAFS delegates from 86 countries gathered in Toronto for the 21st triennial meeting, hosted by the Ontario Forensic Pathology Service and the Ministry of Community Safety and Correctional Services.

The theme of the IAFS 2017 conference was Inter-Professional Collaboration in Forensic Science. The venue for IAFS 2017 was the Sheraton Centre Hotel in downtown Toronto, while pre-conference workshops were held at the Forensic Sciences and Coroner's Complex. Pre-conference workshops, plenaries and lectures offered perspectives on current global issues such as human migration, terrorism and internal armed conflict, as well as violence against women and vulnerable persons.

As president of the IAFS for 2014-17, and chair of the IAFS 2017 conference, Dr. Michael Pollanen was able to raise awareness of the need for capacity development in the forensic sciences to support human rights and justice.

Humanitarian forensic science is a growing field that utilizes forensic disciplines to examine injury, death and the disappearance of people, often during times of conflict, terrorism or natural disaster. IAFS 2017 showcased the humanitarian aspects of these fields as well as evidence-based practices highlighted by a fascinating talk by Mr. Yves Daccord, director general of the International Committee of the Red Cross.

Plenary lectures also focused on humanitarian aspects of the forensic sciences:

- Forensic issues in human migration
- Practicing forensic science in challenging environments: International perspectives
- Major case management showcasing Ontario's successful collaborative and multi-disciplinary approach to investigating high-profile and complex homicides

In addition, there were five areas of special interest for invited speakers and oral presentations:

- Miscarriages of justice and wrongful convictions
- New forensic technologies, digital evidence and cybercrime
- New drugs, new issues, new doping methods
- Violence against women and vulnerable persons
- Terrorism and armed conflict

One of the special scientific sessions was held to honour Dr. Jerry Melbye. Dr. Melbye, who passed away in March 2017, was a friend, colleague or mentor to all of the current OFPS forensic anthropologists and played an important role in the use of forensic anthropology in Ontario. The session in his honour featured recent students from the Forensic Science Program that he founded at the University of Toronto as well as forensic anthropology colleagues and former students.

A leader in forensic anthropology

During the Guy Paul Morin trial in 1989, Dr. Jerry Melbye and Dr. Kathy Gruspier (now a full-time forensic

anthropologist with the [OFPS](#)) consulted for opposite sides. Following Mr. Morin's exoneration and the Kaufman Inquiry into his wrongful conviction, the [OCC](#) began to use forensic anthropology in forensic cases more regularly, largely in cases of skeletal remains. Jerry and Kathy shared the majority of the consulting workload for many years, demonstrating the utility of forensic anthropology in a broader range of case types. Jerry taught many students who have gone on to teach and practice forensic anthropology in jurisdictions across North America and internationally.

Dr. Pollanen was also successful in promoting forensic capacity in developing countries by arranging financial support for 248 young forensic scientists from regions around the world, where there is an increased need for forensic medicine. Through the generous support of organizations and individuals, 109 forensic scientists from developing countries were able to attend the 2017 [IAFS](#) conference and present their work. These young delegates returned home with new skills and contacts that will make a difference in their communities.

A special thank you

Dr. Pollanen and [IAFS](#) 2017 conference organizers offer special thanks to:

- The G. Raymond Chang Foundation
- Hong Kong Forensic Foundation
- Humanitarian and Human Rights Resource Centre
- International Criminal Investigative Training Assistance Program
- Tourism Toronto
- International Committee of the Red Cross
- Government of Ontario
- Many individual donors

Several forensic colleagues from around the world were also recognized for their significant work:

- **Professor Cristina Cattaneo, University of Milano, Italy:** Adelaide Medal for personal, significant contribution to the advancement of forensic sciences from an international perspective
- **Professor Emad Mousa Al-Abdallat, University of Jordan:** G. Raymond Chang Award, a special [IAFS](#) 2017 award to recognize the best abstract from a developing that reflected the ideals of the conference
- **Douglas Ubelaker, Smithsonian Institution:** American Academy of Forensic Sciences Douglas M. Lucas Medal for professional excellence
- **Professor Jørgen Thomsen, Institute of Forensic Medicine, Denmark:** [IAFS](#) Human Rights Award for his extraordinary contribution to the field of forensic pathology
- **Caroline Mireault, Université du Québec a Trois-Rivières:** Canadian Society of Forensic Science H. Ward Smith Award to commemorate the contribution to forensic science in Canada

Forensic sciences are about seeking the truth to support human rights and justice, and working together to improve the health and well-being of societies around the world. The [IAFS](#) aspires to promote a sense of connection to a global forensic science community. The [IAFS](#) 2017 conference did so much to strengthen that connection, especially among developing nations.

The [IAFS](#) is a not-for-profit association governed by a council made up of its past presidents, of which Dr. Pollanen is now a proud member of, following a successful three-year term. The [IAFS](#) Council has appointed Claude Roux, professor of forensic science and director, Centre for Forensic Science, University of Technology, Sydney, Australia as the new president of the [IAFS](#). We are delighted to support Claude and his team as they prepare for [IAFS](#) 2020.

Professor Frederick Beiber, a respected senior forensic scientist and academic at Harvard University,

said it was “the very best forensic conference I have ever attended”.

