Medical Technology in Canada

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  - Director, Health System Performance Studies
- Fraser Institute Policy Briefing
- Tuesday, December 1, 2008

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The Plan

- Why?
- How Does Canada Perform in International Comparisons?
- How Good is the Inventory?
- What is the Availability of Cutting-Edge Technologies?

Medical Technologies: Costs and Benefits

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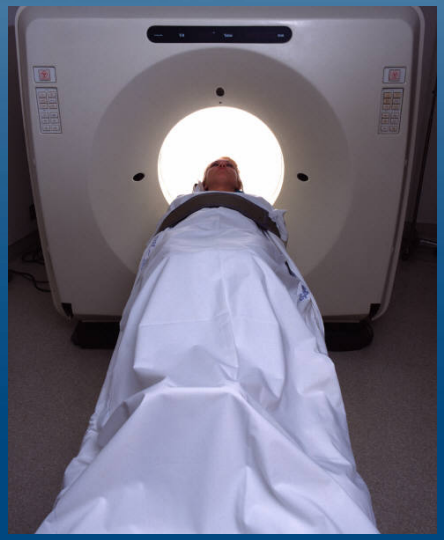

Benefits

- New treatment options
- Improved diagnoses and outcomes
- Increased patient comfort
- Speed up recovery and potentially reduce hospital admissions

Costs

- Can be expensive
- Studies have shown benefits greater than costs in some cases
- In other cases studies show that benefits are worth the increased cost

