2 The use of nuclear medicine diagnostics and Tc-99m varies significantly across countries

Diagnostic imaging modalities using Technetium-99m account for around 30 million examinations worldwide every year and approximately 85% of all nuclear medicine diagnostic scans. Following a decrease with the 2009/10 supply crisis, demand for Tc-99m has been flat in recent years and little growth is forecast for OECD countries through 2023. Imaging rates vary significantly between countries, from 2-3 Tc-99m-based scans per 1 000 population per year in some Eastern European countries to 30-50 in Belgium and North America. The ten most populous countries and countries with high scan rates account for more than 90% of the aggregate volume of Tc-99m-based scans across the countries in scope of this Report. There are also significant differences between countries in the utilisation patterns by organ system and anatomical areas scanned. The potential impacts of future shortages and the scope for substitution are therefore not the same across countries.

2.1. Introduction

This Chapter provides a brief overview of the global demand for radioisotopes, and for Technetium-99 (Tc-99m) in particular. The Chapter compares NM diagnostic imaging activity across the countries in scope. It shows that NM diagnostic imaging rates vary significantly between countries and that ten countries represent more than 90% of all the aggregate volume of Tc-99m-based scans across the countries in scope. There are also significant differences between countries in the utilisation patterns by organ systems and anatomical areas scanned. The potential impacts of future shortages and the scope for substitution are therefore not the same across countries.

2.2. Global demand for Mo-99/Tc-99m has been flat since 2012

Medical diagnostic imaging modalities using Tc-99m account for approximately 85% of all nuclear medicine procedures, representing around 30 million examinations worldwide every year (NEA, 2018[1]). NEA estimates that mature markets account for 84% of global demand for Mo-99/Tc-99m, and developing markets for 16%. Estimated market growth rates are 0.5% annually for mature markets and 5% for developing markets through 2023 (ibid.).

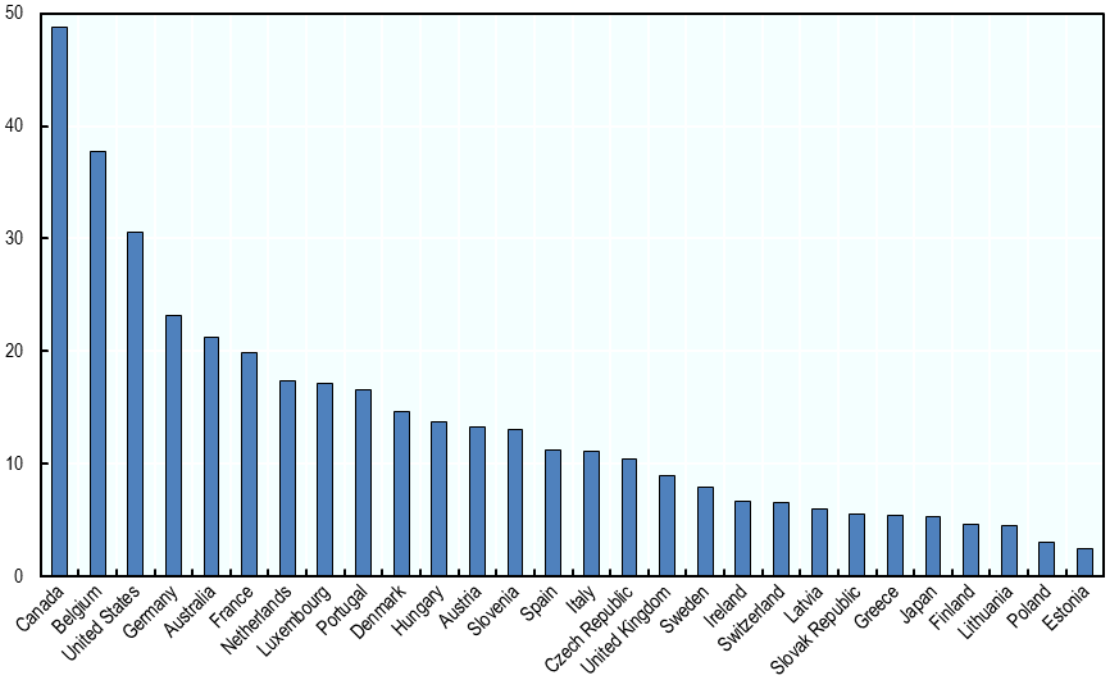
Successive NEA demand forecasts have assessed market demand since 2011. Following the 2009/2010 supply crisis, demand decreased by around 20% driven by better use of available Mo-99/Tc-99m, more efficient elution of Tc-99m generators, adjustments to patient scheduling, some reductions in average injected dose due to technical improvements in gamma cameras and some retention of substitute diagnostic tests/isotopes (NEA, 2018[1]). Greater efficiency in the use of Tc-99m generator activity may also be a result of increased generator prices due to gradual implementation of full-cost recovery (FCR) (ibid.).

