Health Canada Santé Canada

Annual Trends for the Adverse Reaction Case Reports of Health Products and Medical Device Problem Incidents to Health Canada (2008-2017)

Canada

Health Canada is the federal department responsible for helping the people of Canada maintain and improve their health. Health Canada is committed to improving the lives of all of Canada's people and to making this country's population among the healthiest in the world as measured by longevity, lifestyle and effective use of the public health care system.

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Tendances annuelles dans les déclarations d'effets indésirables des produits de santé et des incidents liés aux matériels médicaux à Santé Canada (2008-2017)

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Executive Summary

Health Canada is responsible for protecting the health of Canadians by monitoring and assessing the safety and effectiveness of health products on the Canadian market. Active post-market surveillance of drug adverse events and medical devices incidents is essential to ensure ongoing safety and effectiveness of these health products. Health Canada's primary monitoring mechanisms in this regard are (1) the Canada Vigilance (CV) System for the reporting of adverse drug reactions, (2) the Canada Vigilance - Medical Device Problem Reporting system (CV-MDS) for the reporting of medical device incidents and (3) the Canadian Medical Devices Sentinel Network (CMDSNet) program for the monitoring of medical device incidents in participating hospitals. Manufacturers and importers of prescription health products and medical devices are mandated by regulation to submit adverse event reports to the Health Canada via Canada Vigilance and CV-MDS. Health Canada also receives reports of adverse events, submitted voluntarily, from consumers and health professionals, and in the case of medical device incidents by hospitals participating in the Canadian Medical Devices Sentinel Network (CMDSNet) program. More information can be found on the Adverse Reaction and Medical Devices Incidents Reporting page. https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-reporting.html

The primary objective of this report is to provide the annual numbers and trends of adverse drug reaction case reports and medical device incident reports to Health Canada between 2008 and 2017. The data are based on reports submitted to Health Canada through Canada Vigilance, the MDS, and CMDSNet.

Multiple factors influence reporting. These include the length of time a drug or medical device is marketed, the market share, size, and sophistication of the sales force, publicity about adverse events and regulatory actions. In some cases, the reported clinical data is incomplete and there is no certainty that the health product caused the reported reaction. As such, quantitative comparisons of health product safety cannot be made from the data and the ability to compare and interpret patterns is limited. However, this report does provide a data snapshot that highlights serious and non-serious reports received for descriptive purposes.

Adverse Reaction (AR) Case Reporting through Canada Vigilance

- More than 64,000 unique domestic AR case reports were submitted to Canada Vigilance in 2017, with 6.5% of those adverse drug events resulting in patient deaths and nearly 20% resulting in patient hospitalisation.
- The total number of domestic AR cases reported to Health Canada has continued to increase annually from 15,551 in 2008 to 64,617 in 2017.
- Voluntary AR case reporting to Health Canada remained fairly consistent at approximately 7,000 cases reported annually during this time period.
- Both serious and non-serious AR case reports have increased over this time period.
- Health professionals consistently submitted the majority of AR case reports.
- Pharmaceuticals and biotechnology products were consistently the product types with the most AR case reports.

Mandatory Problem Reporting of Medical Device Incidents (MDI) through the Medical Devices System (MDS) and CMDS-Net

- More than 11,000 MDI reports were submitted to Health Canada in 2017.
- The total number of reports has continued to increase annually from 4,008 in 2008 to 11,307 in 2017.
- There has been a steady increase in the non-serious (30-day) mandatory MDI reports, while the serious (10-day) mandatory MDI reports have remained fairly constant since 2013 at approximately 2,000 reports per year.
- Health Canada consistently received the most mandatory MDI reports for medical devices in Classes II and III.
- The most common device medical specialty submitted to health Canada through MDI reporting is General Hospital.

- Since its inception in 2009, the number of health authorities reporting to Health Canada through CMDSNet, has increased from 10 to 16.
- Between 2009 and 2017, 1,476 MDI reports have been reported through CMDSNet

All marketed drugs and health products have benefits and risks. Although health products are carefully tested before they are licensed in Canada, some adverse reactions may become evident only after a product is in use by the general population. Tracking suspected adverse reactions through mandatory and voluntary reporting to Health Canada contributes to the ongoing collection of information that occurs once health products are on the market. This information includes: the identification of previously unrecognized rare or serious adverse reactions; domestic and international data regarding benefits, risks and effectiveness of drugs and health products. Health Canada uses the important information submitted on ARs and MDIs to ensure the risk/benefit ratio of health products in Canada remains favourable and available to inform action such as changes in product safety information, or other regulatory actions such as withdrawal of a product from the Canadian market.

Introduction

Adverse reactions are unintended occurrences associated with the use of a health product or a medical device which have caused or could have caused harm to individuals. In the case of health products, an adverse event can also include side effects to the health product. For medical devices, it can be near misses that may have led to serious injury or death if not for timely intervention. Notably, the occurrence of an adverse event does not necessarily mean there is something wrong with the health product or medical device. The event could be the result of incorrect off-label use of the health product, two properly functioning medical devices that were not intended to be used in combination, or to an underlying health or medical condition of the individual.

As mandated by the *Food and Drug Regulations*[1], the *Natural Health Products Regulations*[2], the *Blood Regulations*[3] ,the *Medical Device Regulations*[4] and the *Safety of Human Cells, Tissues and Organs for Transplantation Regulations*[5], regulated parties are required to submit to Health Canada reports of domestic and foreign adverse reactions including unusual failure in efficacy for new drugs and incident reports on medical devices. Adverse reactions for health products and medical devices cases are also submitted, on a voluntary basis, by health professionals and consumers directly to Health Canada or via regulated parties. In Canada, the Canada Vigilance[6] database contains adverse reaction case reports associated with health products including medication errors and product quality complaints resulting in adverse reactions. Health Canada's Canada Vigilance - Medical Device System (CV-MDS) contains information on problem incidents associated with medical devices ranging from band aids to pace-makers.

The Canadian Medical Devices Sentinel Network (CMDSNet) is an active surveillance program that comprises of acute or community-based healthcare facilities within Canada who report high quality data to Health Canada about adverse events associated with medical devices.

Canada Vigilance, the CV-MDS, and CMDSNet are useful tools for post-market surveillance and are used by Health Canada to monitor potential safety concerns that might be related to a marketed health product or medical device, evaluating a manufacturer's compliance to reporting regulations and responding to outside requests for information. Reported adverse events in these databases are evaluated by scientific reviewers and if a potential safety concern is identified, further evaluation is performed. This may include conducting studies using other large databases, systematic literature reviews, liaising with international regulatory agencies, and checking product monographs and labelling information. Following a comprehensive evaluation, Health Canada may take regulatory action(s) to ensure product safety and protect the public health, including adding warnings, precautions and adverse reaction information to the Product Information and Consumer Medicine Information, restricting the use of the health product or medical device, communicating new safety information to the public, or, in rare cases, removing a health product or medical device from the market. Further information is available on the MedEffect™ Canada Web site[7].

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[1] *Food and Drug Regulations* found at http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._870/index.html

[2] *Natural Health Product Regulations* found at https://laws-lois.justice.gc.ca/eng/regulations/SOR-2003-196/

[3] *Blood Regulations* found at https://www.canada.ca/en/health-canada/services/drugs-health-products/biologics-radiopharmaceuticals-genetic-therapies/applications-submissions/guidance-documents/blood-regulations.html

[4] *Medical Device Regulations* found at http://laws-lois.justice.gc.ca/eng/regulations/SOR-98-282/page-6.html

[5] *Safety of Human Cells, Tissues and Organs for Transplantation Regulations* found at http://laws-lois.justice.gc.ca/eng/regulations/SOR-2007-118/

[6] Canada Vigilance database found at https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/canada-vigilance-program.html

[7] MedEffect™ Canada Web site found at https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada.html

This website also provides access to advisories, recalls, safety reviews and the Health Product InfoWatch publication[8].

The purpose of this report is to provide a descriptive analysis of the types of adverse reactions, including case reports of health products and medical device incidents, that have been reported to Health Canada between 2008 and 2017. The data are presented in three sections.

- Section 1 includes information on trends of adverse reaction case reports to Health Canada through Canada Vigilance between 2008 and 2017. A more detailed annual breakdown of the data is also presented for the period from 2013 – 2017.
- Section 2 includes trends on medical device incidents reported to Health Canada between 2008 and 2017. A more detailed annual breakdown of the data is presented for the period from 2013 – 2017.
- Section 3 presents data from CMDSNet, Health Canada's active surveillance program on medical device incidents, between its inception in 2009 and 2017.

[8] More information about Health Product InfoWatch publication available at https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/health-product-infowatch.html

Section 1.0 Adverse Reaction (AR) Case Reporting Through Canada Vigilance

AR cases for the following health products marketed in Canada are reported through Canada Vigilance: prescription and non-prescription medications; natural health products; biologics (includes biotechnology products, vaccines, fractionated blood products, human blood and blood components products, as well as human cells, tissues and organs); radiopharmaceuticals; and disinfectants and sanitizers with disinfectant claims.

AR cases frequently contain multiple reported reactions which are coded in the Canada Vigilance database using the Medical Dictionary for Regulatory Activities[9] (MedDRA). MedDRA uses a hierarchy in order to group similar conditions or reactions together.

1.1 Trends in AR Reporting (2008-2017)

Since 2008, there has been a continuous increase in AR case reporting to Health Canada from 15,551 cases in 2008 to 64,617 cases in 2017 (Figure 1).

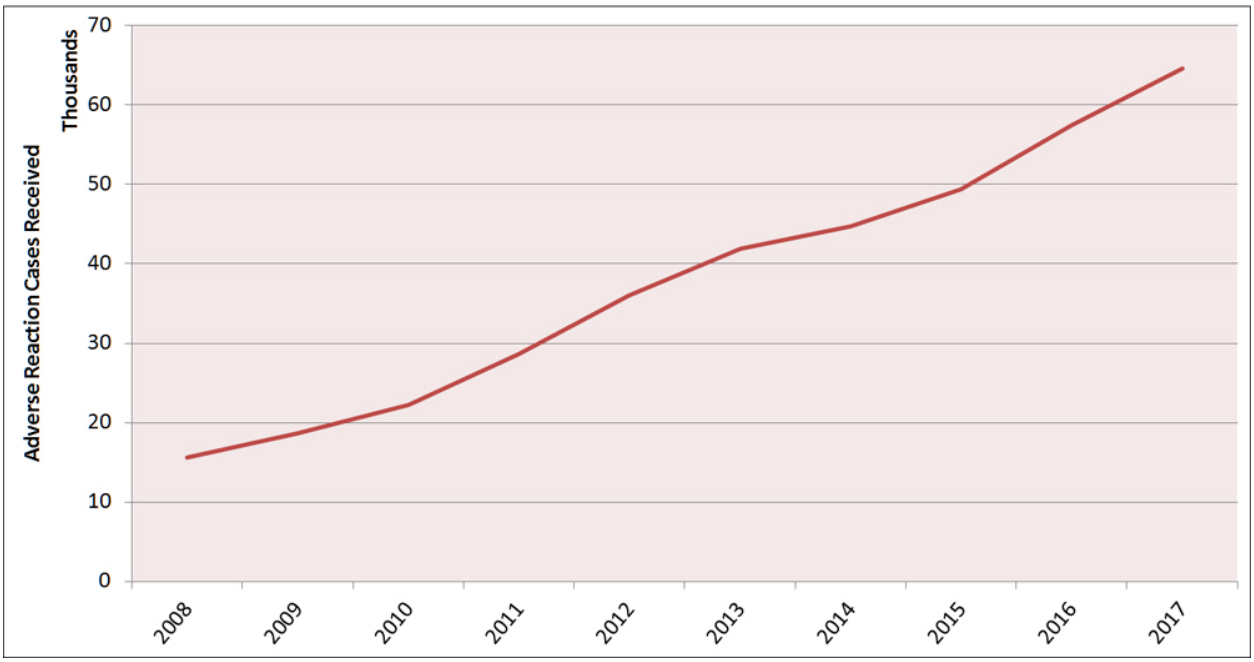


Figure 1: Number of Domestic Adverse Reaction Cases for Marketed Health Products from 2008 to 2017

1.2 Mandatory and Voluntary AR Case Reports

AR cases reports are submitted voluntarily by health professionals and consumers either directly to Health Canada or via regulated parties as mandated by the relevant regulations. Over the years, there has been a significant increase in the number of mandatory AR case reports submitted to Health Canada from 10,124 cases in 2008 to 56,983 cases in 2017. In contrast, the number of voluntary case reports has remained relatively constant (between approximately 5,400 cases and 8,600 cases) during this time period (Figure 2).

[9] More information about MedDRA available at https://www.meddra.org/

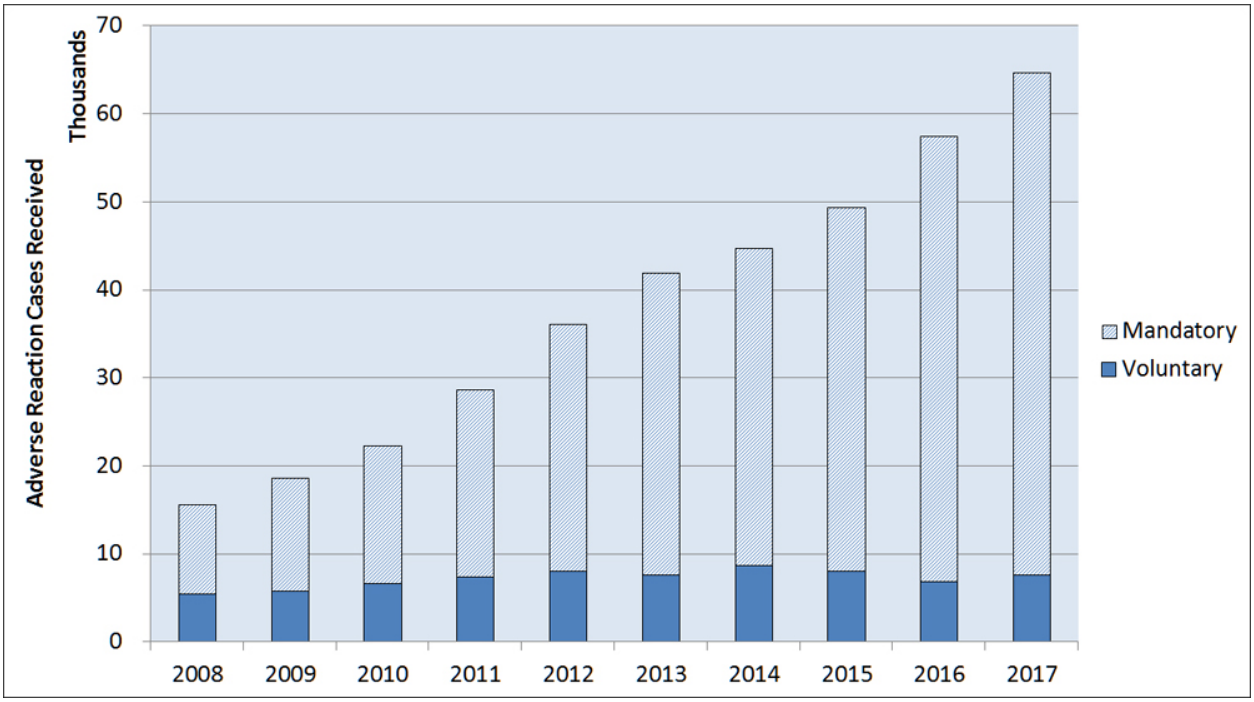


Figure 2: Domestic Mandatory and Voluntary Adverse Reaction Case Reporting from 2008 to 2017

1.3 Seriousness of Domestic AR Case Reports

Health Canada receives both serious and non-serious AR case reports for a variety of health products with differing timelines for reporting. For example, as per the *Food and Drug Regulations*.[10], regulated parties are required to report to Health Canada, serious domestic ARs involving marketed health products and natural health products within 15 days after receiving or becoming aware of the information.

Health Canada defines a serious AR as "a noxious and unintended response to a drug, which occurs at any dose and requires in-patient hospitalization or prolongation of existing hospitalization, causes congenital malformation, results in persistent or significant disability or incapacity, is life-threatening or results in death. Important medical events that may not be immediately life-threatening or result in death or hospitalization, but may jeopardize the patient or may require intervention to prevent one of the outcomes listed above, may also be considered serious."