Comparisons of the Availability of Medical Technologies

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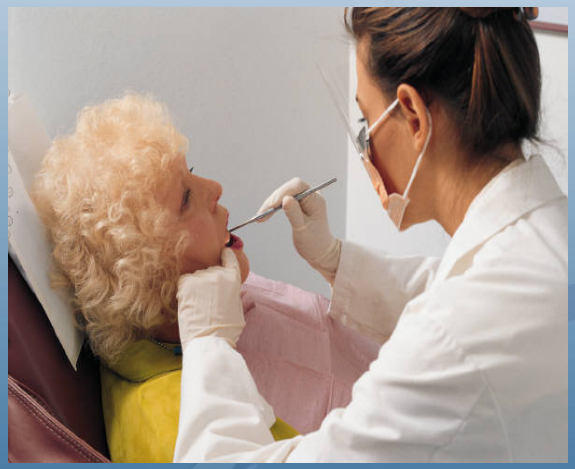
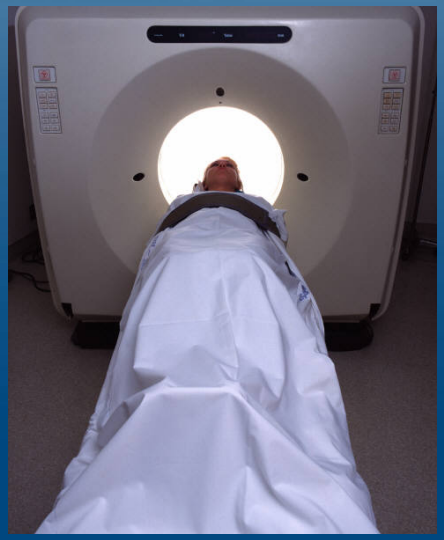
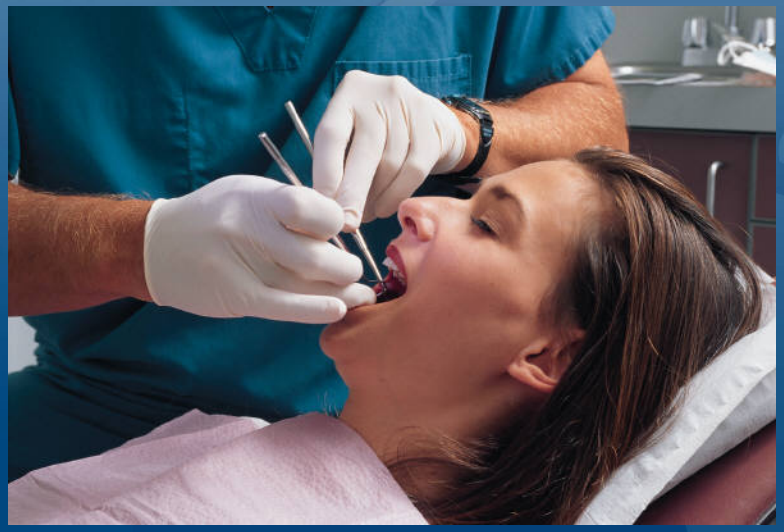
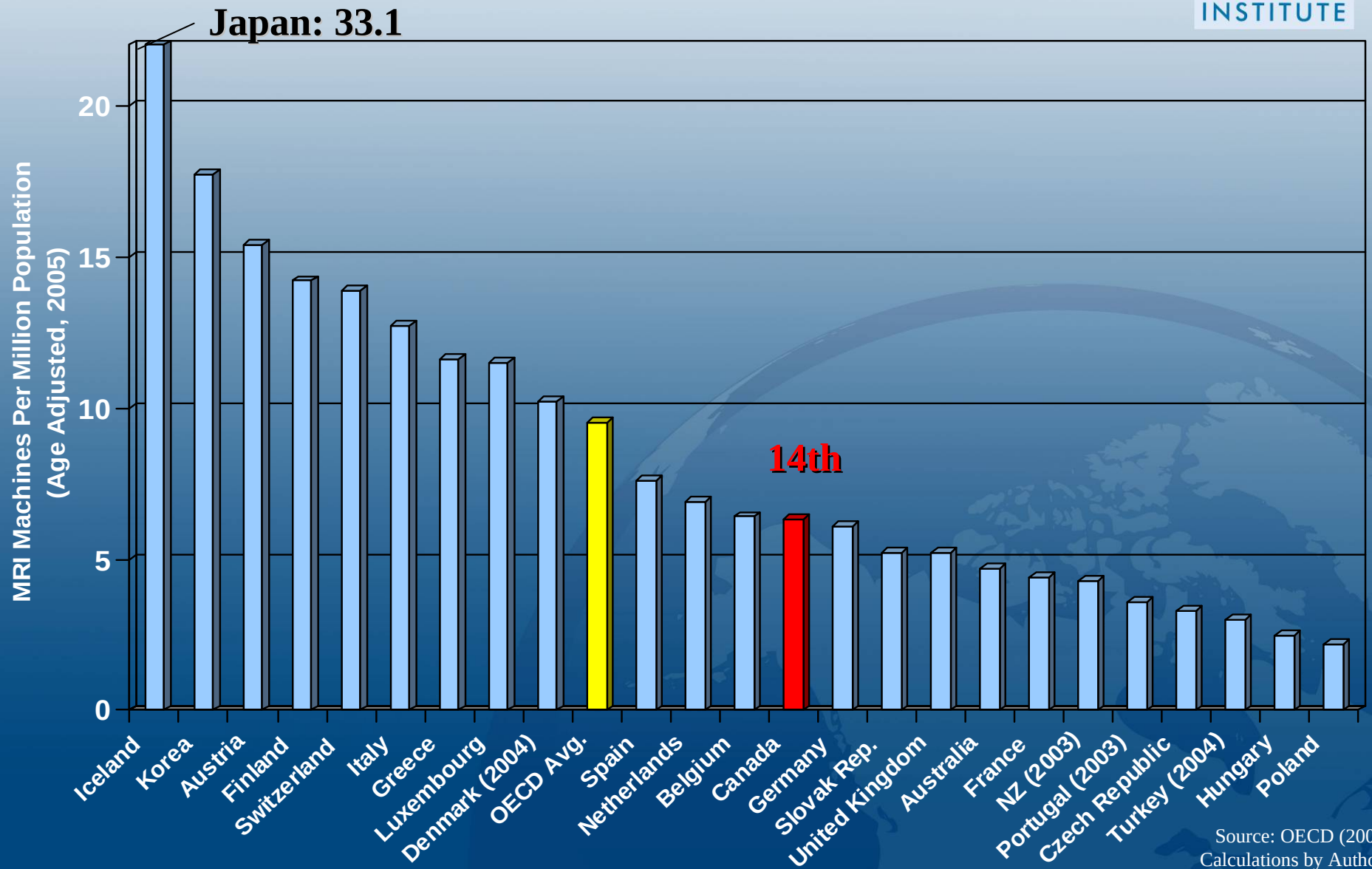