Since 2012, the demand has been relatively flat. There have been some increases in production required at the irradiator and processor level of the supply chain in the period since 2016 to overcome the decay loss in transport to the large North American market, following the end of routine production in Canada. Data for 2017 reconfirm that recent global demand for Mo-99 is close to 9 400 six-day curies per week end-of-processing,[1] with some demand fluctuations seen at a quarterly level (NEA, 2018, p. 8[1]).

2.3. A small number of populous countries and countries with high scan rates account for a large share of utilisation

The use of NM diagnostic imaging varies widely across countries in scope of this report. Similar to other diagnostic imaging modalities (OECD, 2018[2]), there are large differences in utilisation rates of NM diagnostic imaging relative to the population between countries. For example, estimates collated by the OECD Health Division research indicate that only about 2-3 Tc-99m-based scans are performed per ‘000 population per year in Estonia and Poland, while 31 and 38 scans are performed per ‘000 population per year in the United States and Belgium respectively, and this number may be close to 50 in Canada. Figure 2.1 shows estimates of the rate of Tc-99m-based NM diagnostic scan per ‘000 population.

Figure 2.1. Number of Tc-99m-based NM diagnostic scans per ’000 population per year

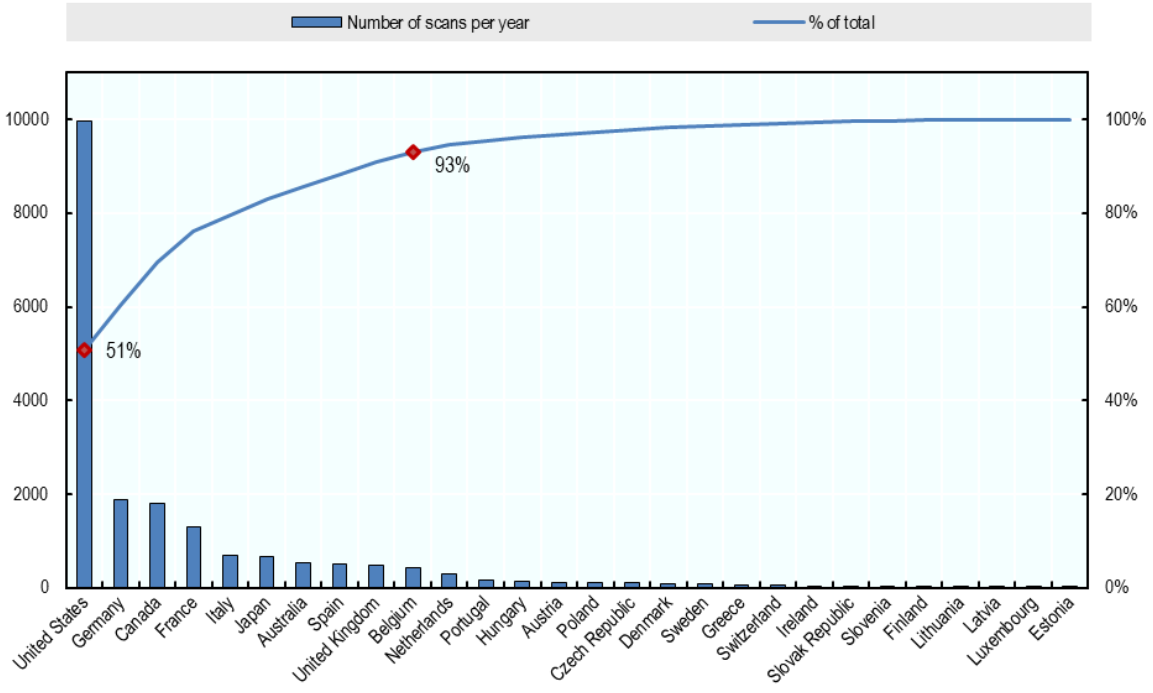


Note: Data was collated from various sources and may not be fully accurate or comparable. Refer to Annex B for data accuracy and comparability issues.
Source: Author based on Health Division survey and various public sources. Refer to Annex B for details.

A large proportion of total NM diagnostic activity is found in countries that have large populations and/or relatively high NM diagnostic imaging rates. According to estimates collated by the OECD Health Division, around 10 million Tc-99m-based diagnostic scans are performed in the United States per year, which alone represents more than 50% of the total number of scans across countries in scope. Scans performed in Canada, Germany, France, Japan, Italy, Spain, Belgium and the United Kingdom collectively represent another 40% of total activity so that these 10 countries together account for more than 90% of scans across countries in scope. Figure 2.2 shows the number of Tc-99m-based NM diagnostic scans per year.

Figure 2.2.Absolute number of Tc-99m-based NM diagnostic scans per year by country

Number of scans in '000s.