While there has been an increase in both serious and non-serious cases reported to Health Canada, there has been a significantly higher increase in the number of serious cases reported (from 10,717 in 2008 to 44,910 in 2017 for serious cases vs 4,834 in 2008 to 19,707 in 2017 for non-serious cases, Figure 3).

[10] *Food and Drug* Regulations found at http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._870/index.html

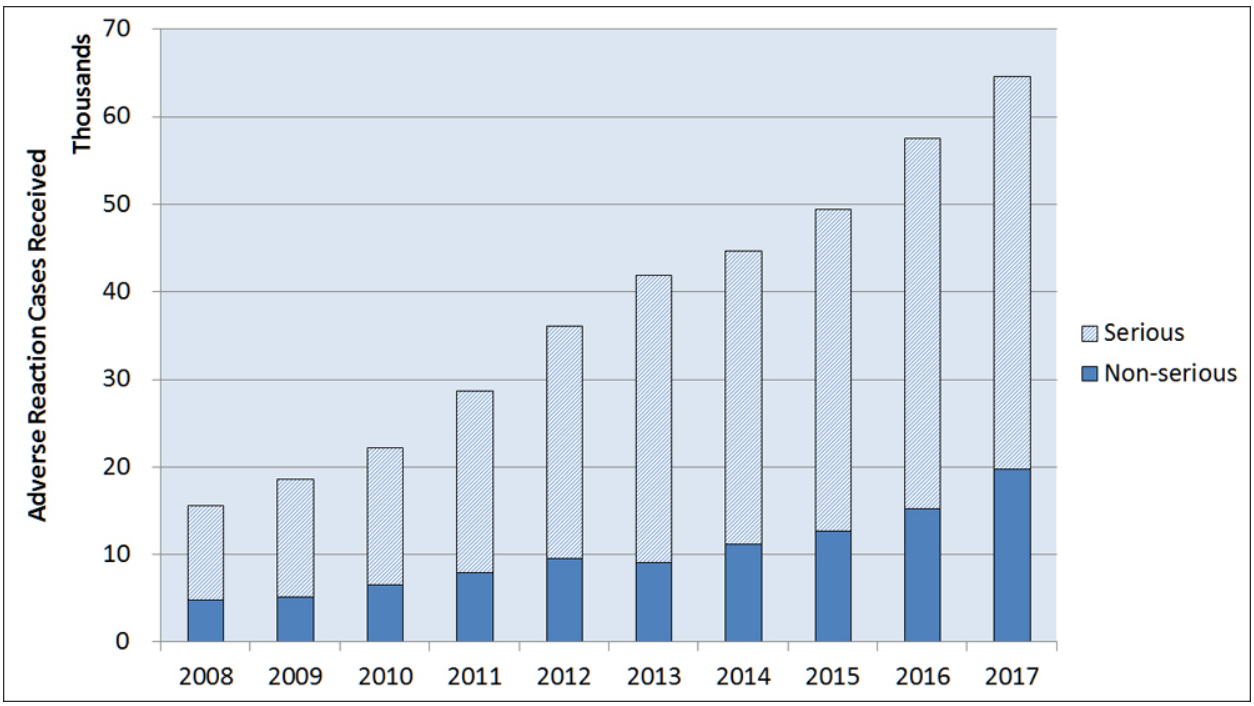


Figure 3: Seriousness of Domestic Adverse Reaction Case Reports Received from 2008 to 2017

1.4 Domestic AR Cases Reported to Health Canada, 2017

In 2017, Health Canada received 64,617 domestic AR case reports and approximately 500,000 foreign AR case reports. Of the domestic cases, 88% were received via mandatory reporting from regulated parties. Additionally, 70% of the domestic case reports received were identified as serious by the reporter.

1.4.1 Reporters of Domestic Mandatory and Voluntary AR Case Reports, 2017

The distribution of domestic AR case reporters is shown in Figure 4. These AR case reports were either voluntarily submitted to Health Canada directly by the reporters or the reporters voluntarily submitted the case to a regulated party who are mandated by the relevant regulations to report to Health Canada. At 69%, health professionals, which includes physicians, nurses, and pharmacists, submitted the most AR case reports in 2017.

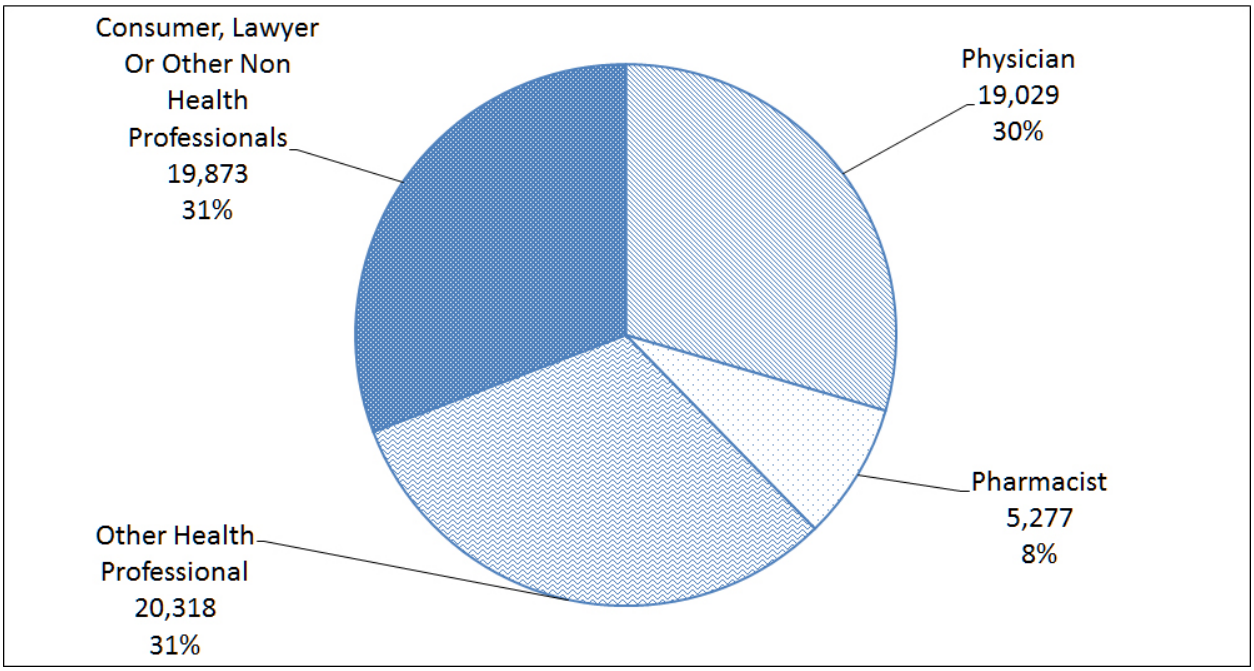


Figure 4: Domestic Adverse Reactions Case Reports by Reporter Type Received for 2017

1.4.2 Domestic AR Case Reports by Product Type, 2017

In 2017, Health Canada received domestic AR case reports for four distinct product types: pharmaceuticals, radiopharmaceuticals, biologics, and natural health products. The largest amount of case reports were received for pharmaceuticals (60%) followed by biologics (39%, Figure 5). A further subcategorization of the AR case reports due to biologics is also presented in Figure 5.

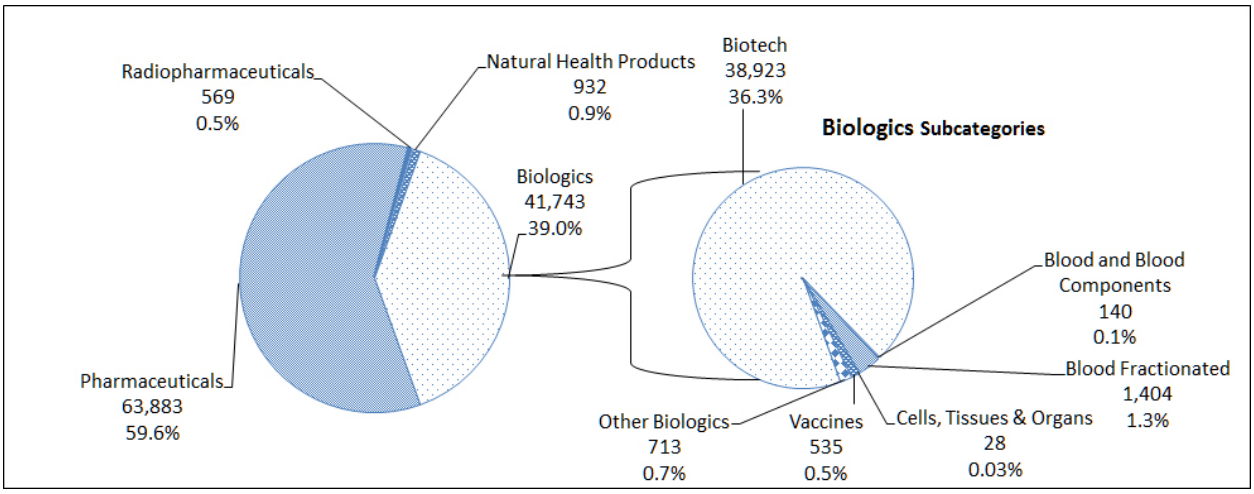


Figure 5: Type of Suspect Products in Domestic Adverse Reaction Case Reports Received by Health Canada in 2017

1.4.3 Anatomical Therapeutic Chemical (ATC) System Groups from Domestic AR Case Reports, 2017

The ATC classification system[11] is a tool for drug utilization research. Table 1 outlines the ten ATC groups most represented by domestically reported suspect products.

Table 1: The 10 Most Common ATC Groups in 2017

10 Most Common ATC Groups	Number of Reported Suspect Products	% of Reported Suspect Products
Immunosuppressants (L04)	42,089	39.2%
Antineoplastic Agents (L01)	16,748	15.6%
Drugs For Obstructive Airway Diseases (R03)	3,018	2.8%
Psycholeptics (N05)	2,839	2.7%
Antidiarreal, intestinal, antiinflammatory / antiinfective agents (A07)	2,694	2.5%
Antiinflammatory And Antirheumatic Products (M01)	2,678	2.5%
Drugs For Treatment Of Bone Diseases (M05)	2,457	2.3%
Corticosteroids For Systemic Use (H02)	2,404	2.2%
Antiprotozoals (P01)	2,085	1.9%
Analgesics (N02)	1,874	1.8%

1.4.4 Domestic AR Case Reports by System Organ Class, 2017

A breakdown, using Medical Dictionary for Regulatory Activities[12] (MedDRA) coding, of the broadest grouping, called the System Organ Class, is shown in Table 2. This System Organ Class includes disorders that affect several body systems or sites (e.g., drug ineffective, fatigue, fever, edema, pain, reactions at the administration site). The most commonly reported AR case reports were general disorders and administration site conditions.

[11] More information about ATC classification system available at https://www.whocc.no/atc_ddd_index/

[12] More information about MedDRA available at https://www.meddra.org/

Table 2: Number of Adverse Reaction Case Reports for the 10 Most Common System Organ Classes in 2017

10 Most Common System Organ Classes	Number of Reported Adverse Reactions	% of Reported Adverse Reactions
General disorders and administration site conditions	56,625	22.8%
Gastrointestinal disorders	25,341	10.2%
Infections and infestations	20,560	8.3%
Musculoskeletal and connective tissue disorders	19,923	8.0%
Investigations	18,548	7.5%
Injury, poisoning and procedural complications	16,541	6.7%
Nervous system disorders	15,758	6.3%
Respiratory, thoracic and mediastinal disorders	13,765	5.5%
Skin and subcutaneous tissue disorders	13,591	5.5%
Psychiatric disorders	8,602	3.5%

1.5 Domestic AR Cases Reported to Health Canada, 2016

In 2016, Health Canada received 57,485 domestic AR case reports and approximately 500,000 foreign AR case reports. Of the domestic case reports, 88% were received via mandatory reporting from regulated parties. Additionally, 74% of domestic case reports received were serious in nature.

1.5.1 Reporters of Domestic Mandatory and Voluntary AR Case Reports, 2016

The distribution of domestic AR case reporters is shown in Figure 6. These AR case reports were either voluntarily submitted to Health Canada directly by the reporters or the reporters voluntarily submitted the case to a regulated party who are mandated by the relevant regulations to report to Health Canada. At 73%, health professionals, which includes physicians, nurses, and pharmacists submitted the most AR case reports in 2016.

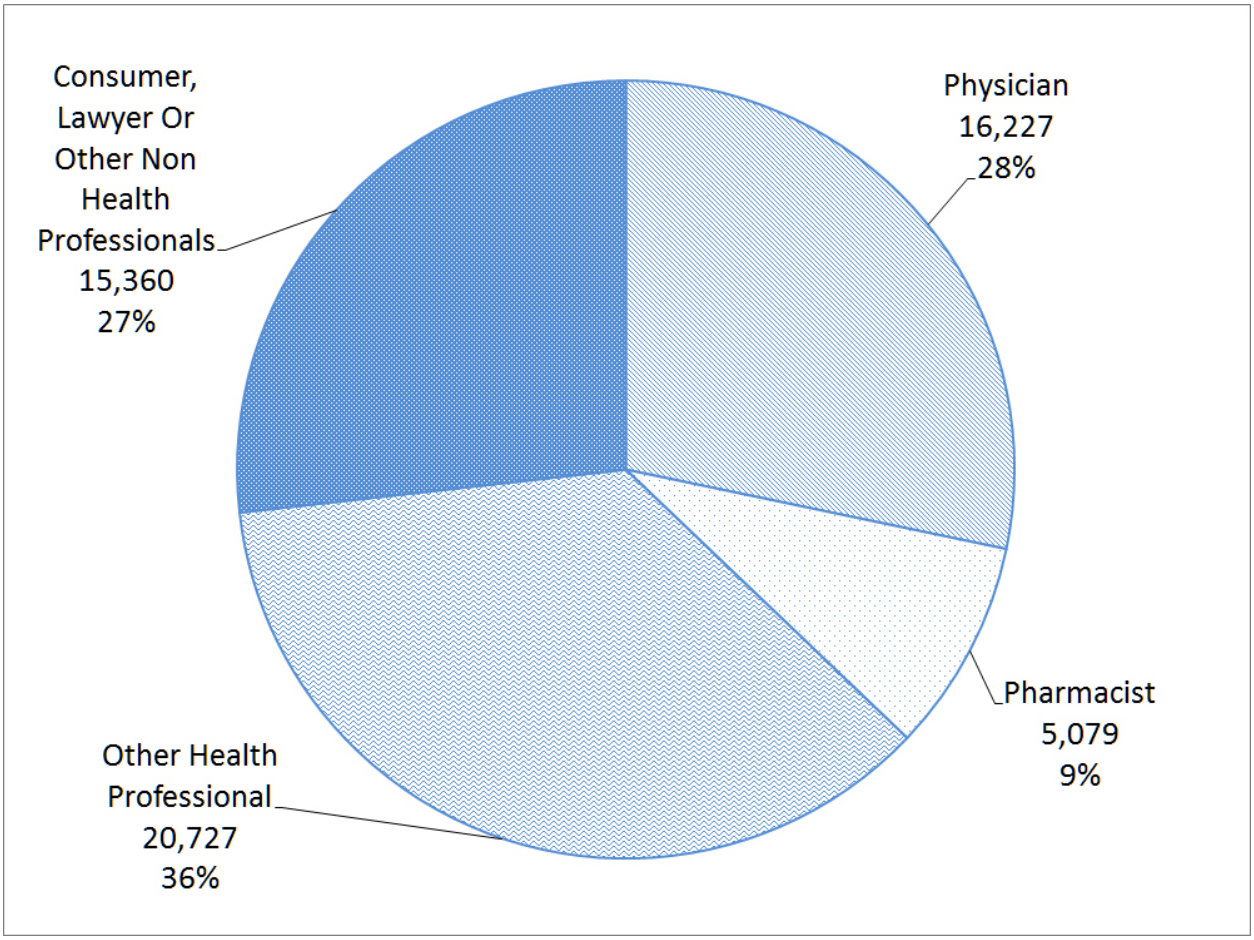


Figure 6: Adverse Reactions Case Reports by Reporter Type for 2016

1.5.2 Domestic AR Case Reports by Product Type, 2016

In 2016, the largest amount of AR case reports received by Health Canada were for pharmaceuticals (59%) followed by biologics (40%, Figure 7). A further subcategorization of the AR case reports due to biologics is also presented in Figure 7.