2016-17 Results

Register of pathologists

Under the Coroners Act, medico legal autopsies may be performed only by pathologists who are appropriately credentialed and registered by the [OFPS](#). On the basis of their qualifications, registered pathologists may be approved to perform:

- all medico legal autopsies including homicide and criminally suspicious cases (Category A)
- routine cases only (Category B)
- non-suspicious pediatric cases only (Category C)

As of July 26, 2017, a total of 113 registered pathologists were active, including 40 Category A pathologists permitted to conduct all types of autopsies. These 40 pathologists are recognized as having additional experience, training and/or certification in forensic pathology.

Register Composition by Pathologist Category

Category	2010	2011	2012	2013	2014	2015	2016	2017
A	24	27	29	31	31	34	39	40
B	142	132	115	99	97	66	65	66
C	5	7	7	7	7	6	7	7

The Credentialing Subcommittee of the Forensic Pathology Advisory Committee reviews applications and provides advice to the chief forensic pathologist regarding acceptance and renewal to the register.

Pathologists are registered for a five-year term after which their appointments are considered for renewal. The Quality Team assembles data for review by the Credentialing Subcommittee, including:

- case load, cumulative over five years and year-by-year
- turnaround time for post-mortem examination reports
- peer review history
- complaints, incident reports and critical incidents, and remediation by the chief forensic pathologist and by the College of Physicians and Surgeons of Ontario ([CPSO](#)), where applicable

The [OFPS Register](#) is available publicly through the ministry’s website.

Performance management of registered pathologists related to quality of medico legal autopsies is the responsibility of the chief forensic pathologist. When there is professional misconduct or incompetence, the chief forensic pathologist is obligated by law to report the issue to the College of Physicians and Surgeons of Ontario.

Supervision and direction of pathologists

To promote consistent and high quality practices across Ontario and to assist registered pathologists in their work, the [OFPS](#) provides a practice manual and toolkit, updated in 2014.

The practice manual includes the Code of Ethics, practice guidelines for medico legal autopsies, and explanations of the peer review system and Register. Together, these documents provide the professional

and policy foundation for the OFPS.

The Code of Ethics was adapted from the Forensic Pathology Section of the Canadian Association of Pathologists.

Pathology Information Management System (PIMS)

The OFPS uses the Pathology Information Management System (PIMS) to collect information about autopsies performed across Ontario. All registered pathologists contribute information to the system through the Post-mortem Examination (PME) Record. This record, an electronic form used to capture high level data about autopsies, is completed and submitted to the OFPS directly after the autopsy. The record is reviewed daily by a senior forensic pathologist to ensure that autopsies are done according to guidelines. The collected information is also used to evaluate resources, as well as provide statistics about performance and quality. PIMS, in conjunction with the PME record, facilitates accountability and the oversight of autopsies by the chief forensic pathologist.

Caseload statistics

Caseload statistics are derived from Post-mortem Examination Records submitted during the reporting period.

Each OFPS case begins with a coroner's request for an autopsy by warrant to a pathologist. Autopsies on homicides, criminally suspicious and pediatric cases, deaths involving firearms and routine (non-suspicious) autopsies are performed in Forensic Pathology Units by appropriately qualified forensic pathologists. Some non-suspicious (medical type) autopsies of children are performed at pediatric sites. Routine autopsies are conducted in community hospitals. Approximately 85 per cent of all autopsies were performed in Forensic Pathology Units and pediatric sites, and 15 per cent in community hospitals. Chart 1 shows the distribution of autopsies captured in the system by OCC investigative regions.

Chart 1: Distribution of Autopsies by OCC Investigative Region 2016-17

FPU and pediatric/perinatal sites:

- Hamilton: 1087
- Kingston: 229
- London: 538
- Ottawa: 736
- Sudbury: 475
- Toronto: 3141

Community Hospitals:

- Central East: 71
- Central West: 197
- Hamilton: 165
- London: 426
- Thunder Bay: 214

Chart 2: Distribution of Autopsies by Site Type (Community Hospitals/FPU & Pediatric-Perinatal sites) 2016-17

- 2010-11: 1826/3534
- 2011-12: 1631/3937
- 2012-13: 1546/4417
- 2013-14: 1199/4529

- 2014-15: 1115/4990
- 2015-16: 1107/5312
- 2016-17: 1073/6206

Pediatric autopsies (for children 17 years of age or under) are often complex, requiring additional ancillary testing and/or consultation with other medical specialists. Pediatric autopsies of a criminally suspicious nature are all performed in Forensic Pathology Units.

For the reporting period, there were a total of 361 paediatric cases, of which 214 were children less than five years of age and 147 were between the ages of five and 17. Of the total number of cases, 345 were non-suspicious and 16 were criminally suspicious/homicides (Chart 3).

Chart 3: Pediatric Cases by Type and Age, 2016-17

- Less than 5 years routine: 57%
- Less than 5 years criminally suspicious/homicide: 2%
- 5-17 years routine: 39%
- 5-17 years criminally suspicious/homicide: 2%

Chart 4 provides a breakdown of autopsies by case type for 2016-17. The category 'sudden' includes non-homicidal gunshot wounds, drug overdoses and others not specified in the available categories.

Chart 4: Distribution of Autopsies by PIMS Case Type, 2016-17

- Sudden: 61%
- Homicide: 3%
- Suspicious: 1%
- Collision: 7%
- Fall: 2%
- Hanging: 7%
- Decomposed: 4%
- Fire: 1%
- Water: 3%
- Case Other: 11%

In some cases, the decision is made to limit an autopsy to an external examination where sufficient information can be obtained from a limited examination. There were 595 such cases performed in Forensic Pathology Units and 95 in community hospitals. Forensic pathologists at the Provincial Forensic Pathology Unit (PFPU) rely on imaging technology to inform their decisions about limited autopsies.