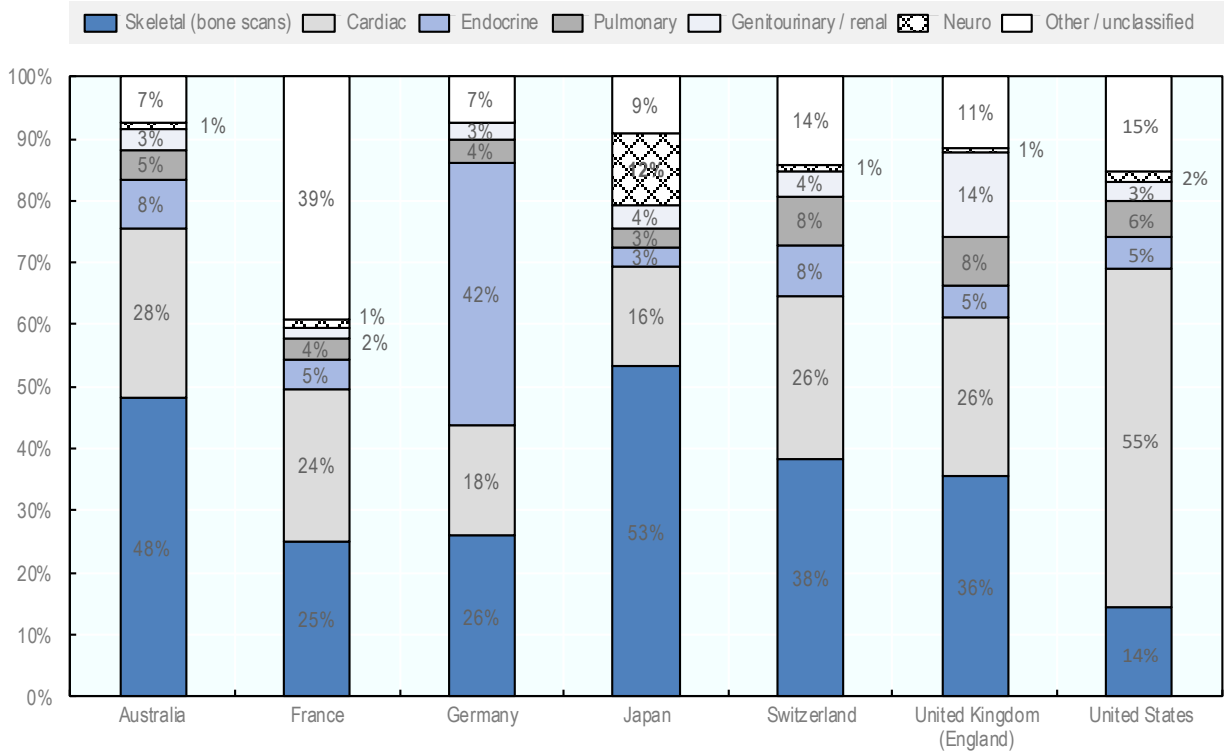


Note: Data was collated from various sources and may not be fully accurate or comparable. Refer to Annex B for data accuracy and comparability issues.
Source: Author based on Health Division survey various public sources. Refer to Annex B for details.

Patterns in utilisation of Tc-99m-based NM diagnostic scans also vary between countries when broken down by organ system or anatomical region scanned. Figure 2.3 breaks down the total number of scans in Australia, France, Germany, Japan, Switzerland, the United Kingdom (England) and the United States into seven main organ systems. Except in Germany, bone and cardiac scans are the most common types of scan, collectively representing between 60% and 76% of all activity. While bone scans are more common than cardiac scans in six of the seven countries, the opposite is true in the United States, where cardiac scans represent 55% of the total and bone scans only 14%. In Germany, endocrine scans are the most common type, representing 42% of the total. In Japan, bone scans represent 53% of the total and neurological scans of the brain or spinal cord are also a relatively large category, representing 12%, while neurological scans represent 2% or less of the total in the six other countries. It should be noted that, as described in the notes to Figure 2.3 and in Annex B, these data should be interpreted with some caution and viewed only as an illustration of variation between countries because they are not fully comparable between countries.

Figure 2.3. Proportion of scans by organ system

Data available for Australia, France, Germany, Japan, Switzerland, the United Kingdom (England) and the United States.