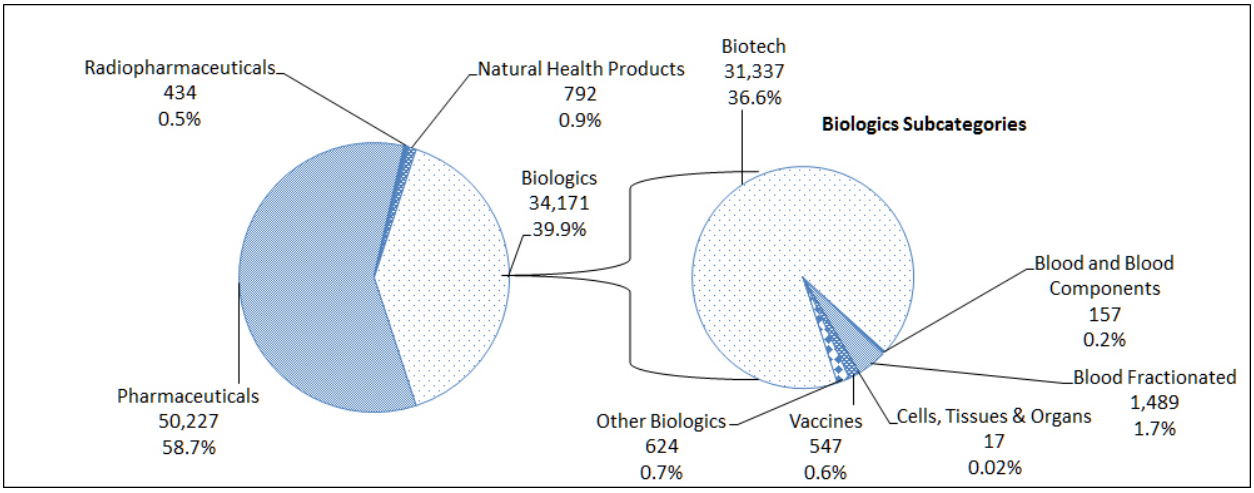


Figure 7: Type of Suspect Products in Domestic Adverse Reaction Case Reports Received by Health Canada in 2016

1.5.3 Anatomical Therapeutic Chemical (ATC) System Groups From Domestic AR Case Reports, 2016

The ATC classification system[13] is a tool for drug utilization research. Table 3 outlines the ten ATC groups most represented by domestically reported suspect products.

Table 3: The 10 Most Common ATC Groups in 2016

10 Most Common ATC Groups	Number of Reported Suspect Products	% of Reported Suspect Products
Immunosuppressants (L04)	32,811	38.3%
Antineoplastic Agents (L01)	12,153	14.2%
Psycholeptics (N05)	2,356	2.8%
Drugs For Obstructive Airway Diseases (R03)	2,311	2.7%
Drugs For Treatment Of Bone Diseases (M05)	2,305	2.7%
Antiviralsfor Systemic Use (J05)	1,915	2.2%
Antiinflammatory And Antirheumatic Products (M01)	1,835	2.1%
Analgesics (N02)	1,623	1.9%
Psychoanaleptics (N06)	1,600	1.9%
Corticosteroids For Systemic Use (H02)	1,537	1.8%

1.5.4 Domestic AR Case Reports by System Organ Class, 2016

A breakdown, using Medical Dictionary for Regulatory Activities[14] (MedDRA) coding, of the broadest grouping, called the System Organ Class, is shown in Table 4. The most commonly reported AR case reports were general disorders and administration site conditions.

[13] More information about ATC classification system available at https://www.whocc.no/atc_ddd_index/

[14] More information about MedDRA available at https://www.meddra.org/

Table 4: Number of Adverse Reaction Case Reports for the 10 Most Common System Organ Classes in 2016

10 Most Common System Organ Classes	Number of Reported Adverse Reactions	% of Reported Adverse Reactions
General disorders and administration site conditions	47,874	20.8%
Gastrointestinal disorders	26,131	11.3%
Injury, poisoning and procedural complications	19,755	8.6%
Investigations	18,466	8.0%
Infections and infestations	18,292	7.9%
Musculoskeletal and connective tissue disorders	16,716	7.3%
Nervous system disorders	14,539	6.3%
Respiratory, thoracic and mediastinal disorders	13,059	5.7%
Skin and subcutaneous tissue disorders	12,513	5.4%
Psychiatric disorders	7,374	3.2%

1.6 Domestic AR Cases Reported to Health Canada, 2015

In 2015, Health Canada received 49,374 domestic AR case reports and approximately 450,000 foreign AR case reports. Of the domestic case reports, 84% were received via mandatory reporting from regulated parties. Additionally, 74% of domestic case reports received were identified as serious by the reporter.

1.6.1 Reporters of Domestic Mandatory and Voluntary AR Case Reports, 2015

The distribution of domestic AR case reporters is shown in Figure 8. These AR case reports were either voluntarily submitted to Health Canada directly by the reporters or the reporters voluntarily submitted the case report to a regulated party who are mandated as per the relevant regulations to report to Health Canada. At 73%, health professionals, which includes physicians, nurses, and pharmacists submitted the most AR case reports in 2015.

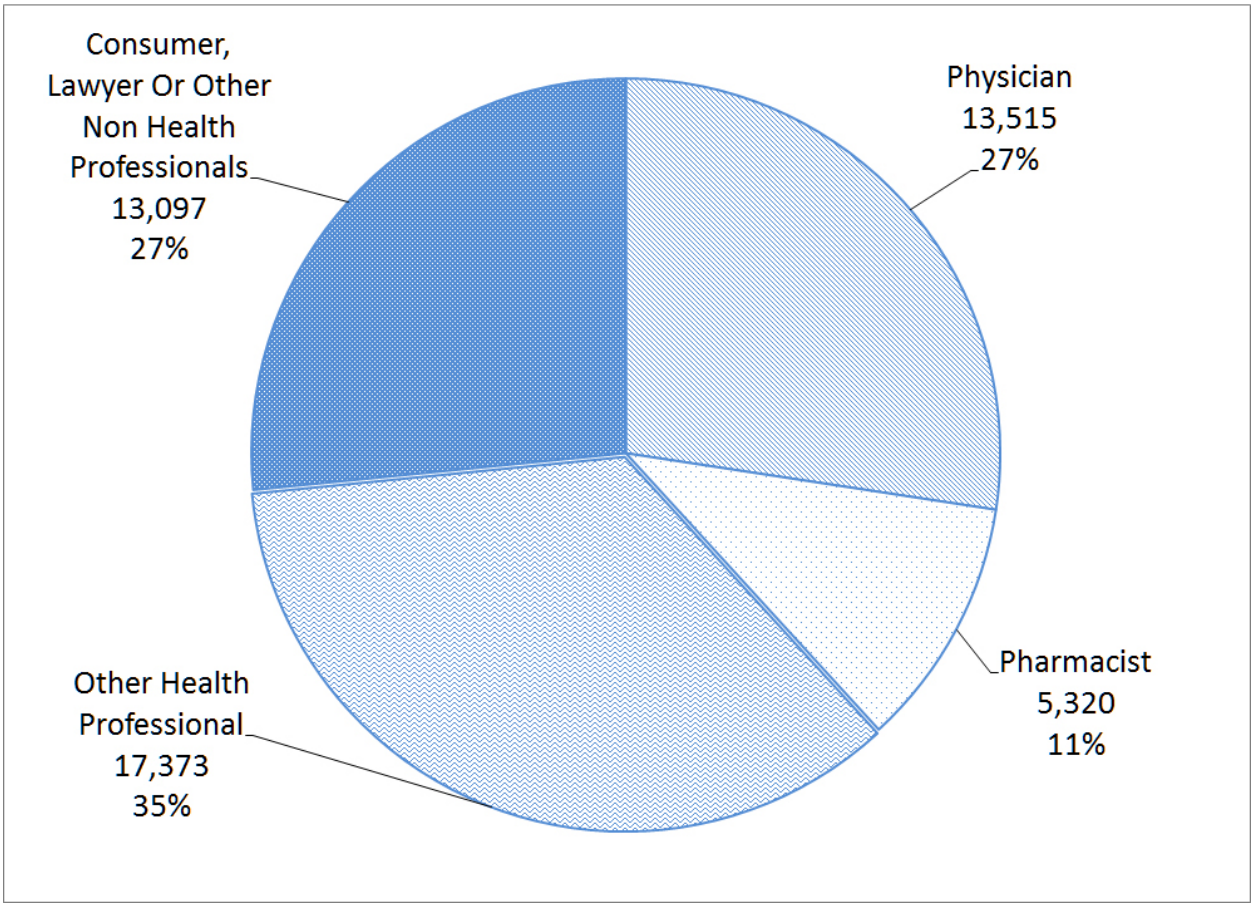


Figure 8: Domestic Adverse Reactions Case Reports by Reporter Type for 2015

1.6.2 Domestic AR Case Reports by Product Type, 2015

In 2015, the largest amount of AR case reports received by Health Canada were for pharmaceuticals (62%) followed by biologics (36%, Figure 9). A further subcategorization of the AR case reports due to biologics is also presented in Figure 9.

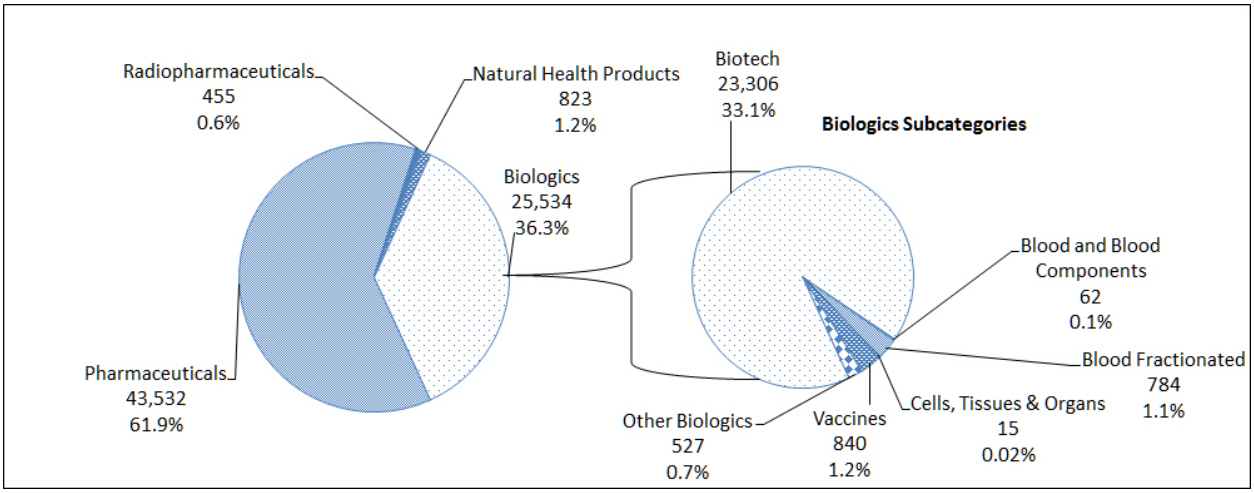


Figure 9: Type of Suspect Products in Domestic Adverse Reaction Case Reports Received by Health Canada in 2015

1.6.3 Anatomical Therapeutic Chemical (ATC) System Groups from Domestic AR Case Reports, 2015

The ATC classification system[15] is a tool for drug utilization research. Table 5 outlines the ten ATC groups most represented by domestically reported suspect products.

Table 5: The 10 Most Common ATC Groups in 2015

10 Most Common ATC Groups	Number of Reported Suspect Products	% of Reported Suspect Products
Immunosuppressants (L04)	21,923	31.1%
Antineoplastic Agents (L01)	9,803	13.9%
Psycholeptics (N05)	2,575	3.7%
Analgesics (N02)	2,393	3.4%
Drugs For Treatment Of Bone Diseases (M05)	2,287	3.3%
Drugs For Obstructive Airway Diseases (R03)	1,919	2.7%
Psychoanaleptics (N06)	1,826	2.6%
Antiviralsfor Systemic Use (J05)	1,767	2.5%
Antithrombotic Agents (B01)	1,624	2.3%
Antibacterials For Systemic Use (J01)	1,612	2.3%

1.6.4 Domestic AR Case Reports by System Organ Class, 2015

A breakdown, using Medical Dictionary for Regulatory Activities[16] (MedDRA) coding, of the broadest grouping, called the System Organ Class, is shown in Table 6. The most commonly reported AR case reports were general disorders and administration site conditions.

[15] More information about ATC classification system available at https://www.whocc.no/atc_ddd_index/

[16] More information about MedDRA available at https://www.meddra.org/

Table 6: Number of Adverse Reaction Case Reports for the 10 Most Common System Organ Classes in 2015

10 Most Common System Organ Classes	Number of Reported Adverse Reactions	% of Reported Adverse Reactions
General disorders and administration site conditions	36,951	19.7%
Gastrointestinal disorders	19,100	10.2%
Investigations	16,879	9.0%
Infections and infestations	14,934	8.0%
Nervous system disorders	13,498	7.2%
Musculoskeletal and connective tissue disorders	12,968	6.9%
Respiratory, thoracic and mediastinal disorders	11,673	6.2%
Injury, poisoning and procedural complications	11,401	6.1%
Skin and subcutaneous tissue disorders	9,956	5.3%
Psychiatric disorders	7,951	4.2%

1.7 Domestic AR Cases Reported to Health Canada, 2014

In 2014, Health Canada received 44,695 domestic AR case reports and approximately 430,000 foreign AR case reports. Of the domestic case reports, 81% were received via mandatory reporting from regulated parties. Additionally, 75% of domestic case reports received were identified as serious by the reporter.

1.7.1 Reporters of Domestic Mandatory and Voluntary AR Case Reports, 2014

The distribution of domestic AR case reporters is shown in Figure 10. These AR case reports were either voluntarily submitted to Health Canada directly by the reporters or the reporters voluntarily submitted the case to a regulated party who are mandated by the relevant regulations to report to Health Canada. At 70%, health professionals, which includes physicians, nurses, and pharmacists, submitted the most AR case reports in 2014.

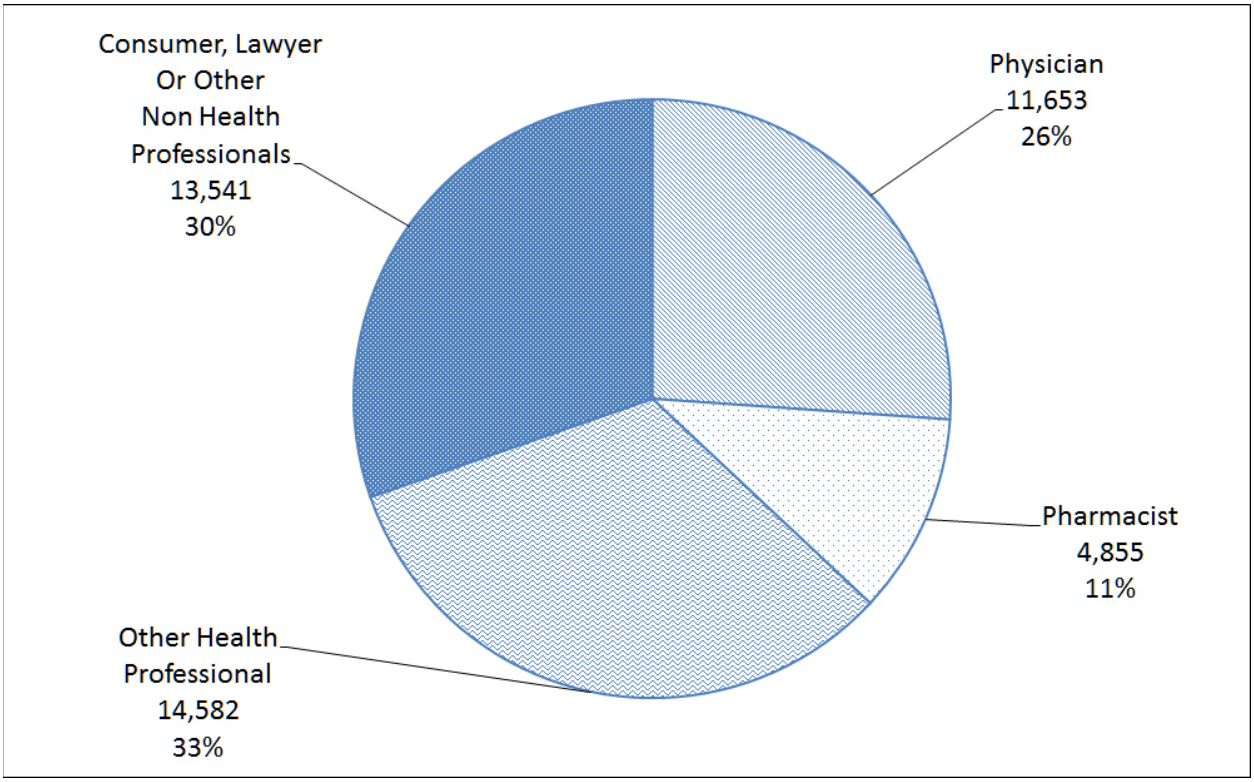


Figure 10: Domestic Adverse Reactions Case Reports by Reporter Type for 2014

1.7.2 Domestic AR Case Reports by Product Type, 2014

In 2014, the largest amount of case reports received by Health Canada were for pharmaceuticals (59%) followed by biologics (38%, Figure 11). A further subcategorization of the AR case reports due to biologics is also presented in Figure 11.