Quality management

The OFPS has a robust quality assurance program comprised of the following:

- Pathologist Register
- practice guidelines, including standardized reporting templates and forms
- consultation in difficult or challenging cases
- collection of standardized case information through the Post-mortem Examination Record
- peer review of all autopsy reports on homicide, criminally suspicious and Special Investigations Unit (SIU)* cases, and complex pediatric cases (deaths under five) prior to report distribution
- audit of autopsy reports on routine cases
- peer review of courtroom testimony
- detection and follow-up of significant quality issues and critical incidents

- reporting of key performance indicators to clients and stakeholders
- tracking of complaints to ensure timely resolution and corrective action
- continuing medical education in forensic pathology to
 - maintain specialist competence as required by the Royal College of Physicians and Surgeons of Canada
 - address performance concerns

* The Special Investigations Unit civilian oversight agency responsible for investigating circumstances involving police that have resulted in a death, serious injury, or allegations of sexual assault of a civilian in Ontario.

Peer review of autopsy reports for homicide, criminally suspicious, pediatric and SIU cases

There were 281 autopsy reports peer reviewed over the current reporting period. On average, about 11 reviews were completed by each reviewing forensic pathologist. The average turnaround time for peer review was five days. The standard OFPS turnaround time for peer review is 10 working days.

Peer review of courtroom testimony by forensic pathologists

Forensic pathologists who testify submit one transcript of courtroom testimony each year for review by another forensic pathologist. Courtroom testimony is assessed for:

- accuracy and evidence-base
- professionalism and objectivity
- clear language
- presentation of limitations, uncertainties and alternate hypotheses

No problems have been identified in courtroom testimony reviewed to date.

Audit of autopsy reports for routine cases

Autopsy reports for routine cases are audited for administrative and technical accuracy by directors of Forensic Pathology Units. Reports from community hospitals are audited by the chief forensic pathologist or designate.

The administrative audit focuses on completeness and adherence to guidelines. All community hospital reports undergo administrative audit and 10 per cent of routine autopsy reports from Forensic Pathology Units undergo this type of audit.

The technical audit focuses on the content of the report to ensure that the approach, conclusions and opinions derived from the evidence are reasonable.

A technical audit is done for all reports that fall into the following categories:

- cases with an undetermined cause of death
- non-traumatic and non-toxicologic deaths of individuals younger than 40 years old
- reports from pathologists performing fewer than 20 autopsies per year

Key performance indicators

Key performance indicators for autopsy reports such as submission compliance, completeness, turnaround time and validity are collected from the administrative and technical reviews and reported.

Table 1: Key Performance Indicators for Autopsy Reports*

Table 1

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Key Performance Indicators for Autopsy Reports	Target	Results
Submission Compliance (PME Record)	100%	95% - approaching compliance
Completeness	95%	100% - good compliance
Consistency	95%	99.66% - good compliance
Turnaround Time	90 days	Average = 94 days – approaching compliance
Reports with Significant Issues (Forensic Pathology Units)	< 2%	0% - good compliance
Reports with Significant Issues (Community Hospitals)	< 2%	0.9% (15 amended reports requested out of 1659 audits) – good compliance
Critical Incidents	0	0 – good compliance

**Turnaround time may be influenced by case complexity and availability of ancillary testing*

Pathologists in community hospitals are expected to follow the best practices set out in the practice manual. Pathologists are provided feedback from routine audits with the goal of improving report quality.

Note: community hospitals may use their own institution's report templates if they include the required template fields.

Chart 5 illustrates consistency of the content and opinion of autopsy reports as assessed by the reviewing pathologist during the period, as shown by a technical audit.

Chart 5: Consistency Measures as Shown by Technical Audit, 2016-17

PM Report Consistency % (Community Hospitals/FPU's & Pediatric-Perinatal sites):

- Satisfactory Descriptions: 100/100
- Appropriate Ancillary Testing: 99/100
- Free of Language Errors: 100/100
- Independently Reviewable: 100/100
- COD Reasonable: 99/100
- Opinions Are Reasonable: 98/100

Significant issues

Significant issues include substantial errors, omissions and other deficiencies.

A critical incident is a significant issue that contributes to a serious error in a death investigation. All critical incidents are analyzed to determine root cause and corrective action.

If the reviewing forensic pathologist detects a significant issue during the technical review, feedback is provided to the case pathologist. For the given reporting period, no significant issues were detected in routine case reports from Forensic Pathology Units or community hospitals.

The purpose of quality assurance is to improve the quality of autopsies and reports. When a significant issue is detected, the reviewing pathologist contacts the original pathologist directly to discuss and recommend changes to the report. Continual improvement of autopsy practice and report writing is supported with:

- continuing education events such as the annual education course for coroners and pathologists and

special workshops on autopsy practice

- resources such as the 2014 practice manual for pathologists and toolkit, including synoptic reports, annotated autopsy report templates, and chief forensic pathologist's guidance with case examples

Turnaround time

Timeliness of autopsy reports is a key performance indicator. Turnaround time is influenced by case complexity, return of ancillary test results, pathologist workload and staffing levels. The OFPS policy regarding turnaround time is:

- 90 per cent of autopsy reports are to be completed within 90 days of the day of the post-mortem examination
- cases involving homicides, pediatric deaths, deaths in custody and those in which the coroner has requested that the report be prioritized (due to requests from family or other parties) are to be expedited as a matter of routine
- no more than 10 per cent of cases should be greater than six months old without a justifiable reason for delay (e.g., delays caused by molecular autopsy for channelopathy)

Chart 6 depicts the turnaround time for community hospital pathologists and forensic pathologists in forensic pathology units for 2016-17. The longer turnaround time for forensic pathologists may be explained by the more complex nature of the autopsies performed.