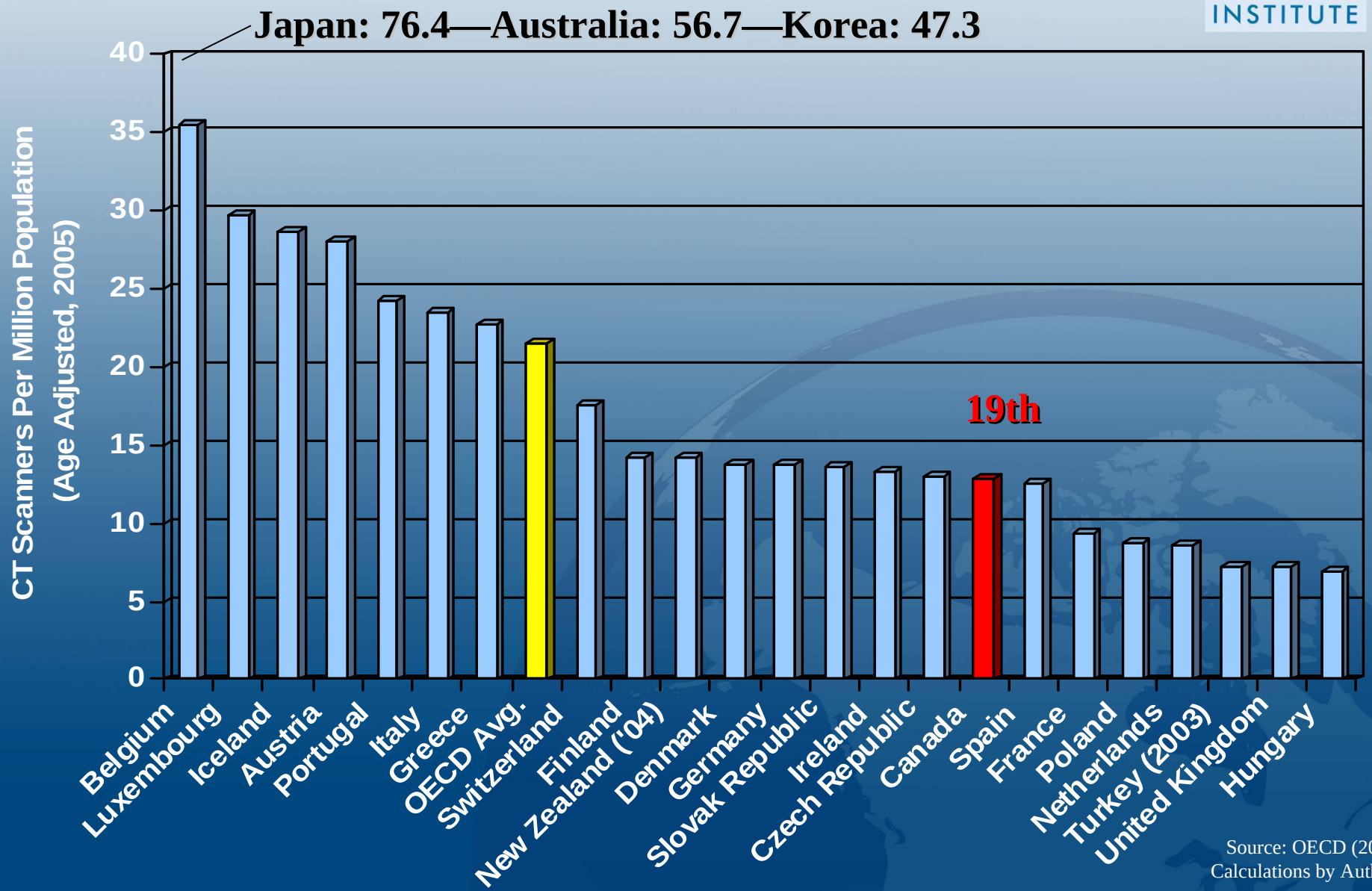


MRI Machines in the OECD