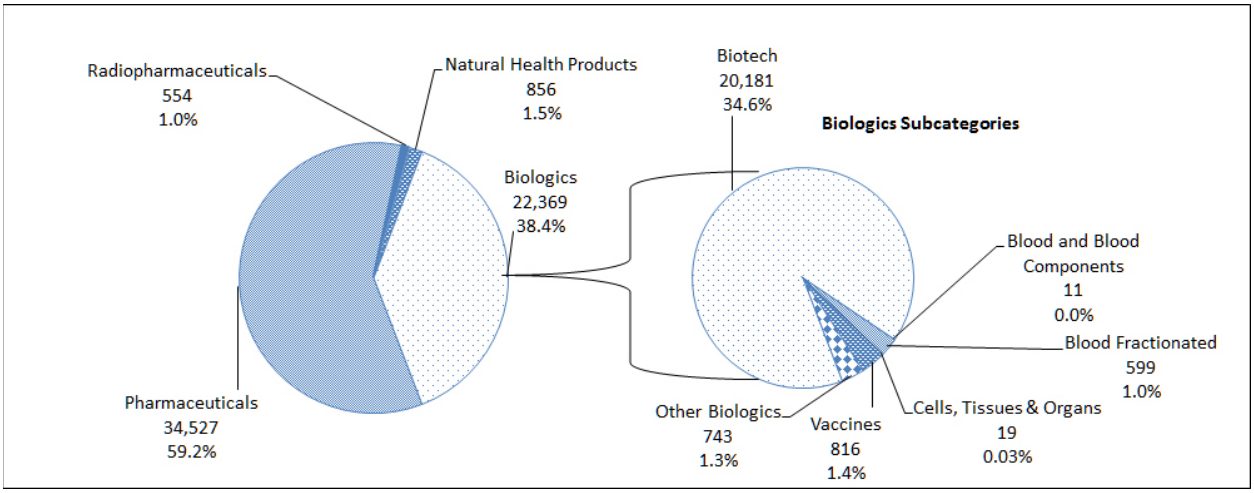


Figure 11: Type of Suspect Products in Domestic Adverse Reaction Case Reports Received by Health Canada in 2014

1.7.3 Anatomical Therapeutic Chemical (ATC) System Groups from Domestic AR Case Reports, 2014

The ATC classification system[17] is a tool for drug utilization research. Table 7 outlines the ten ATC groups most represented by domestically reported suspect products.

Table 7: The 10 Most Common ATC Groups in 2014

10 Most Common ATC Groups	Number of Reported Suspect Products	% of Reported Suspect Products
Immunosuppressants (L04)	15,992	27.4%
Antineoplastic Agents (L01)	6,652	11.4%
Blood Substitutes And Perfusion Solns. (B05)	2,393	4.1%
Drugs For Treatment Of Bone Diseases (M05)	2,095	3.6%
Psycholeptics (N05)	2,080	3.6%
Analgesics (N02)	1,966	3.4%
Psychoanaleptics (N06)	1,669	2.9%
Antibacterials For Systemic Use (J01)	1,585	2.7%
Antithrombotic Agents (B01)	1,398	2.4%
Drugs For Obstructive Airway Diseases (R03)	1,392	2.4%

1.7.4 Domestic AR Case Reports by System Organ Class, 2014

A breakdown, using Medical Dictionary for Regulatory Activities[18] (MedDRA) coding, of the broadest grouping, called the System Organ Class, is shown in Table 8. The most commonly reported AR case reports were general disorders and administration site conditions.

Table 8: Number of Adverse Reaction Case Reports for the 10 Most Common System Organ Classes in 2014

10 Most Common System Organ Classes	Number of Reported Adverse Reactions	% of Reported Adverse Reactions
General disorders and administration site conditions	29,045	18.2%
Gastrointestinal disorders	17,015	10.7%
Investigations	12,778	8.0%
Infections and infestations	12,595	7.9%
Nervous system disorders	12,405	7.8%
Injury, poisoning and procedural complications	10,323	6.5%
Musculoskeletal and connective tissue disorders	9,763	6.1%
Respiratory, thoracic and mediastinal disorders	8,944	5.6%
Skin and subcutaneous tissue disorders	8,462	5.3%
Psychiatric disorders	6,718	4.2%

[17] More information about ATC classification system available at https://www.whocc.no/atc_ddd_index/

[18] More information about MedDRA available at https://www.meddra.org/

1.8 Domestic AR Cases Reported to Health Canada, 2013

In 2013, Health Canada received 41,872 domestic AR case reports and approximately 400,000 foreign AR case reports. Of the domestic case reports, 82% were received via mandatory reporting from regulated parties. Additionally, 78% of domestic case reports received were identified as serious by the reporter.

1.8.1 Reporters of Domestic Mandatory and Voluntary AR Case Reports, 2013

The distribution of domestic AR case reporters is shown in Figure 12. These AR case reports were either voluntarily submitted to Health Canada directly by the reporters or the reporters voluntarily submitted the case to a regulated party who are mandated by the relevant regulations to report to Health Canada. At 67%, health professionals, which includes physicians, nurses, and pharmacists, submitted the most AR case reports in 2013.

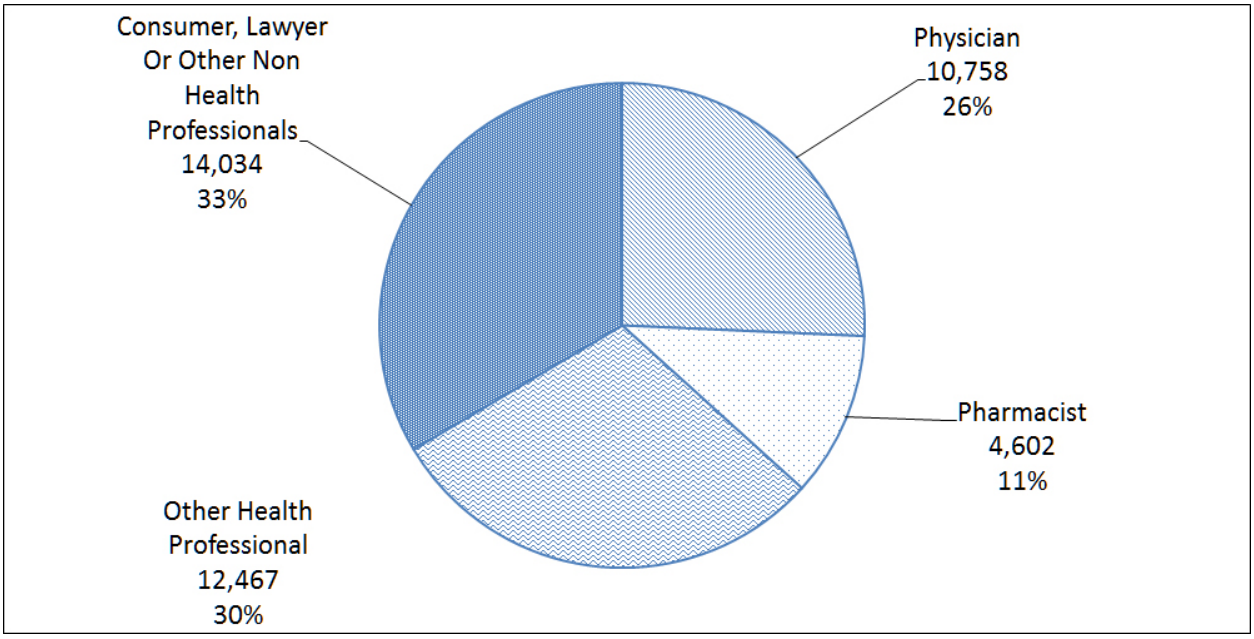


Figure 12: Domestic Adverse Reactions Case Reports by Reporter Type for 2013

1.8.2 Domestic AR Case Reports by Product Type, 2013

In 2013, the largest amount of case reports received by Health Canada were for pharmaceuticals (60%) followed by biologics (37%, Figure 13). A further subcategorization of the AR case reports due to biologics is also presented in Figure 13.

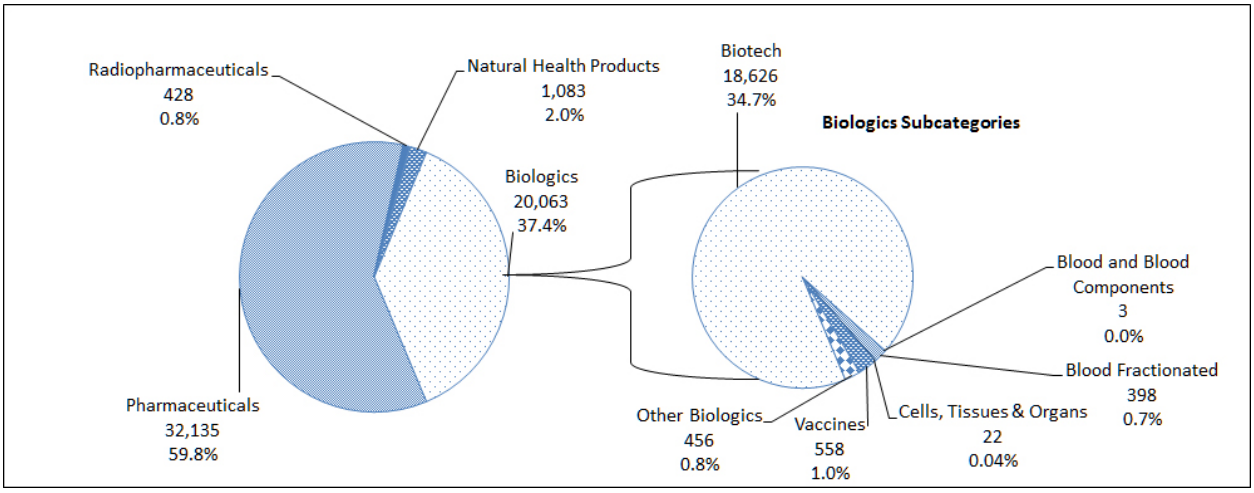


Figure 13: Type of Suspect Products in Domestic Adverse Reaction Case Reports Received by Health Canada in 2013

1.8.3 Anatomical Therapeutic Chemical (ATC) System Groups from Domestic AR Case Reports, 2013

The ATC classification system[19] is a tool for drug utilization research. Table 9 outlines the ten ATC groups most represented by domestically reported suspect products.

Table 9: The 10 Most Common ATC Groups in 2013

10 Most Common ATC Groups	Number of Reported Suspect Products	% of Reported Suspect Products
Immunosuppressants (L04)	14,114	26.2%
Antineoplastic Agents (L01)	7,223	13.4%
Blood Substitutes And Perfusion Solns. (B05)	2,944	5.5%
Drugs For Treatment Of Bone Diseases (M05)	2,066	3.8%
Psycholeptics (N05)	1,875	3.5%
Analgesics (N02)	1,751	3.3%
Antithrombotic Agents (B01)	1,554	2.9%
Psychoanaleptics (N06)	1,327	2.5%
Drugs For Obstructive Airway Diseases (R03)	1,257	2.3%
Immunomodulators/Stimulants (L03)	1,254	2.3%

1.8.4 Domestic AR Case Reports by System Organ Class, 2013

A breakdown, using Medical Dictionary for Regulatory Activities[20] (MedDRA) coding, of the broadest grouping, called the System Organ Class, is shown in Table 10. The most commonly reported ARs were general disorders and administration site conditions.

[19] More information about ATC classification system available at https://www.whocc.no/atc_ddd_index/

[20] More information about MedDRA available at https://www.meddra.org/

Table 10: Number of Adverse Reaction Case Reports for the 10 Most Common System Organ Classes in 2013

10 Most Common System Organ Classes	Number of Reported Adverse Reactions	% of Reported Adverse Reactions
General disorders and administration site conditions	26,303	18.0%
Gastrointestinal disorders	14,820	10.1%
Investigations	12,738	8.7%
Infections and infestations	11,735	8.0%
Nervous system disorders	11,546	7.9%
Musculoskeletal and connective tissue disorders	9,402	6.4%
Injury, poisoning and procedural complications	8,859	6.1%
Respiratory, thoracic and mediastinal disorders	8,639	5.9%
Skin and subcutaneous tissue disorders	7,552	5.2%
Psychiatric disorders	6,598	4.5%

Section 2.0: Mandatory Problem Reports for Medical Device Incidents (MDI) through Canada Vigilance – Medical Devices System (CV-MDS)

For medical devices, a mandatory problem report for an incident is required by the manufacturer and importer concerning any incident that comes to their attention occurring inside or outside Canada and involving a medical device that is sold in Canada. Domestic mandatory reports include incidents of a failure of the device or a deterioration in its effectiveness, or any inadequacy in its labelling or in its directions for use, and/or if the incident has led to the death of or a serious deterioration in the state of health of a patient, user or other person, or could do so if it were to recur.

Medical device problem reports on incidents frequently contain multiple reported problems with a device. These problems are coded into the Medical Device System (MDS) database by Health Canada according to a structured coding system. Recent work by the International Medical Device Regulators Forum[21] (IMDRF) has proposed a three level hierarchical terminology for Medical Device Problem terms/codes. The first level divides problems into 27 broad categories. Health Canada has conducted an exercise to map the codes used in the MDS to these 27 categories.

Medical devices are categorised based on the risk associated with their use, with Class I devices representing the lowest potential risk (e.g., mercury thermometers) and Class IV devices presenting the greatest potential risk (e.g., certain pacemakers/defibrillators). Prior to selling a device in Canada, manufacturers of Class II, III and IV devices must obtain a Medical Device Licence. Health Canada, maintains a database of all licensed Class II, III, and IV medical devices offered for sale in Canada. This Medical Devices Active Licence Listing[22] (MDALL) database is made searchable and available online for query. Class I medical devices do not require a medical device licence and are monitored by Health Canada through Establishment Licensing.

2.1 Trends in Mandatory MDI Reports (2008 – 2017)

Since 2008, there has been an increase in mandatory MDI reporting to Health Canada, both from domestic and foreign sources, as demonstrated in Figure 14 below. For the past 10 years, the number of MDIs reported continues its upward trend as Health Canada received 14% more domestic incidents per year on average; domestic incidents have increased from 4,008 in 2008 to 11,307 in 2017.