Chart 6: Turnaround Time, 2016-17

Average Turnaround Time – Autopsy date to final report sign out date (Community Hospitals/FPUs & Pediatric-Perinatal sites):

- 2011-12: 91/55
- 2012-13: 121/66
- 2013-14: 121/75
- 2014-15: 99/67
- 2015-16: 101/72
- 2016-17: 115

Clinical forensic medicine

At present, qualified expert opinions and testimony by forensic specialists are usually available only in cases of violent death. However, cases of serious assault with a surviving victim can often benefit from the review and interpretation of injuries by a forensic expert, and the expert's opinion can be useful to the criminal justice system. Forensic pathologists consult by reviewing medical records and digital photographs.

Forensic anthropology

Forensic anthropologists are experts in the study of skeletal remains in the medico legal context. Forensic anthropologists make an important contribution to death investigations where the remains are skeletonized, burned, decomposed, mutilated or otherwise unrecognizable. Forensic anthropologists act as part of the death investigation team. They are the experts at determining whether found bones are human or non-human by examining digital photographs or the remains themselves. They help to plan for multiple fatality events and manage identification when they occur. They are also the experts who determine whether found remains are of recent forensic interest or are archaeological or historical in nature.

One full-time forensic anthropologist works in the OFPS along with several fee-for-service consultants.

Other professional consultants

The [OFPS](#) relies on the expert contributions of other professionals, including cardiovascular pathologists, neuropathologists, forensic odontologists, radiologists and a forensic entomologist.

Histology

Histology is the preparation of microscope slides from tissues obtained at autopsies for examination by a pathologist. The number of slides prepared for each case varies with the type of case and the pathologist's preference.

Histology services are provided by laboratories at community hospitals and Forensic Pathology Units located in hospitals. At the [PFPU](#), two full-time histotechnologists are employed to process more than 3,500 tissue specimens each month.

Toxicology

Toxicological analysis of post-mortem samples is performed by scientists at the Centre of Forensic Sciences (CFS). In many cases, pathologists rely on the results and interpretive notes provided by toxicologists in coming to an opinion about the cause of death.

During the reporting period, toxicological analysis was requested in approximately 4,400 death investigations. The average time to issue a toxicology report by the CFS was 46.6 days. In cases where toxicology was required, 99.9 per cent of the autopsy reports were issued within 90 days of receiving the toxicology reports.

Molecular autopsy / cardiovascular pathology

Many natural disease processes are now recognized to have a genetic underpinning. For a number of these conditions, characterization of the genetic mutations involved is becoming the standard of care in hospitals for living patients and is part of the movement towards targeted therapy and personalized medicine. The first significant manifestation of such a disease may be sudden and unexpected death, which may be first recognized and diagnosed following the autopsy. Thus, particularly for young people, the identification of a genetic contribution to sudden death can have huge implications for the surviving family members as well as the health care system.

A large proportion of cases where genetic disease may have contributed to death involve the heart and blood vessels. The [OFPS](#) provides high quality cardiovascular pathology services to investigate sudden cardiac and vascular deaths in Ontario and occasionally by request from across Canada. In cases that may have an underlying genetic predisposition, DNA banking and genetic testing will also be performed (the molecular autopsy). With the results of the post-mortem examination and clinical investigation, DNA analysis can help define the underlying disease that caused death, facilitate screening in surviving family members and sometimes contribute prognostic information for affected relatives.

High quality pathological diagnoses are essential. Through the [OCC](#), we communicate with families to give them information about a potential genetic condition and their options for care in subspecialty hospital clinics.

It is also being increasingly accepted that unrecognized genetic disease may play a role in deaths following interactions with correctional officers or police, or in the course of a criminal act. In these circumstances, a molecular autopsy can help provide answers in these challenging death investigations and contribute to coroner's inquests and the criminal justice system.

Next of kin clinics

In 2016, the [PFPU](#) and the [OCC](#) established a Next of Kin Clinic, a collaborative effort to improve communication with surviving family members. Families meet with coroners, forensic pathologists and the Family Liaison Coordinator at the [FSCC](#) in person, via video or teleconferencing to review the findings of a death investigation and answer questions.

The intent of the clinic is to provide better understanding of the death investigation process, review autopsy results and provide advice when a possible genetic disease was identified in the deceased family member. While all families are eligible to take part, those with young children or with possible genetic cardiovascular disease are specifically targeted. Sometimes, other specialists or investigators attend these meetings, such as toxicologists or police, to improve the multidisciplinary nature of the information transfer. Feedback shows that this clinic is well-liked by participating families.

Child injury interpretation committee

In 2017, the [OFPS](#) formed a new committee to provide enhanced peer review of criminally suspicious pediatric deaths. Membership includes forensic pathologists from across Ontario, particularly those with special interest in pediatric deaths, as well as pediatricians from the SickKids [SCAN](#) (Suspected Child Abuse and Neglect) team, neuropathologists, cardiovascular pathologists, and forensic pathologists from other provinces. The peer review takes place before the autopsy report is released to provide a broad spectrum of specialist opinions for each case to ensure the quality of these challenging death investigations.