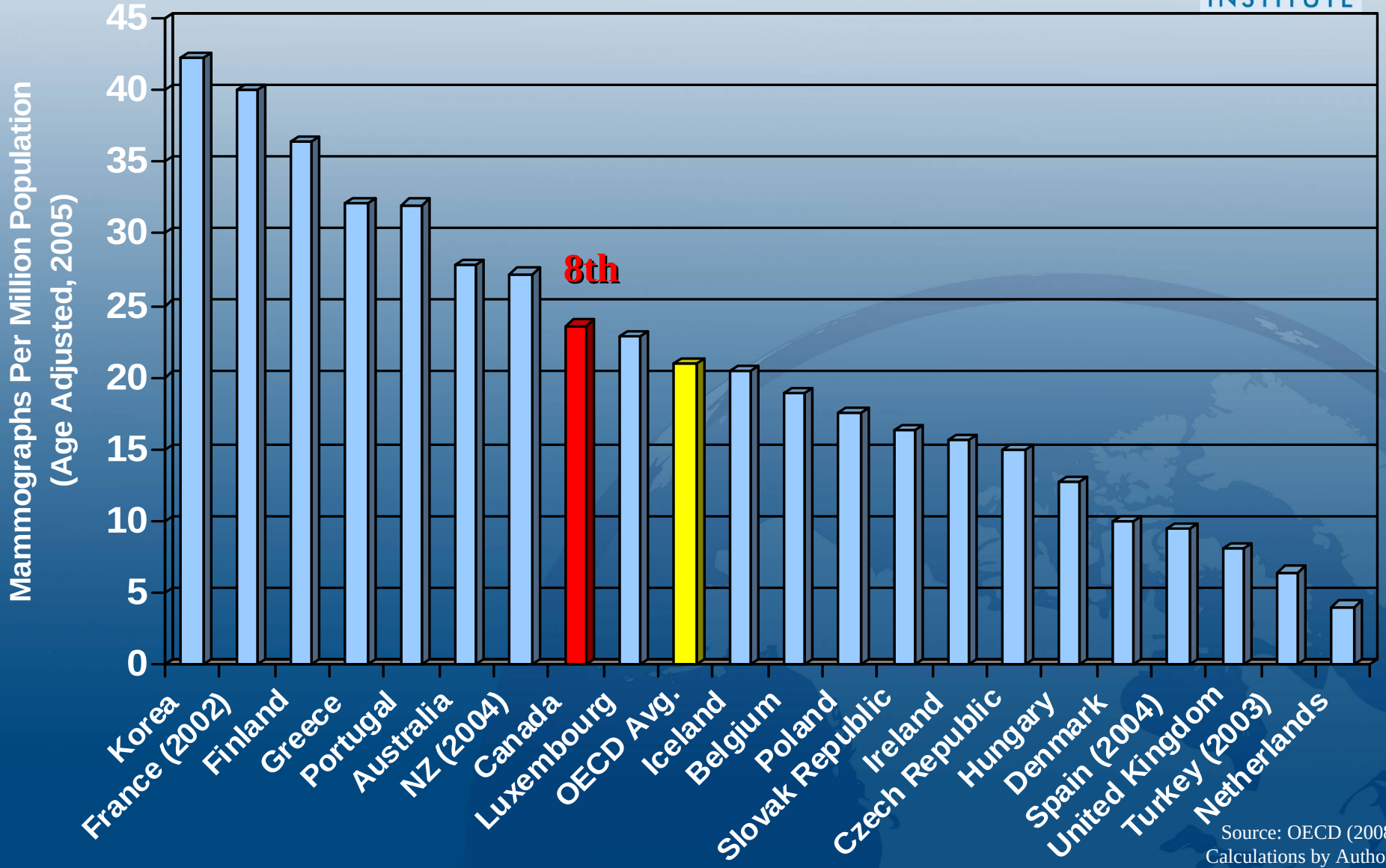
Source: OECD (2008)
Calculations by Authors