[21] More information about IMDRF found at http://www.imdrf.org/

[22] More information about MDALL found at https://www.canada.ca/en/health-canada/services/drugs-health-products/medical-devices/licences/medical-devices-active-licence-listing.html

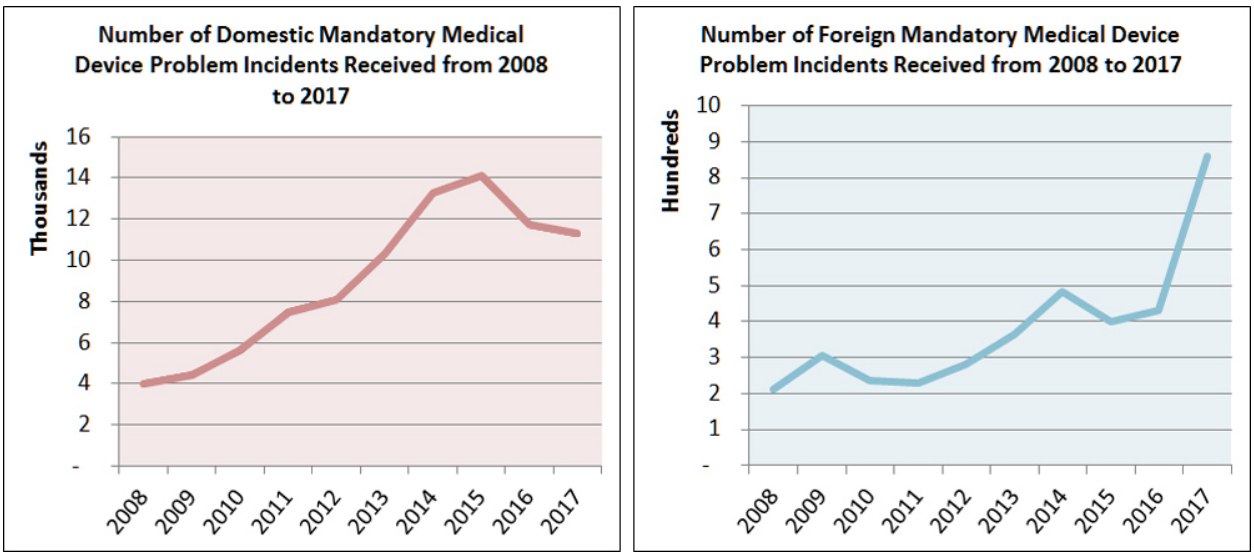


Figure 14: Number of Reported Domestic and Foreign Medical Device Incidents from 2008 to 2017

Mandatory problem reports for foreign incidents are only required when the incident meets the same conditions as for a domestic incident, but in addition the incident must have resulted in either the manufacturer's intent to undertake a corrective action or the foreign regulatory body requiring that the manufacturer undertakes a corrective action. As this is a more restrictive set of criteria, the number of foreign mandatory reports is much lower than the number of domestic reports.

2.2 Seriousness of MDI Reports

The reporting window after awareness of an incident varies depending on the nature of the incident. A manufacturer or importer must submit a preliminary report within 10 days of awareness of an incident if the incident has led to the death or a serious deterioration in the state of health of a person; whereas, the reporting time frame is 30 days for cases where the incident has not led to the death or a serious deterioration in the state of health of a person, but could do so were it to recur. 10-day reports are more serious, and are prioritised for assessment.

Figure 15 illustrates the distribution of incident seriousness as measured by reporting timeline since 2008. Overall, there has been a slight increase in the serious (10-day) reporting from 587 in 2008 to 1,721 in 2017. While the trend in non-serious (30-day) reporting has increased since 2008, there seems to have been a moderate decline in these reports since 2015.

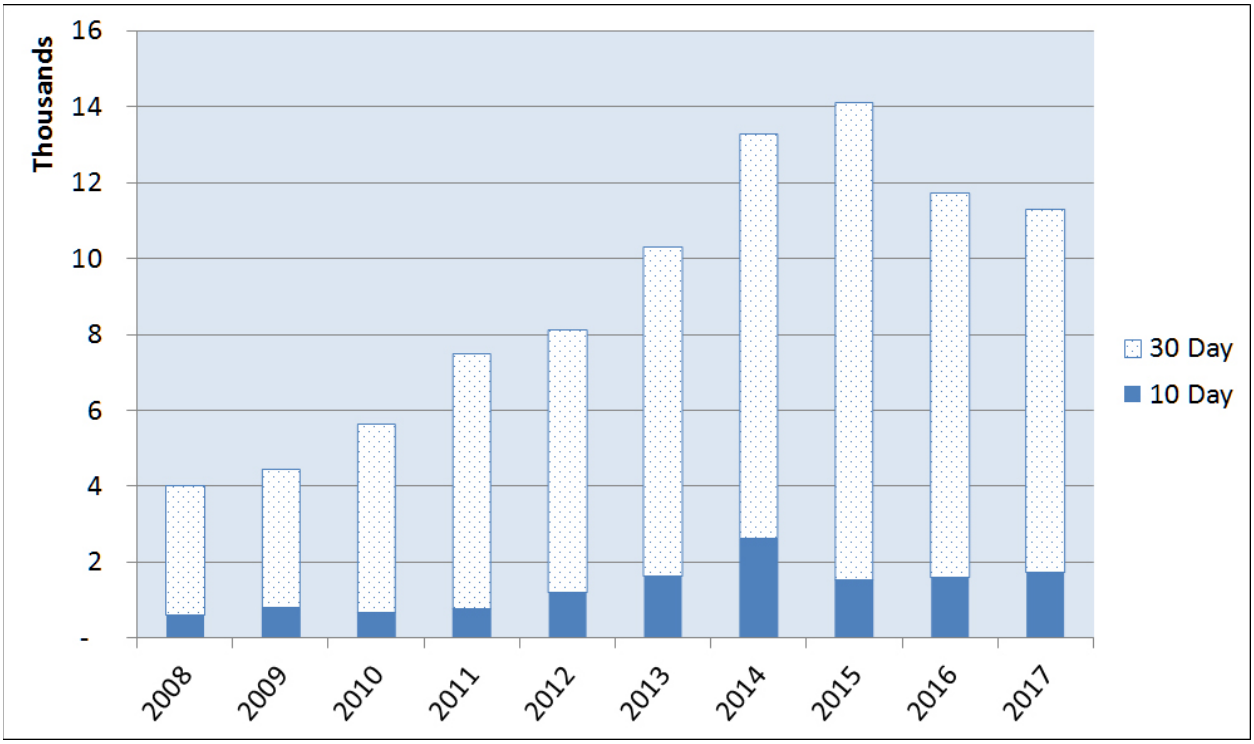


Figure 15: Reported Domestic Medical Device Incidents by Seriousness from 2006 to 2017

2.3 Mandatory MDI Reports, 2017

In 2017, Health Canada received 11,307 mandatory domestic MDI reports and 858 mandatory foreign MDI reports. The 10-day incident reports accounted for 15% of all domestic incidents received in 2017.

2.3.1 Class of Medical Device in Mandatory MDI Reports, 2017

Medical devices are categorised based on the risk associated with their use, with Class I devices representing the lowest potential risk (e.g., mercury thermometers) and Class IV devices presenting the greatest potential risk (e.g., certain pacemakers/defibrillators). Prior to selling a device in Canada, manufacturers of Class II, III and IV devices must obtain a Medical Device Licence. Figure 16 presents the proportion of reports representing each of the four classes of medical device received in 2017.

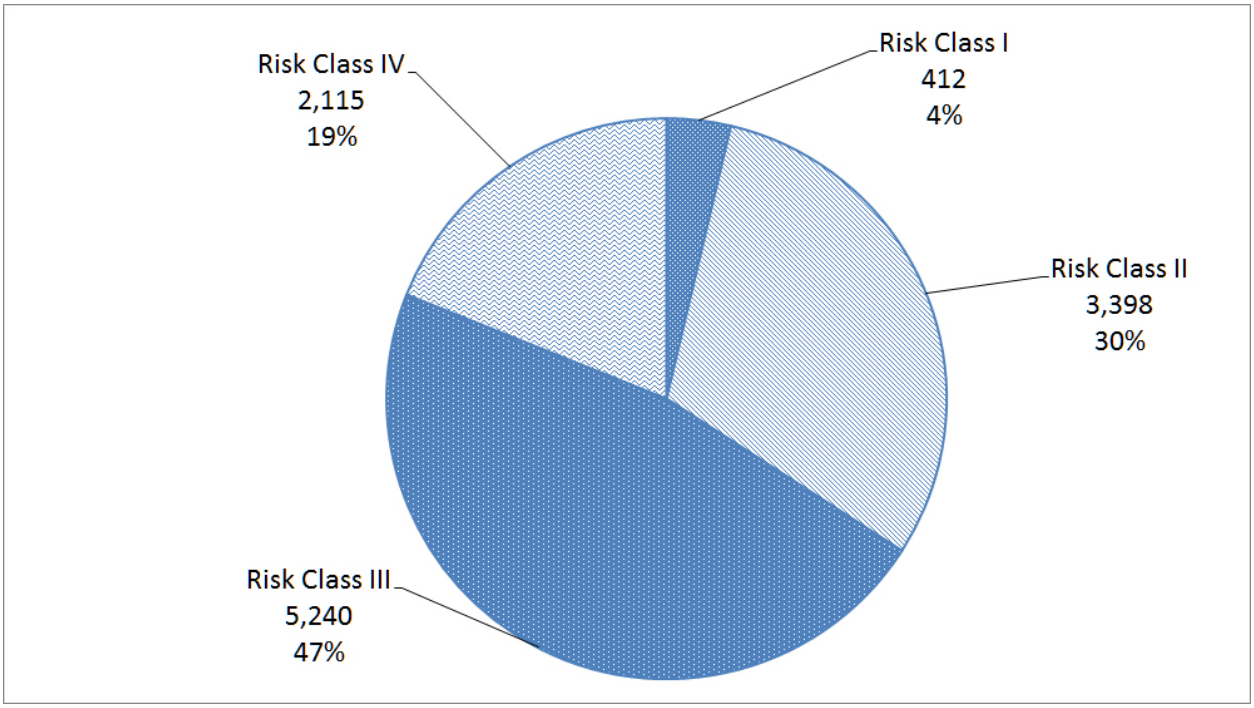


Figure 16: Domestic Mandatory MDI Reports Received in 2017 by Medical Device Risk Class

2.3.2 Mandatory MDI Reports by Medical Specialty of Device, 2017

MDI reports are received for medical devices with a number of different medical specialties. Table 11 outlines the number of reported MDIs for the 10 most common medical specialities in 2017.

Table 11: Number of Reported Medical Device Incidents for the 10 Most Common Medical Specialities in 2017

Medical Specialty of Device	Number of Reported Devices	% of Reported Devices
General Hospital	4,187	36.3%
Cardiovascular	2,068	17.9%
Chemistry	1,226	10.6%
General & Plastic Surgery	840	7.3%
Orthopaedics	718	6.2%
Gastroenterology & Urology	561	4.9%
Ophthalmology	447	3.9%
Obstetrics & Gynaecology	322	2.8%
Anesthesiology	308	2.7%
Neurology	228	2.0%

2.3.3 Mandatory MDI Reports by Device Problem Category, 2017

MDI reports frequently contain multiple problems with a device. Table 12 is a list of the top 10 problem codes recorded in 2017, mapped to the International Medical Device Regulators Forum[23] (IMDRF) Annex A Level 1 codes/terms.

Table 12: Number of Reported Medical Device Incidents for the 10 Most Common IMDRF codes recorded in 2017

IMDRF Code	Number of Incidents	% of incidents
A04 - Material Integrity Problem	3,185	15.1%
A05 - Mechanical Problem	2,918	13.8%
A09 - Output Problem	2,372	11.2%
A26 - Insufficient Information	2,023	9.6%
A07 - Electrical /Electronic Property Problem	1,650	7.8%
A14 - Infusion or Flow Problem	1,097	5.2%
A23 - Use of Device Problem	1,065	5.0%
A02 - Manufacturing, Packaging or Shipping Problem	991	4.7%
A15 - Activation, Positioning or Separation Problem	601	2.8%
A16 - Protective Measures Problem	386	1.8%

2.4 Mandatory MDI Reports, 2016

In 2016, Health Canada received 11,707 mandatory domestic MDI reports and 431 mandatory foreign MDI reports. The 10-day incident reports accounted for 13% of all domestic incidents received in 2016.

2.4.1 Class of Medical Device in Mandatory MDI Reports, 2016

Medical devices are categorised based on the risk associated with their use, with Class I devices representing the lowest potential risk (e.g., mercury thermometers) and Class IV devices presenting the greatest potential risk (e.g., certain pacemakers/defibrillators). Prior to selling a device in Canada, manufacturers of Class II, III and IV devices must obtain a Medical Device Licence. Figure 17 presents the proportion of reports representing each of the four classes of medical device received in 2016.

[23] More information about IMDRF found at http://www.imdrf.org/

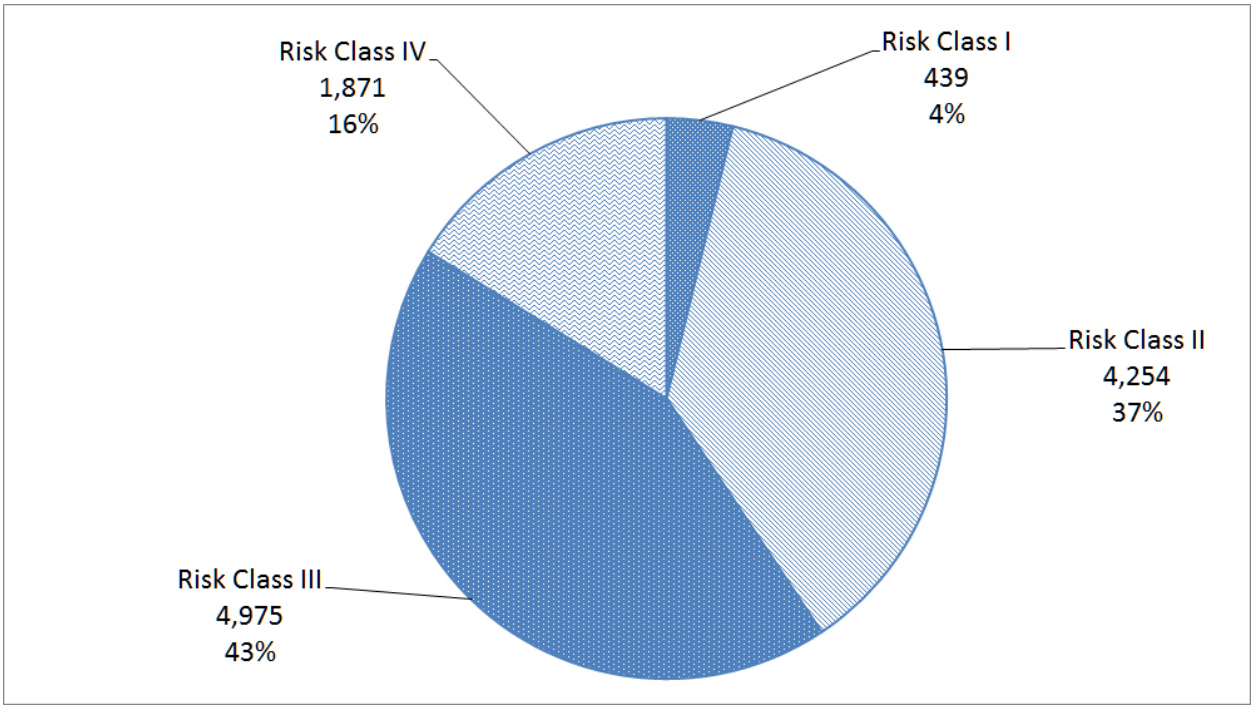


Figure 17: Domestic Mandatory MDIs Received in 2016 by Medical Device Risk Class

2.4.2 Mandatory MDI Reports by Medical Specialty of Device

MDI reports are received for medical devices with a number of different medical specialties. Table 13 outlines the number of reported MDIs for the 10 most common medical specialities in 2016.

Table 13: Number of Reported Medical Device Incidents for the 10 Most Common Medical Specialities in 2016.

Medical Specialty of Device	Number of Reported Devices	% of Reported Devices
General Hospital	5,343	45.5%
Cardiovascular	1,926	16.4%
Chemistry	889	7.6%
Gastroenterology & Urology	633	5.4%
General & Plastic Surgery	591	5.0%
Orthopaedics	508	4.3%
Ophthalmology	431	3.7%
Anesthesiology	395	3.4%
Neurology	221	1.9%
Obstetrics & Gynaecology	182	1.5%

2.4.3 Mandatory MDI Reports by Device Problem Category, 2016

MDI reports frequently contain multiple reported problems with a device. Table 14 is a list of the top 10 problem codes recorded in 2016, mapped to the International Medical Device Regulators Forum[24] (IMDRF) Annex A Level 1 codes/terms.

Table 14: Number of Reported Medical Device Incidents for the 10 Most Common IMDRF codes recorded in 2016

IMDRF Code	Number of incidents	% of Incidents
A05 - Mechanical Problem	3,479	16.0%
A04 - Material Integrity Problem	2,994	13.8%
A02 - Manufacturing, Packaging or Shipping Problem	2,717	12.5%
A14 - Infusion or Flow Problem	2,318	10.7%
A09 - Output Problem	1,711	7.9%
A07 - Electrical /Electronic Property Problem	1,609	7.4%
A26 - Insufficient Information	839	3.9%
A15 - Activation, Positioning or Separation Problem	738	3.4%
A16 - Protective Measures Problem	628	2.9%
A12 - Connection Problem	525	2.4%

2.5 Mandatory MDI Reports, 2015

In 2015, Health Canada received 14,101 mandatory domestic MDIs and 399 mandatory foreign MDIs. The 10-day incident reports accounted for 11% of all domestic incidents received in 2015.