Forensic imaging

Pathologists at the [PFPU](#) incorporate the findings of advanced post-mortem imaging modalities such as computed tomography ([CT](#)) and magnetic resonance imaging ([MRI](#)) into their daily practice. Introduction of these techniques has resulted in targeted examinations, resulting in efficiencies and benefits to families. Post-mortem imaging findings are discussed at morning rounds, allowing consensus decisions about targeted dissections and maximizing the potential of magnetic resonance imaging.

Senior residents from the University of Toronto's Diagnostic Radiology Residency Program spend one month at the [PFPU](#) where they are integrated into daily service work. The residents learn about lethal injury and disease as well as changes in the body after death. They write reports on post-mortem [CT](#) and [MRI](#) scans, and are able to see pathologic lesions in a way that is not possible in the clinical setting.

Tissue recovery for donation

The [OFPS](#) and [OCC](#) are committed to facilitating and increasing the availability of tissue for transplantation through the Trillium Gift of Life Network ([TGLN](#)). The [FSCC](#) houses a dedicated Tissue Recovery Suite that is used exclusively for obtaining donor tissues including corneas, heart valves, skin and bones. After consent by the family, tissues are recovered by trained staff from [TGLN](#) as well as the [OCC](#) and [OFPS](#).

For the reporting period, there have been 97 tissue recoveries. These include bones, skin, eyes and heart valves.

OFPS-based education

Annual Education Course for Coroners and Pathologists

This two-and-a-half day course is offered jointly by the [OCC](#) and [OFPS](#) each autumn. This meeting qualifies as continuing education for the Maintenance of Certification Program of the Royal College of Physicians and

Surgeons of Canada.

The 2016 course was held from November 16 – 18 and was attended by 26 registered pathologists.

The topics covered included:

- death scene management
- wellness and mindfulness
- Perinatal and Maternal Death Review Committee, maternal deaths and placental pathology
- opioid deaths
- cardiomyopathies
- elder abuse and dementia
- bodies from fire

Department of Laboratory Medicine and Pathobiology, University of Toronto

The Department of Laboratory Medicine and Pathobiology (LMP) at the University of Toronto has a goal to advance teaching and research in forensic medicine. Many of the forensic pathologists working in the OFPS are faculty for the University's continuing educational programs.

Continuing education events

LMP hosts continuing education events that bring national and international experts to University of Toronto to discuss topics in forensics. The courses are attended by academics, those working in forensic disciplines, other medical and legal professionals, and law enforcement practitioners. Since the last annual report, the following courses were offered:

Dr. Frederick Jaffe Memorial Lectureship

A special lecture series was created in memory of Dr. Frederick Jaffe, one of the first forensic pathologists in Canada. Dr. Jaffe authored a textbook, *Guide to Pathological Evidence*, which was used for many years by attorneys and judges. He was also the first director of a province-wide forensic medical service.

The lecture in October 2017 was given by the Chief Medical Examiner of Nova Scotia, Dr. Matthew Bowes where he described the evolution of death investigation in Nova Scotia.

Training Canadian forensic pathologists

The PFPU, in partnership with the Forensic Pathology Residency Training Program at University of Toronto and with funding support from the Ministry of Health and Long-term Care, has the first training program in Canada leading to certification in forensic pathology by the Royal College of Physicians and Surgeons of Canada (RCPSC). Since 2008, 16 pathologists have completed training, 13 of whom are now working within the OFPS. One former trainee practices forensic pathology in Quebec. The Hamilton Forensic Pathology Unit also trains forensic pathology residents in partnership with McMaster University.

In 2017, one new resident began training in forensic pathology in the University of Toronto program:

Christopher (Tooper) G. Ball MD received his Bachelor of Medicine and Bachelor of Surgery from the University of Wollongong in Australia in 2011. He completed his residency in Anatomical Pathology at the University of Ottawa.

One resident began training in forensic pathology in the McMaster University program:

Jay Maxwell MD has degrees in Archaeology, Physical Anthropology and Clinical Anatomy. He completed his MD at the University of Calgary and his Anatomical Pathology residency at McMaster University.

Clinical fellows in forensic medicine

We are committed to developing global forensic medicine and have outreach activities and training collaborations with Jamaica, the Middle East, Sri Lanka, Chile and soon, Zambia. Since 2007, ten international fellows have trained in forensic pathology at the PFPU. Since 2016, clinical fellows are eligible to write the Royal College of Physician and Surgeons of Canada examination in Forensic Pathology, through the Subspecialty Examination Affiliate Program.

In 2017, one clinical fellow from Sri Lanka trained at the PFPU:

Dr. B.C.S. (Chaminda) Perera MD trained in medicine at the Rostov State Medical University in Russia. He completed a Post-graduate Diploma in Legal Medicine (DLM) and MD Forensic Medicine Degree from Postgraduate Institution of Medicine, University of Colombo, Sri Lanka.

Some trainees benefit from the **G. Raymond Chang Forensic Pathology Fellowship** through the University of Toronto's Department of Laboratory Medicine and Pathobiology. This is the first fund in the world that enables young physicians from the developing world to train and ultimately strengthen forensic capacity in their own countries. This fellowship provides financial support to trainees whose countries may not be able to fund a year of training in Canada, particularly those from the West Indies.