Note: Data were collated from various sources and may not be fully accurate or comparable. For example, data from Japan include Tc-99m-based scans only, which represent 61% of all NM diagnostic scans; when including all NM isotopes use, the proportion of cardiac scans (using Tl-201 more commonly than Tc-99m) increases to 28%, the proportion of neurological scans (using I-123 more commonly than Tc-99m) to 24%, and the proportion of bone scans (using Tc-99m only) decreases to 32%. Billing data from Australia, France, Germany and England do not allow for a precise isolation of Tc-99m-based scans from other isotopes used. The French nomenclature includes several generic billing codes that cannot be allocated to a single anatomical area (e.g. tomo-scintigraphy complementing a planar image), explaining the large proportion of unclassified scans. Estimates for the United States include all NM diagnostic scans except PET scans. Refer to Annex B for further information on data sources, accuracy and comparability.
Source: Authors based on various sources. Refer to Annex B for details.

References

(n.a.) (n.d.), *X*. [3]

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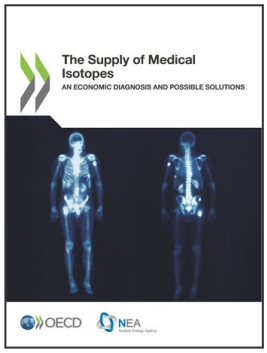
OECD (2018), *OECD Health Statistics 2018*, http://www.oecd.org/els/health-systems/health-data.htm (accessed on 11 September 2018). [2]

Notes

[1] A 6-day curie is the measurement of the remaining radioactivity of Mo-99 six days after it leaves the processing facility (i.e. at the end of processing – EOP). In International System Units, 1 Ci is equal to 37 GBq.



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