2.5.1 Class of Medical Device in Mandatory MDIs, 2015

Medical devices are categorised based on the risk associated with their use, with Class I devices representing the lowest potential risk (e.g., mercury thermometers) and Class IV devices presenting the greatest potential risk (e.g., certain pacemakers/defibrillators). Prior to selling a device in Canada, manufacturers of Class II, III and IV devices must obtain a Medical Device Licence. Figure 18 presents the proportion of reports representing each of the four classes of medical device received in 2015.

[24] More information about IMDRF found at http://www.imdrf.org/

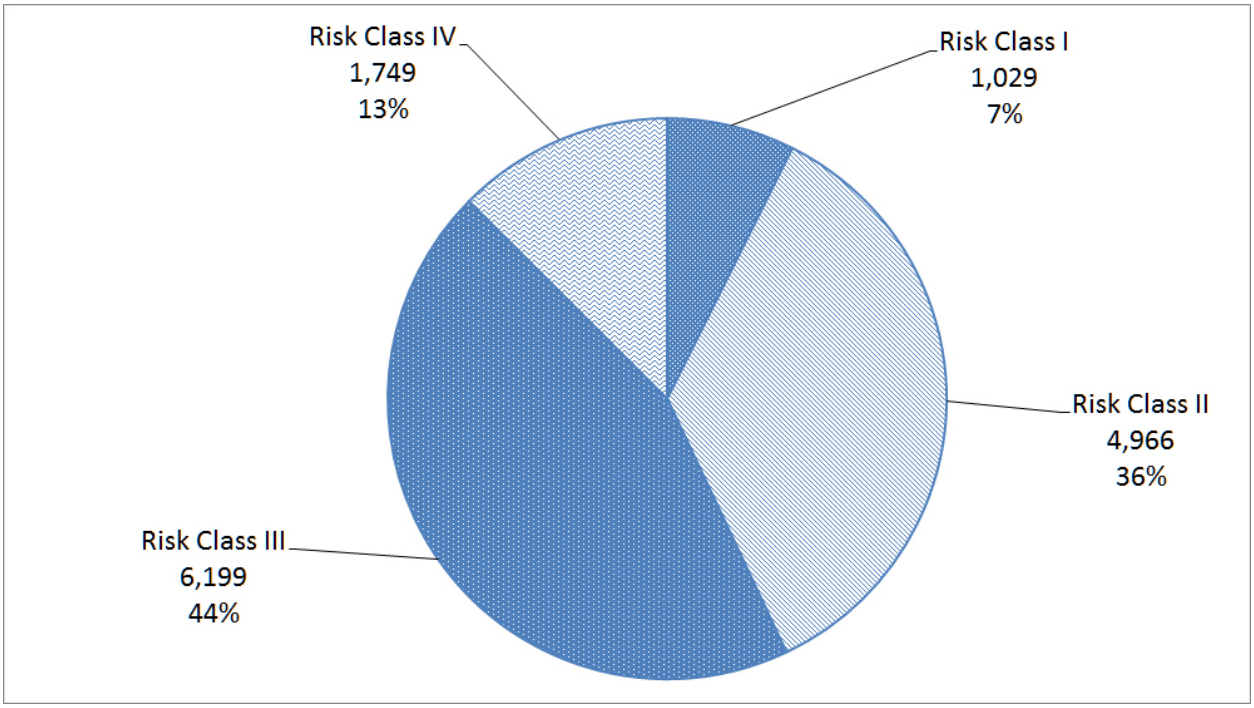


Figure 18: Domestic Mandatory MDIs Received in 2015 by Medical Device Risk Class

2.5.2 Mandatory MDI Reports by Medical Specialty, 2015

MDI reports are received for medical devices with a number of different medical specialties. Table 15 outlines the number of reported MDIs for the 10 most common medical specialities in 2015.

Table 15: Number of Reported Medical Device Incidents for the 10 Most Common Medical Specialities in 2015.

Medical Specialty of Device	Number of Reported Devices	% of Reported Devices
General Hospital	6,046	42.8%
Cardiovascular	1,919	13.6%
Gastroenterology & Urology	1,467	10.4%
Chemistry	1,017	7.2%
Orthopaedics	757	5.4%
Physical Medicine	701	5.0%
General & Plastic Surgery	563	4.0%
Ophthalmology	376	2.7%
Anesthesiology	341	2.4%
Haematology	213	1.5%

2.5.3 Mandatory MDI Reports by Device Problem Category, 2015

MDI reports frequently contain multiple reported problems with a device. Table 16 is a list of the top 10 problem codes recorded in 2015, mapped to the International Medical Device Regulators Forum[25] (IMDRF) Annex A Level 1 codes/terms.

Table 16: Number of Reported Medical Device Incidents for the 10 Most Common IMDRF codes recorded in 2015

IMDRF Code	Number of incidents	% of Incidents
A04 - Material Integrity Problem	4,100	15.5%
A05 - Mechanical Problem	3,579	13.6%
A02 - Manufacturing, Packaging or Shipping Problem	2,883	10.9%
A14 - Infusion or Flow Problem	2,683	10.2%
A09 - Output Problem	1,918	7.3%
A07 - Electrical /Electronic Property Problem	1,752	6.6%
A16 - Protective Measures Problem	1,356	5.1%
A12 - Connection Problem	724	2.7%
A26 - Insufficient Information	682	2.6%
A11 - Computer Software Problem	571	2.2%

2.6 Mandatory MDI Reports, 2014

In 2014, Health Canada received 13,279 mandatory domestic MDIs and 482 mandatory foreign MDIs. The 10-day incident reports accounted for 20% of all domestic incidents received in 2014.

2.6.1 Class of Medical Device in Mandatory MDI Reports, 2014

Medical devices are categorised based on the risk associated with their use, with Class I devices representing the lowest potential risk (e.g., mercury thermometers) and Class IV devices presenting the greatest potential risk (e.g., certain pacemakers/defibrillators). Prior to selling a device in Canada, manufacturers of Class II, III and IV devices must obtain a Medical Device Licence. Figure 19 presents the proportion of reports representing each of the four classes of medical device received in 2014.

[25] More information about IMDRF found at http://www.imdrf.org/

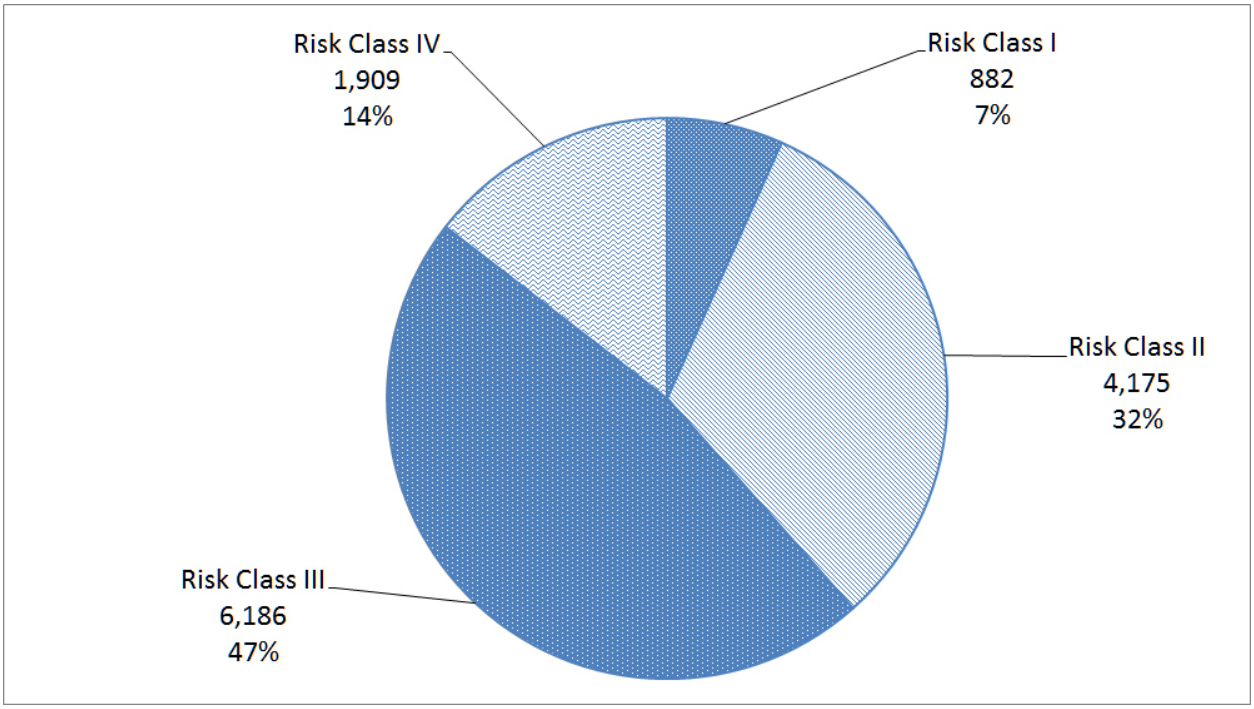


Figure 19: Mandatory Domestic MDI Reports Received in 2014 by Medical Device Risk Class

2.6.2 Mandatory MDI Reports by Medical Specialty, 2014

MDI reports are received for medical devices with a number of different medical specialties. Table 17 outlines the number of reported MDIs for the 10 most common medical specialities in 2014.

Table 17: Number of Reported Medical Device Incidents for the 10 Most Common Medical Specialities in 2014

Medical Specialty of Device	Number of Reported Devices	% of Reported Devices
General Hospital	4,389	33.0%
Cardiovascular	2,071	15.6%
Gastroenterology & Urology	1,458	11.0%
Orthopaedics	1,399	10.5%
Chemistry	970	7.3%
General & Plastic Surgery	528	4.0%
Physical Medicine	465	3.5%
Ophthalmology	453	3.4%
Dental	401	3.0%
Haematology	293	2.2%

2.6.3 Mandatory MDI Reports by Device Problem Category, 2014

MDI reports frequently contain multiple reported problems with a device. Table 18 is a list of the top 10 problem codes recorded in 2014, mapped to the International Medical Device Regulators Forum[26] (IMDRF) Annex A Level 1 codes/terms.

Table 18: Number of Reported Medical Device Incidents for the 10 Most Common IMDRF codes recorded in 2014

IMDRF Code	Number of incidents	% of Incidents
A04 - Material Integrity Problem	3,477	15.3%
A05 - Mechanical Problem	2,672	11.8%
A14 - Infusion or Flow Problem	1,874	8.3%
A09 - Output Problem	1,864	8.2%
A02 - Manufacturing, Packaging or Shipping Problem	1,851	8.2%
A23 - Use of Device Problem	1,581	7.0%
A07 - Electrical /Electronic Property Problem	1,525	6.7%
A12 - Connection Problem	1,379	6.1%
A16 - Protective Measures Problem	1,141	5.0%
A26 - Insufficient Information	548	2.4%

2.7 Mandatory MDI Reports, 2013

In 2013, Health Canada received 10,305 mandatory domestic MDIs and 366 mandatory foreign MDIs. The 10-day reports accounted for 16% of all domestic incidents received in 2013.

2.7.1 Class of Medical Device in Mandatory MDIs, 2013

Medical devices are categorised based on the risk associated with their use, with Class I devices representing the lowest potential risk (e.g., mercury thermometers) and Class IV devices presenting the greatest potential risk (e.g., certain pacemakers/defibrillators). Prior to selling a device in Canada, manufacturers of Class II, III and IV devices must obtain a Medical Device Licence. Figure 20 presents the proportion of reports representing each of the four classes of medical device received in 2013.

[26] More information about IMDRF found at http://www.imdrf.org/

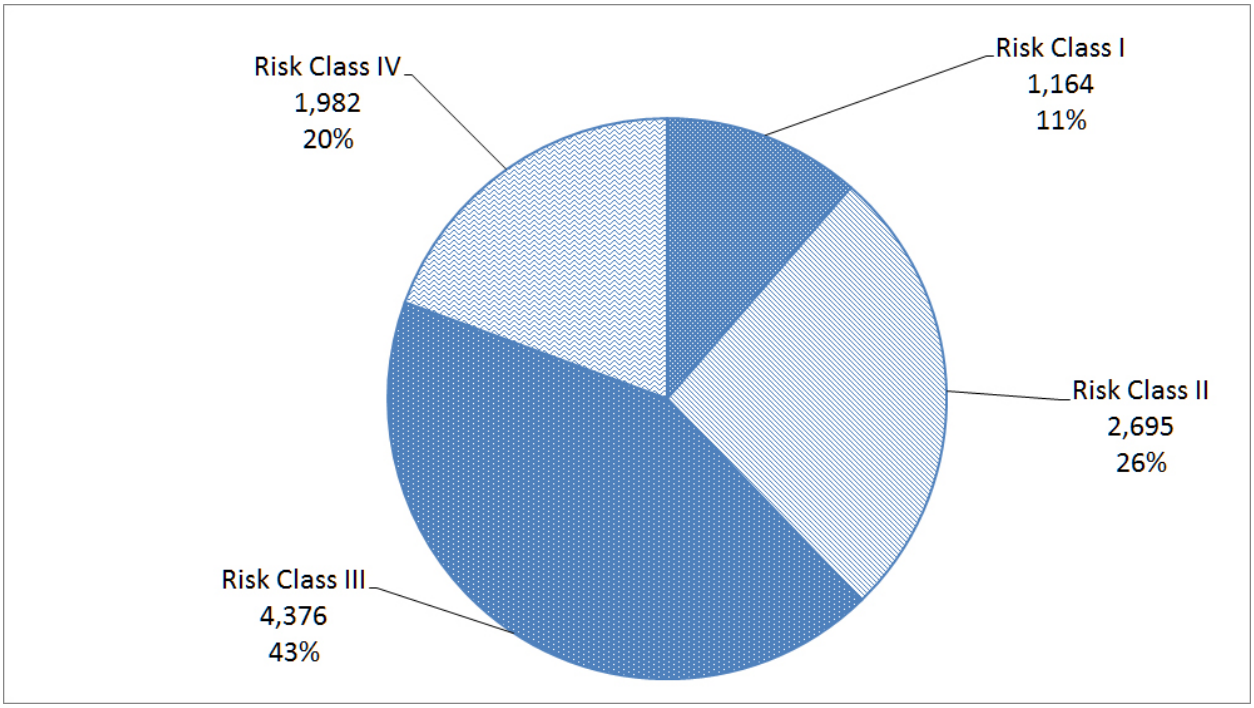


Figure 20: Mandatory Domestic MDI Reports Received in 2013 by Medical Device Risk Class

2.7.2. Mandatory MDI Reports by Medical Specialty, 2013

MDI reports are received for medical devices with a number of different medical specialties. Table 19 outlines the number of reported MDIs for the 10 most common medical specialities in 2013.

Table 19: Number of Reported Medical Device Incidents for the 10 Most Common Medical Specialities in 2013

Medical Specialty of Device	Number of Reported Devices	% of Reported Devices
General Hospital	2,988	29.0%
Cardiovascular	2,090	20.3%
Gastroenterology & Urology	1,026	9.9%
Chemistry	931	9.0%
Physical Medicine	661	6.4%
Orthopaedics	621	6.0%
General & Plastic Surgery	502	4.9%
Haematology	335	3.2%
Ophthalmology	231	2.2%
Obstetrics & Gynaecology	198	1.9%

2.7.3 Mandatory MDI Reports by Device Problem Category, 2013

MDI reports frequently contain multiple reported problems with a device. Table 20 is a list of the top 10 problem codes recorded in 2013, mapped to the International Medical Device Regulators Forum[27] (IMDRF) Annex A Level 1 codes/terms.