In keeping with the Chang Foundation's philanthropic vision, the partnership was enhanced in 2017 through the addition of a **Catalyst Fund** to broaden the strategy to focus on critical infrastructure development in Jamaica, training of West Indian non-physician learners, and extension to other global areas in need.

The Raymond Chang Foundation

The Raymond Chang Foundation is named for the late Toronto-based businessman and philanthropist who had a passion for adult education and was dedicated to improving opportunities where it was most needed. Born in Jamaica, Mr. Chang was a proud and active member of the Caribbean-Canadian community. He was appointed to the Order of Jamaica in 2011 and as an officer of the Order of Canada in 2014.

Raymond Chang understood the relevance of forensic pathology as a truth-seeking tool for justice. The fellowship is a legacy that lives on through the dedication of his children, Andrew Chang and Brigitte Chang-Addorisio. Their generosity and shared vision has ensured a sustainable fellowship training program at the University of Toronto.

Recruitment of forensic pathologists

The capacity of the OFPS has been enhanced through the recent addition of talented new recruits:

Andrew S. Williams MD received his Doctor of Medicine from The University of Western Ontario in 2011. He completed his residency in Anatomical Pathology at Dalhousie University and passed the RCPSC examination in Anatomical Pathology in 2016. He completed his training in Forensic Pathology at the Provincial Forensic Pathology Unit (PFPU) in June 2017 and began working at PFPU as a Staff Forensic Pathologist in July 2017.

Linda Kocovski MBBS graduated from the University of Sydney with a degree in Medicine in 2010. She completed her residency in General Pathology at McMaster University in 2016, followed by her fellowship in Forensic Pathology at Mac and the Hamilton Forensic Pathology Unit (FPU). She began working as a Forensic Pathologist at the Hamilton FPU in July 2017.

Forensic Pathology Units

Sault Ste. Marie Forensic Pathology Unit

The Sault Ste. Marie Forensic Pathology Unit is led by Medical Director, Dr. Michael D'Agostino. Approximately 100 autopsies were performed in 2017.

The unit teaches students from medical schools around the province, pathologist assistant students from Western University on an elective rotation, as well as police and Centre of Forensic Sciences staff.

Eastern Ontario Regional Forensic Pathology Unit (Ottawa)

The Eastern Ontario Forensic Pathology Unit has four full-time forensic pathologists who performed more than 750 medico legal autopsies in 2017, as well as autopsies for the chief coroner for Nunavut. All forensic pathologists hold academic appointments at the University of Ottawa and teach residents in Anatomical Pathology, as well as residents at the University of Toronto and in the Faculty of Law.

Other activities of Ottawa forensic pathologists include:

- teaching to external partners, including the Canadian Police College
- presenting at provincial, national and international meetings, including the Canadian Association of Pathologists, National Association of Medical Examiners, the American Academy of Forensic Sciences and the British Association in Forensic Medicine
- participating in academic and professional activities:
 - Dr. Parai is chair of the forensic pathology section of the Canadian Association of Pathologists (CAP) and the chair of the Royal College Specialty Committee in Forensic Pathology
 - Dr. Kepron is a member of Deaths Under Five Committee of the OCC
 - Dr. Walker teaches at the University of West Indies in Jamaica
 - Dr. Milroy serves as chair and Dr. Kepron is a member of the Royal College Examiners Committee in Forensic Pathology. Dr. Parai is a bilingual examiner and the specialty chair and Dr. Kepron is also an examiner
 - Dr. Milroy is the interim editor of Academic Forensic Pathology, the Official Journal of the National Association of Medical Examiners.
 - Dr. Milroy served on the Board and is executive of the National Association of Medical Examiners in 2017
 - Dr. Milroy was a vice-president of IAFS 2017
 - Dr. Kepron was on the academic committee and program chair for the Pathology/Biology section of the American Academy of Forensic Sciences for 2018

Hamilton Forensic Pathology Unit

The Hamilton Forensic Pathology Unit at the Hamilton Health Sciences Centre is affiliated with McMaster University and performs over 1000 autopsies each year. Forensic pathologists hold academic appointments and teach forensic pathology residents (PGY6), anatomical and general pathology, medical students and undergraduates.

Since the last annual report:

- Dr. Jane Turner has returned to the United States
- Dr. John Fernandes has resumed the role of medical director and continues in his role as chief of laboratory medicine and medical director of Hamilton Regional Laboratory Medical Programme (HRLMP)
- Dr. Elena Bulakhtina has returned from a leave of absence
- Dr. David Chiasson continues to provide coverage one weekend per month
- Dr. Vidhya Nair has relocated to Ottawa where she continued to provide Category B service and cardiovascular consultations and directs the General Pathology Program at McMaster University until January 2018

- Dr. Sahar Al-Haddad provided locum coverage as a Category B pathologist
- Dr. Linda Kocovski, a former resident in forensic pathology, has taken over the role of programme director for the forensic pathology fellowship programme at McMaster University

Kingston Forensic Pathology Unit

The Kingston Forensic Pathology Unit at Kingston General Hospital is affiliated with Queen's University and performs about 200 medico legal autopsies each year.

Dr. Jeffrey Tanguay recently assumed the role of Medical Director. He was one of the first residents to complete the program at the University of Toronto and be certified as a forensic pathologist by the Royal College of Physicians and Surgeons of Canada.

London Forensic Pathology Unit

The London Forensic Pathology Unit, serving Southwestern Ontario, is based in the Department of Pathology and Laboratory Medicine at London Health Sciences Centre (University Hospital). The unit performs about 530 medico legal autopsies per year.