Table 20: Number of Reported Medical Device Incidents for the 10 Most Common IMDRF codes recorded in 2013

IMDRF Code	Number of incidents	% of Incidents
A04 - Material integrity problem	3,219	15.2%
A05 - Mechanical problem	2,553	12.0%
A09 - Output problem	2,121	10.0%
A07 - Electrical / Electronic property problem	2,082	9.8%
A02 - Manufacturing, packaging or shipping problem	1,722	8.1%
A14 - Infusion or flow problem	1,565	7.4%
A23 - Use of device problem	1,052	5.0%
A12 - Connection problem	706	3.3%
A15 - Activation, positioning or separation problem	700	3.3%
A26 - Insufficient information	634	3.0%

[27] More information about IMDRF found at http://www.imdrf.org/

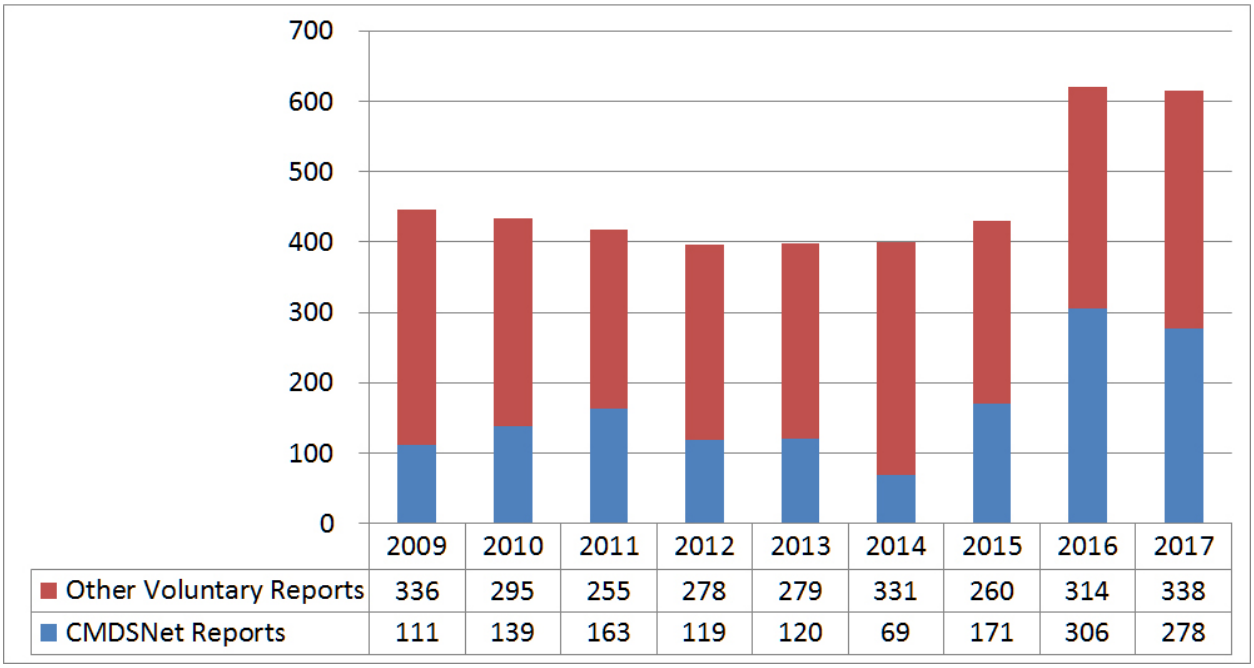
Section 3.0: Canadian Medical Devices Sentinel Network (CMDSNet) Program Reporting

The Canadian Medical Devices Sentinel Network (CMDSNet) is an active surveillance program that relies on a group of dedicated and trained representatives from acute or community-based healthcare facilities within Canada to provide high quality data reports about adverse events associated with all types of medical devices. Only participating institutions can report via this program, and there is no cost to the organization other than their time to submit the reports to Health Canada. These detailed reports obtained from reporting institutions help to better characterize how organizations use certain devices, how problems are perceived and reported, and what may have contributed to a particular event.

By creating this two-way communication between Health Canada and the clinical community to better understand the environment, it is possible to identify practical risk mitigation strategies, such as increasing awareness of hazards and conditions of use, improving the labelling, and improving safety standards. The overall goals for the CMDSNet program are to contribute to better quality risk assessments and earlier regulatory interventions and to provide health professionals and citizens with timely information to make informed health choices which will help maintain and improve the health of Canadians.

3.1 Trends in Voluntary Reports Received Through CMDSNet (2009 – 2017)

Since the start of the CMDSNet project in 2009, Health Canada has seen an increase in the number of voluntary reports received. The subset of the CMDSNet reports within the overall voluntary reports received is demonstrated in the calendar year statistics shown Figure 21. In 2016, a new site enrolled with automated reports coming directly to CMDSNet, which accounts for this steep increase in overall reports.



	2009	2010	2011	2012	2013	2014	2015	2016	2017
Other Voluntary Reports	336	295	255	278	279	331	260	314	338
CMDSNet Reports	111	139	163	119	120	69	171	306	278

Figure 21: Number of Reports Received by CMDSNet from 2009 to 2017

3.2 Reports Received by CMDSNet (2009 – 2017)

The number of reporting health care organizations has risen from the original 10 in the pilot to 16 in 2017. The initial intent was to ensure that all the provinces and territories were represented. We continue to look for CMDSNet hospitals in Nunavut and the Yukon. These health organizations vary in size from one hospital to a whole provincial health authority that represents over 100 sites and 9,000 inpatient beds. The locations representing CMDSNet participating sites in 2017 are shown in Figure 22.

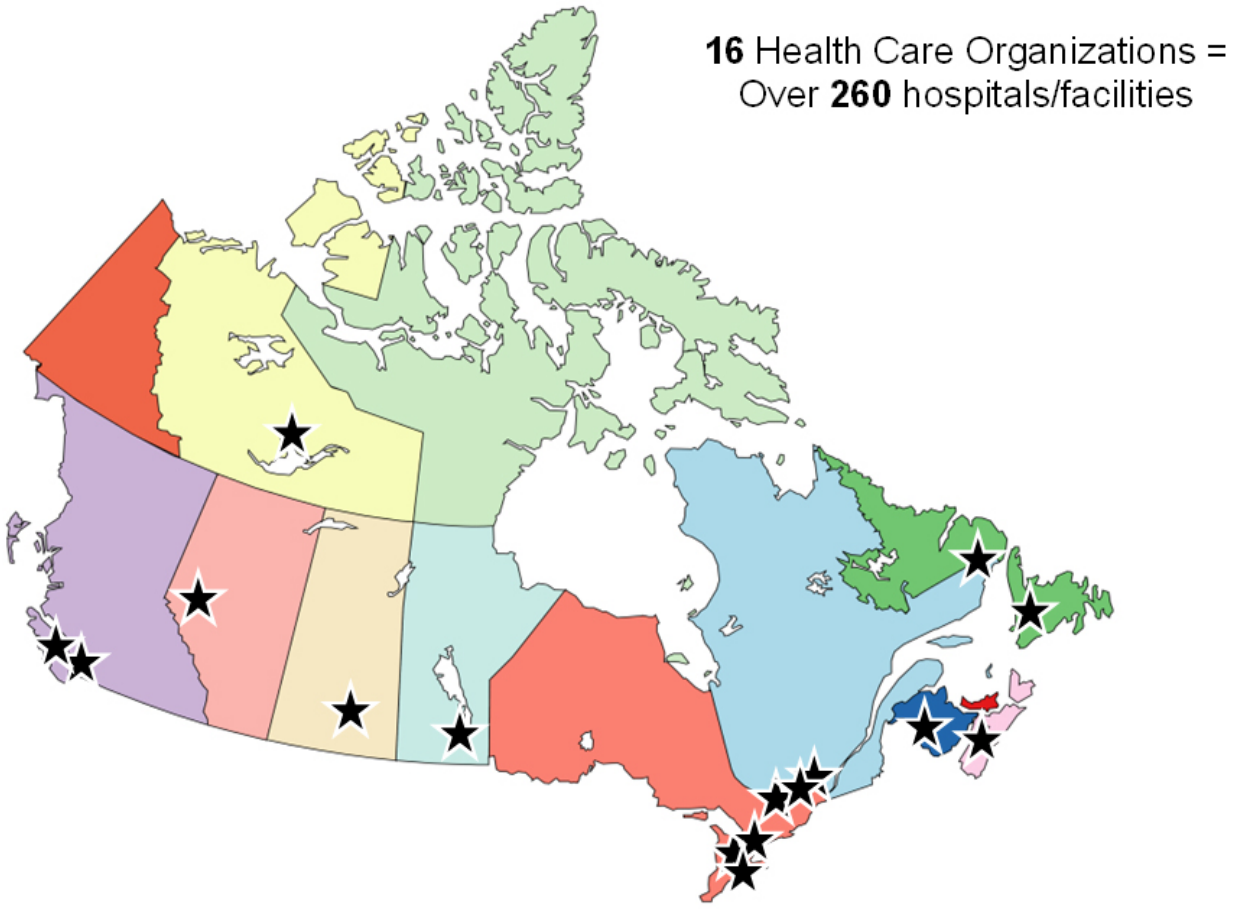


Figure 22: Location of CMDSNet Sites in 2017

3.3 Class of Medical Devices in CMDSNet Reports (2009 – 2017)

Medical devices are categorised based on the risk associated with their use, with class I devices representing the lowest potential risk (e.g., mercury thermometers) and Class IV devices presenting the greatest potential risk (e.g., certain pacemakers/defibrillators). Prior to selling a device in Canada, manufacturers of Class II, III and IV devices must obtain a Medical Device Licence. Figure 23 presents the proportion of reports representing each of the four classes of medical device received via CMDSNet since 2009. There are many class II and III's used in a hospital setting so this may account for many reports.

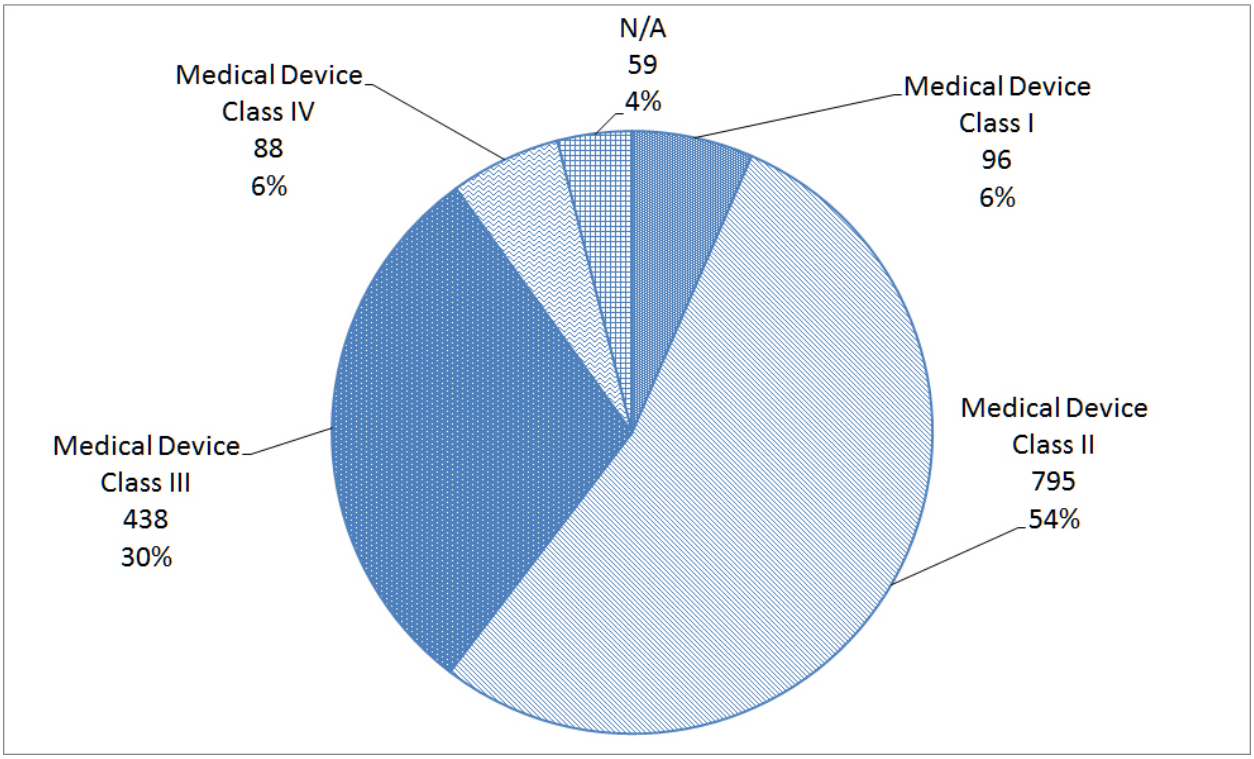


Figure 23: Proportion of Reports Representing Each of the Four Classes of Medical Devices

3.4 Seriousness and Patient Outcomes of CMDSNet Reports (2009 – 2017)

Health Canada considers all pertinent information provided to assess the health hazard of a device and assigns a priority to the reported incident. The program has three levels of priority for medical devices incidents: priority I, priority II and priority III.

Figure 24 and Figure 25 illustrates the distribution of report seriousness and patient outcomes received via CMDSNet since 2009. As seen in Figure 24, the Priority I reports make up 11% of the reports received; however, only 4% of CMDSNet reports have actually led to serious injury/death as shown in Figure 25. Many reports for class II devices are of a quality nature so these are typically less serious. The potential-for-harm reports are interesting because an injury has not yet occurred so there is an opportunity to improve them prior to an incident occurring that would involve harm to patients.

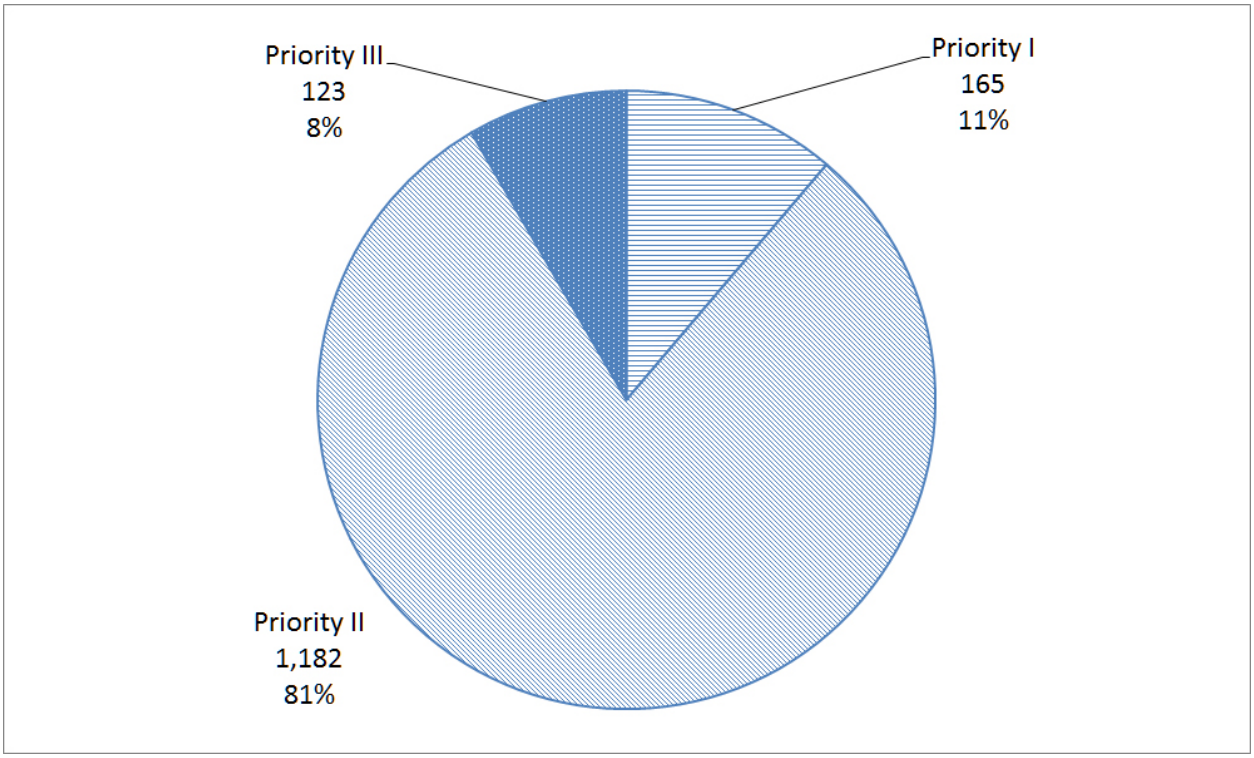


Figure 24: Distribution of Seriousness Received by CMDSNet from 2009 to 2017

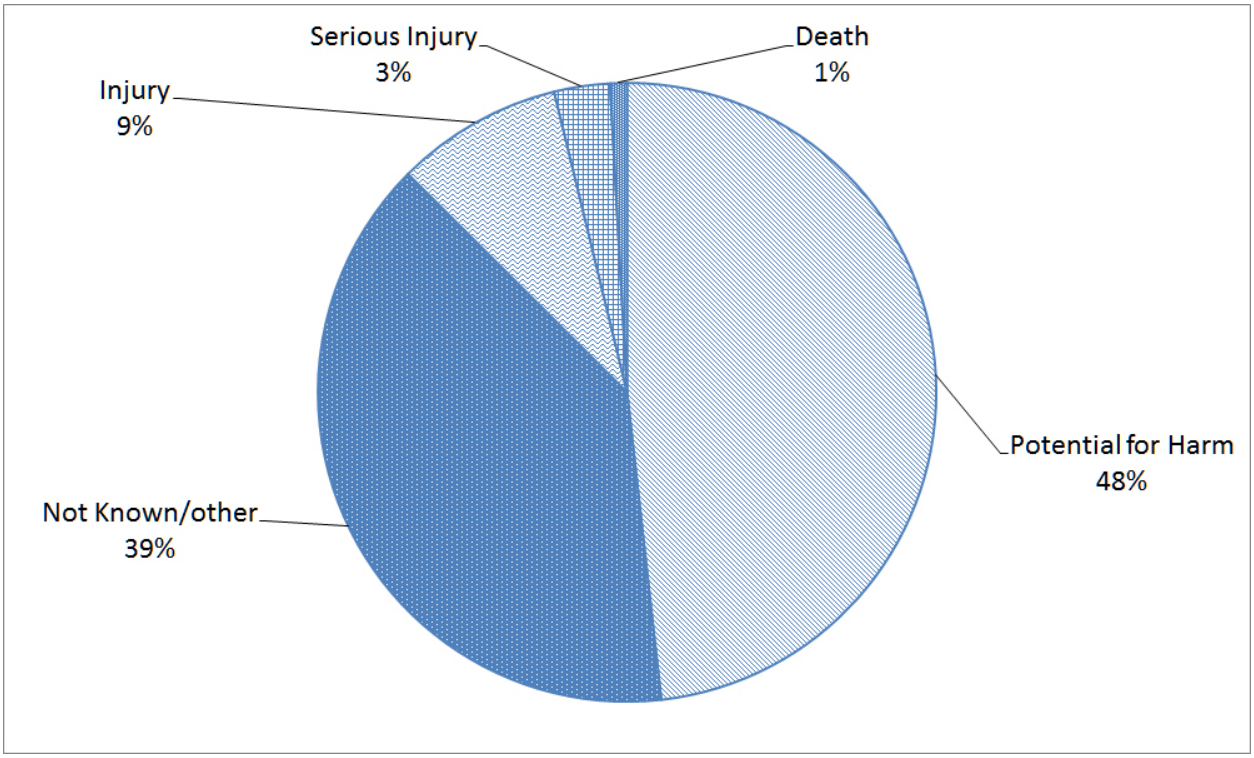


Figure 25: Distribution of Patient Outcomes Received by CMDSNet from 2009 to 2017

3.5 Quality of CMDSNet Reports (2009 – 2017)

Health Canada grades the CMDSNet reports using a modified scale developed by the World Health Organisation[28] (WHO). The modified WHO scale is used to rate the reports on a scale of 1-5 using pre-set rating criteria, with 5 being the best quality and 1 being un-enterable; 88% were of the highest quality as assessed by the modified WHO scale (Figure 26).

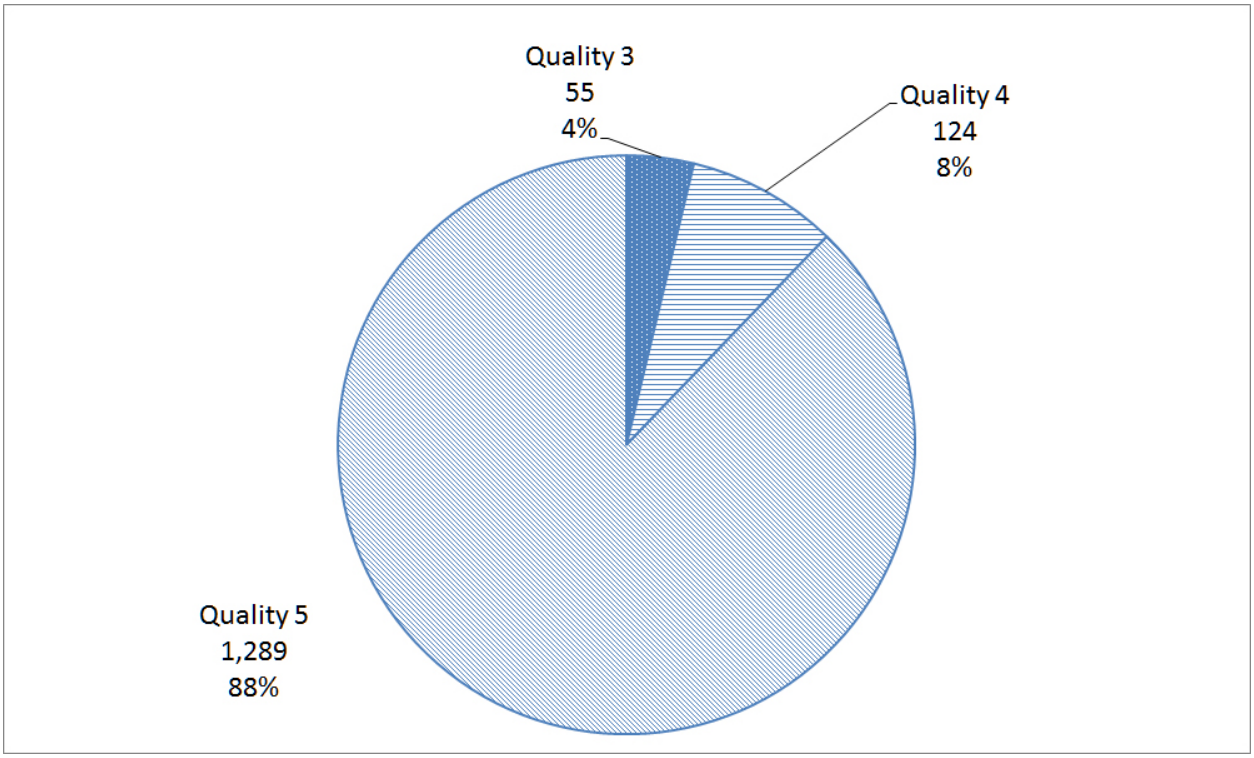


Figure 26: Quality of Reports as Graded by a Modified WHO Scale from 2009 to 2017

3.6 CMDSNet Incident Reports by Medical Specialty (2009 – 2017)

Table 21 shows the Top 5 medical specialties of devices submitted to Health Canada via CMDSNet from 2009 to 2017. The majority (88.3%) are reports in the general hospital, surgical, cardiovascular, gastroenterology and urology, and anaesthesiology Areas. This data seems to correspond to where the most procedures are happening in the hospitals.

Table 21: Top 5 Medical Specialties of Devices in CMDSNet reports from 2009 to 2017

Classification	Reported Devices	% of Reported Devices
General Hospital	535	37.9%
Surgery	209	14.8%
Cardiovascular	208	14.7%
Gastroenterology & Urology	174	12.3%
Anesthesiology	122	8.6%

[28] More information about WHO can be found at http://www.who.int/medicines/areas/quality_safety/safety_efficacy/advdrugreactions/en/

3.7 Medical Device Problem Incident Categories reported through CMDSNet (2009 – 2017)

CMDSNet reports frequently contain multiple reported problems with a device. These problems are coded into the Medical Device System (MDS) database using the device codes from the Medical Dictionary for Regulatory Activities[29] (MedDRA) terminology. Only the device-specific codes from MedDRA are used for CMDSNet reports. Since 2009, nearly 70% of the incidents received are categorized as device defect or malfunction as seen in Table 22. Misuse of devices comprises only 1% of the reports.

Table 22: Top 10 Problems Reported in CMDSNet Reports from 2009 to 2017

Problem with Device	Reported Problems	% of reported Problems
Defect	669	40.9%
Malfunction	471	28.8%
Failure	142	8.7%
Breakage	121	7.4%
Leakage	61	3.7%
Ineffective	46	2.8%
Interaction	36	2.2%
Complication	35	2.1%
Misuse	16	1.0%
Dislocation/insertion/connection	15	0.9%

[29] More information about MedDRA available at https://www.meddra.org/

Data Limitations

Interpretation of Suspected Adverse Reaction Data[30] needs to take into account certain limitations about the data, such as:

1. AR cases are suspected associations which reflect the opinion or observation of the individual reporter. The data does not reflect any Health Canada assessment of association between the health product and the reaction(s).
2. Often, it is not possible to determine if an AR reported to Health Canada is a result of using a specific health product. Other factors contributing to the reaction could be a person's health conditions or other health products they are using at the same time.
3. Several factors may influence the number of cases received such as length of time a product is on the market, extent of use, media coverage, regulatory actions, and method of data collection (cases submitted voluntarily versus organized data-collection systems). For example, ARs to health products may be reported more frequently in organized data-collection systems (e.g., patient registries, surveys, and patient support and disease management programs) which may affect the pattern of reporting. As such, it is not possible to compare the risk between health products based solely on the numbers of cases.

The following considerations should be taken into account when interpreting information pertaining to medical device problem incidents reports:

1. Reportable incidents involving a medical device that affected one or more patients, users or other persons, on the same, or different, dates, are reported to Health Canada as separate incidents, because each incident was a separate event.
2. Reportable incidents involving the failure of more than one medical device, of the same or different lot number, that affected the same patient or user are to be reported to Health Canada as separate incidents.
3. Counts of reports will differ from counts of incidents, as for a given incident we can receive multiple reports from multiple reporters. This can also result in duplicate incidents, if the duplicate reports are not identified.

[30] More information on the interpretation of suspected adverse reaction data can be found at https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-database/interpretation-suspected-adverse-reaction-data.html

Glossary

Definitions for a number of terms used in this document are set out in the glossary below.

Accident

In the context of the Safety of Human Cells, Tissues and Organs for Transplantation Regulations, an accident means an unexpected event that is not attributable to a deviation from the standard operating procedures or applicable laws and that could adversely affect the safety of a transplant recipient or the safety, efficacy or quality of cells, tissues or organs.

Adverse Reaction

An adverse reaction means a noxious and unintended response to a marketed health product.

Cells

In the context of the Safety of Human Cells, Tissues and Organs for Transplantation Regulations, a cell means the fundamental biological unit of a human organism that is for use in transplantation.

Case Report

In the context of adverse reactions to health products, a case report consists of all information describing the adverse reaction(s) experienced by one patient at one time and suspected of being related to the use of one or more health products/medical devices; thus, an adverse reaction case report will include an initial adverse reaction report as well as any subsequent additional information received as follow-up report(s).

Domestic Adverse Reaction

An adverse reaction occurring in Canada.

Drug

According to the Food and Drugs Act, a drug includes any substance or mixture of substances manufactured, sold or represented for use in:

a) the diagnosis, treatment, mitigation or prevention of a disease, disorder or abnormal physical state, or its symptoms, in human beings or animals;
b) restoring, correcting or modifying organic functions in human beings or animals; or
c) disinfection in premises in which food is manufactured, prepared or kept.

Error

In the context of the Safety of Human Cells, Tissues and Organs for Transplantation Regulations, an error means a deviation from the standard operating procedures or applicable laws that could adversely affect the safety of a transplant recipient or the safety, efficacy or quality of cells, tissues or organs.

Foreign Adverse Reaction

An adverse reaction occurring outside Canada to a product with the same combination of active ingredients that is marketed in Canada irrespective of variations in the formulation, dosage form, strength, route of administration, or indication.

Health Product

Health Product includes products regulated under the Food and Drugs Regulations ("drugs") and the Natural Health Products Regulations ("natural health products"). Drugs include both prescription and non-prescription pharmaceuticals; biotechnology products and biologically-derived products such as vaccines, serums, and blood derived products; disinfectants; and radiopharmaceuticals.

Importer

A person, other than the manufacturer of a device, who causes the medical device to be brought into Canada for sale.

Incident

In the context of mandatory problem reporting for medical device incidents, information on the incident refers to the circumstances required to be reported under Section 59 of the Medical Device Regulations.

Malfunction or Deterioration

A failure of a device to perform in accordance with its intended purpose when used in accordance with the manufacturer's instructions. Malfunction is synonymous with "fault".

Manufacturer

In the context of medical device incidents, as is defined in section 1 of the Medical Device Regulations, this term means a person who sells a medical device under their own name, or under a trade mark, design, trade name or other name or mark owned or controlled by the person, and who is responsible for designing, manufacturing, assembling, processing, labeling, packaging, refurbishing or modifying the device, or for assigning it to a purpose, whether those tasks are performed by that person or on their behalf.

Market Authorization Holder (MAH)

In the context of health products, an MAH means the entity that holds the Notice of Compliance, the Drug Identification Number (DIN), the Natural Product Number (NPN), the Homeopathic Medicine Number (DIN-HM), or the product license.

MedEffect™ Canada

MedEffect™ Canada has been developed by Health Canada's Marketed Health Products Directorate:

- to provide centralized access to relevant and reliable health product safety information as it becomes available, in an easy to find, easy to remember location. This includes access to Health Canada's advisories and recalls; the Health Product InfoWatch; and the Canada Vigilance Adverse Reaction Online Database;
- to make it as simple and efficient as possible for health professionals and consumers to complete and file adverse reaction reports via Web, phone, fax or mail; and
- to build awareness about the importance of reporting adverse reactions to Health Canada, and how this information is used to identify and communicate potential risks.

Medical Device Incident Priority I:

A situation in which there is a reasonable probability that the use of, or exposure to, a device has led to the death or serious deterioration of the state of health of a patient, user or other person, or a reasonable belief that recurring exposure could lead to the death or serious deterioration of the state of health of a patient, user or other person.

Medical Device Incident Priority II:

A situation in which the use of, or exposure to, a device may cause temporary deterioration of the state of health of a patient, user or other person, or where the probability of serious deterioration of health is remote.

Medical Device Incident Priority III:

A situation in which the use of, or exposure to, a device is not likely to cause any deterioration of the state of health, of a patient, user or other person.

Natural Health Product (NHP)

A substance set out in Schedule 1 of the Natural Health Products Regulations or a combination of substances in which all the medicinal ingredients are substances set out in Schedule 1 of the Natural Health Products Regulations, a homeopathic medicine or a traditional medicine, that is manufactured, sold or represented for use in:

d) the diagnosis, treatment, mitigation or prevention of a disease, disorder or abnormal physical state or its symptoms in humans;
e) restoring or correcting organic functions in humans; or
f) modifying organic functions in humans, such as modifying those functions in a manner that maintains or promotes health.

However, a natural health product does not include a substance set out in Schedule 2 of the Natural Health Products Regulations, any combination of substances that includes a substance set out in Schedule 2 of the Natural Health Products Regulations or a homeopathic medicine or a traditional medicine that is or includes a substance set out in Schedule 2 of the Natural Health Products Regulations.

Physician

A physician means a person who is entitled to practice the profession of medicine under the laws of the province in which the person provides medical service

Product Monograph (PM)

A product monograph is a factual, scientific document on the drug product that, devoid of promotional material, describes the properties, claims, indications, and conditions of use for the drug, and that contains any other information that may be required for optimal, safe, and effective use of the drug.

Regulated Parties

For the purposes of this document, a regulated party refers to the party who is mandated by either the the Food and Drug Regulations, the Natural Health Products Regulations, the Blood Regulations, the Medical Device Regulations and/or the Safety of Human Cells, Tissues and Organs for Transplantation Regulations to abide by the requirements of the respective regulations.

For example, Market Authorization Holders are required by the Food and Drug Regulations to report adverse reactions involving marketed health products to Health Canada; Blood establishments are required by the Blood Regulations to report adverse reactions involving human blood and blood components for transfusion to Health Canada.

Serious Adverse Reaction

A serious adverse reaction is a noxious and unintended response to a marketed health product that occurs at any dose and that requires in-patient hospitalization or a prolongation of existing hospitalization, that causes congenital malformation, that results in persistent or significant disability or incapacity, that is life threatening or that results in death.