Dr. E. Tweedie coordinates the forensic course offered in the Bachelor of Medical Sciences and Master of Clinical Sciences (MCISc) – Pathologists' Assistant (PA) programs at Western University. In October of 2017, he converted his practice to full-time forensic pathology.

Dr. E. Tugaleva is the medical director of the MCISc Pathologist Assistant program in the Department of Pathology & Laboratory Medicine at Western University and assists Dr. N. Chan, the program director. It is a highly competitive program, and its graduates have been successful in attaining employment in Canada and United States.

Audrey Evetts was supervised by Drs. Tugaleva and M. Shkrum and successfully defended her MSc thesis. Two publications of her research on body and organ measurements in 900 sudden infant deaths investigated by the OCC, have been published in the American Journal of Forensic Medicine and Pathology.

Dr. Shkrum supervised Mariya Kuk, currently a medical student at the University of Ottawa, on a comparison of injury patterns seen in fatally injured drivers during deployment of air bags. This research was published in the Journal of Forensic Sciences. Dr. Shkrum's current motor vehicle-related research focuses on pediatric motor vehicle occupants injured in collisions. This is a conjoint study involving Transport Canada and the trauma program at London Health Sciences Centre.

Northeastern Regional Forensic Pathology Unit (Sudbury)

The Northeastern Regional Forensic Pathology Unit (NERFPU) of Health Sciences North in Sudbury is affiliated with Laurentian University and the Northern Ontario School of Medicine and performs about 400 medico legal autopsies each year for Sudbury and the greater North Bay region.

Provincial coroner dispatch

Provincial dispatch is the single point of contact to notify coroners in Ontario of deaths that may require investigation. Located at the FSCC, the centralized provincial dispatch provides a 24/7, computer-aided service to ensure that the right coroner is assigned to investigate each death. This includes capturing a digital record of case information in real time. The team of 15 dispatchers receives approximately 300 phone calls and makes 750 outgoing calls in each 24-hour period, resulting in coroners being dispatched to more than 16,000 cases per year.

Dispatch staff are also responsible for receiving and releasing each of the approximately 3,500 bodies that arrive at the FSCC for examination or storage each year.

First Nations liaison

Ontario's death investigation system is committed to meeting the needs of First Nations communities by:

- building on existing relations between the OCC/OFPS and First Nations/Indigenous communities as established by the regional supervising coroners
- increasing First Nations/Indigenous communities' awareness of the role of forensic pathologists and willingness of the death investigation system to consider religious/cultural accommodations
- connecting to and communicating with families and community leaders in difficult cases.

International assistance and capacity development

Ontario has a proud history of providing leadership and support to international Disaster Victim Identification missions. These humanitarian missions are assembled following natural or human-caused disasters where help is needed to identify victims. The OFPS has participated internationally with Interpol, the International Committee of the Red Cross, the Federal Bureau of Investigation and other experts from the forensic community.

Some nations do not have a robust system of forensic medicine to support human rights and justice. Dr. Pollanen has worked to build forensic medicine capacity and support human rights investigations in areas such as the Middle East, South Asia, Africa and the Caribbean. Some of this work has involved United Nations agencies and the International Criminal Court, as well as the ICRC.

In 2017, the PFPU hosted a number of international guests and observers:

- Dr. Judith Fronczek, Netherlands Forensic Institute, Holland
- Dr. Zuzanna Gorski, Dorset County Hospital, UK
- Dr. Sangeet Kaur Dhillon, Indira Gandhi Medical College, India

The PFPU has a Memorandum of Understanding with the Institute for Forensic Science and Legal Medicine (IFSLM), Ministry of National Security, Jamaica to support professional development in forensics. Professional and technical staff of the PFPU have visited Jamaica to instruct forensic pathologists, pathologist assistants, administrators and others from IFSLM to promote best practices in forensic medicine.

In 2017, Dr. Pollanen travelled to Uganda to examine living patients suffering from Nodding Syndrome, a little-understood, endemic neurologic disorder of young people in East Africa. This visit inspired a research initiative into the pathological basis of this disease. This is an exciting development that demonstrates the application of forensic science to global health problems.

Professional activities and outreach

Registered pathologists and forensic consultants enrich the practice of forensic science and medicine by participating in provincial, national and international professional organizations such as the Ontario Association of Pathologists, Canadian Association of Pathologists, National Association of Medical Examiners, Canadian Society of Forensic Sciences, American Academy of Forensic Sciences, the IAFS and other organizations.

OFPS forensic pathologists participate in activities of the Royal College of Physicians and Surgeons of Canada that focus on the promotion and accreditation of forensic pathology and anatomical pathology in Canada.

This past year, OFPS pathologists lectured and delivered courses to audiences that included forensic

pathologists and scientists, medical practitioners, the judiciary, lawyers, police, advocacy groups and others.

OFPS pathologists serve as members of editorial boards of international peer-reviewed forensic journals, and act as reviewers for other specialist journals.

Scholarly activities

Teaching

Most forensic pathologists and forensic consultants hold academic appointments at their respective universities. They teach undergraduate and graduate forensic science students, medical students, pathologist assistant and physician assistant students, dentists, nurses, medical artists, law students, medical imaging residents, and pathology and forensic pathology residents. Forensic Pathology Units also host many medical students and pathology residents from Canadian universities and elsewhere.

The PFPU participates in the University of Toronto's Department of Laboratory Medicine and Pathobiology's digital library by providing digital histological images of forensic interest for the educational purposes of pathology residents.

Forensic pathologists also act as visiting faculty to foreign universities.

The PFPU partners with the "LAWS" initiative of the Toronto District School Board, the University of Toronto Faculty of Law and Osgoode Hall Law School to offer an educational program for Grade 11 students to understand forensic pathology, its intersection with the law, and the different career options available in the field. Case-based sessions, for more than 100 students each, are offered at the Forensic Services and Coroner's Complex. The students are exposed to a wide range of forensic specialties involved in a case.

Research

Forensic pathologists contribute to and support research aimed at understanding causes of sudden death and improving public safety.

Committees

Forensic Pathology Advisory Committee

The Forensic Pathology Advisory Committee provides advice to the chief forensic pathologist regarding professional medico legal autopsy practices. This committee includes the directors of the Forensic Pathology Units, the president of the Ontario Association of Pathologists and the chief coroner.

During the reporting period, the committee convened once to discuss policy issues, including:

- problems with limited toxicology testing
- approaches to Sudden Infant Death
- external examinations on hanging cases by Category B pathologists

Forensic Services Advisory Committee

The committee was created to strengthen the objectivity of the OFPS and improve communication with key external stakeholders such as police, Crowns and defense attorneys are represented on the committee, which meets as required to provide advice to the chief forensic pathologist on topics that advance the quality and independence of medico legal autopsies.

During the reporting period, the committee did not meet.

Appendix A: The Coroners Act

The Coroners Act defines the roles and responsibilities of pathologists and coroners in death investigation and enhances the quality, organization and accountability of forensic pathology services. The Coroners Act:

- defines the OFPS as the unified system under which pathologists provide forensic pathology services, including autopsies
- defines the position of the chief forensic pathologist as overseer of forensic pathology services
- defines the positions of the deputy chief forensic pathologist and pathologist
- requires a registry of pathologists accredited to perform medico legal autopsies
- requires the chief forensic pathologist to communicate with the College of Physicians and Surgeons of Ontario on any adverse findings related to competency and professionalism of a registered pathologist

Registered pathologists have legal authority under the Coroners Act to attend scenes and order ancillary tests as required, pursuant to their duties.

Appendix B: Governance

The OFPS and the OCC are part of the Ministry of Community Safety and Correctional Services and are accountable to the minister of Community Safety and Correctional Services. The deputy minister of Community Safety and Correctional Services provides direction on administrative matters.

The Death Investigation Oversight Council (DIOC) ensures that death investigation services are effective and accountable. As an independent advisory agency, DIOC provides oversight of the OFPS and OCC, administers a public complaints process, and provides advice and recommendations to the chief coroner and chief forensic pathologist.

Appendix C: Structure

Ontario Forensic Pathology Service (OFPS)

Under the Coroners Act, the chief forensic pathologist administers and operates the OFPS. Specifically, the chief forensic pathologist:

- supervises and directs pathologists in the provision of services
- conducts programs for the instruction of pathologists
- prepares, publishes and distributes a code of ethics
- maintains a register of pathologists authorized to provide services

The deputy chief forensic pathologist has all the powers and authorities of the chief forensic pathologist in the event the chief forensic pathologist is absent or unable to act, or if the chief forensic pathologist's position becomes vacant. The deputy chief forensic pathologist also supports the chief forensic pathologist in the administration, oversight and quality management of the OFPS.

Provincial Forensic Pathology Unit

The forensic pathologists of the PFPU perform approximately 3,000 autopsies per year, mainly from the Greater Toronto Area. The PFPU is affiliated with the University of Toronto and is the central referral facility for many complex autopsies from across the province, including homicides, skeletal remains and suspicious infant and child deaths. The medical director of the PFPU reports to the chief forensic pathologist.

The operation of the PFPU includes professional and technical roles in addition to forensic pathologists. These include forensic anthropologists, pathologist assistants, technologists and imaging specialists, as well as administrative and management personnel.

Forensic Pathology Units

Forensic Pathology Units are located in university teaching hospitals in Hamilton, Kingston, London, Ottawa, Sault Ste. Marie and Sudbury. These units provide expertise in forensic pathology for approximately 2,900 routine and complex autopsies annually, including homicides and pediatric cases. The Ministry of Community Safety and Correctional Services, through the [OFPS](#), provides funding to these units.

Complex forensic autopsies are performed by qualified forensic pathologists, most of whom work at a Forensic Pathology Unit or at the [PFPU](#) in Toronto. Some non-suspicious pediatric autopsies are performed at the Hospital for Sick Children in Toronto and the Children's Hospital of Eastern Ontario in Ottawa. Perinatal autopsies are also performed at Mount Sinai Hospital in Toronto. Occasionally, pediatric forensic cases from Northwestern Ontario are transferred to Winnipeg for autopsy by pathologists registered in Ontario.

Community hospitals

Pathologists working in 22 community hospitals support the work of the [OFPS](#) by conducting routine medico legal autopsies in their facilities on a fee-for-service basis.

Appendix D: Partners and working relationships

Our major partners are the [OCC](#), municipal and provincial police agencies, the Office of the Fire Marshal and Emergency Management, the Special Investigations Unit, the Centre of Forensic Sciences and the criminal justice system.

The [OFPS](#) also collaborates with universities on research, education and training. Furthermore, the [OFPS](#) provides services to organizations outside Ontario such as Canada's Department of National Defence.