CT Scanners in the OECD



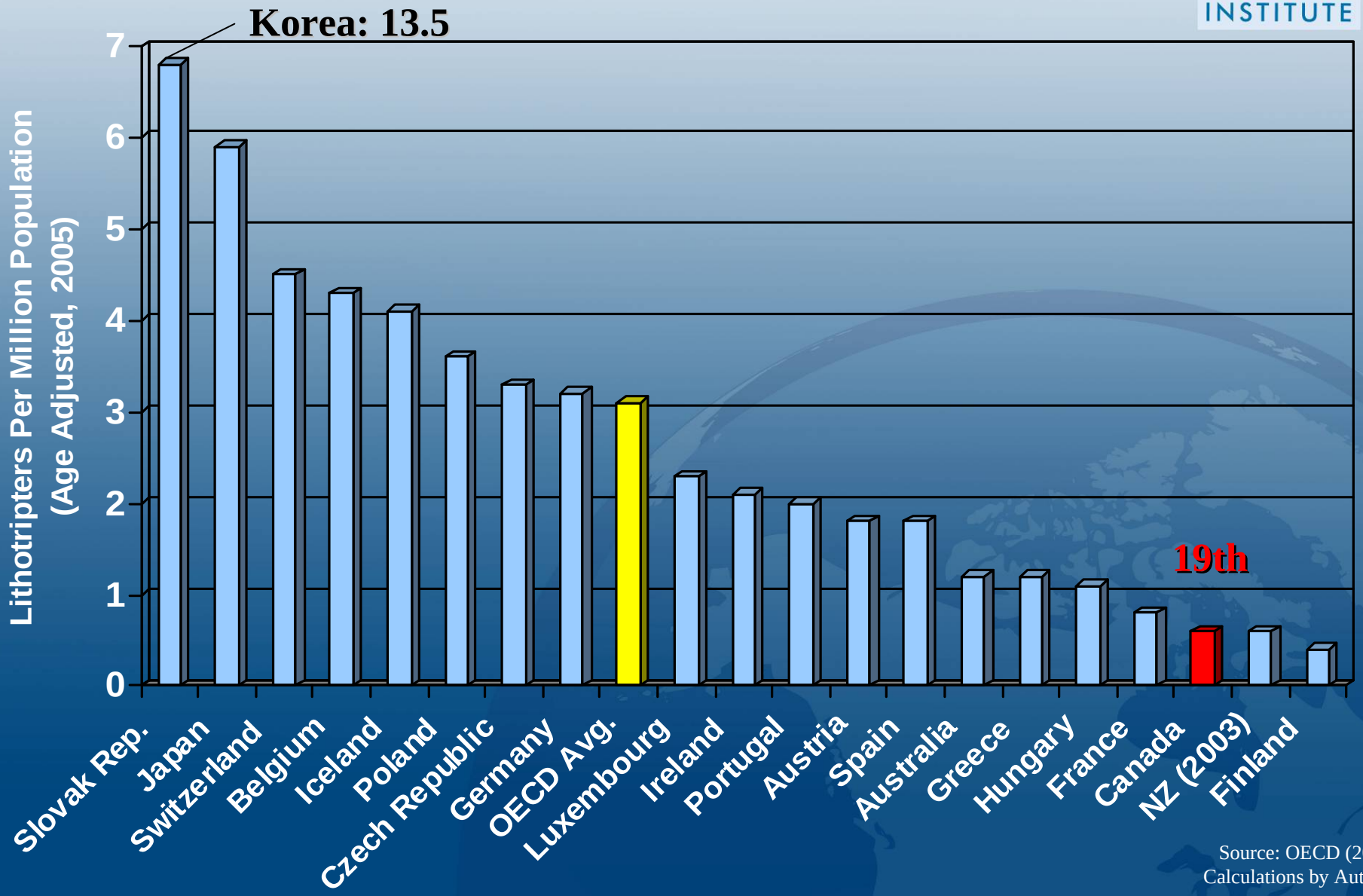
Source: OECD (2008)
Calculations by Authors

Mammographs in the OECD



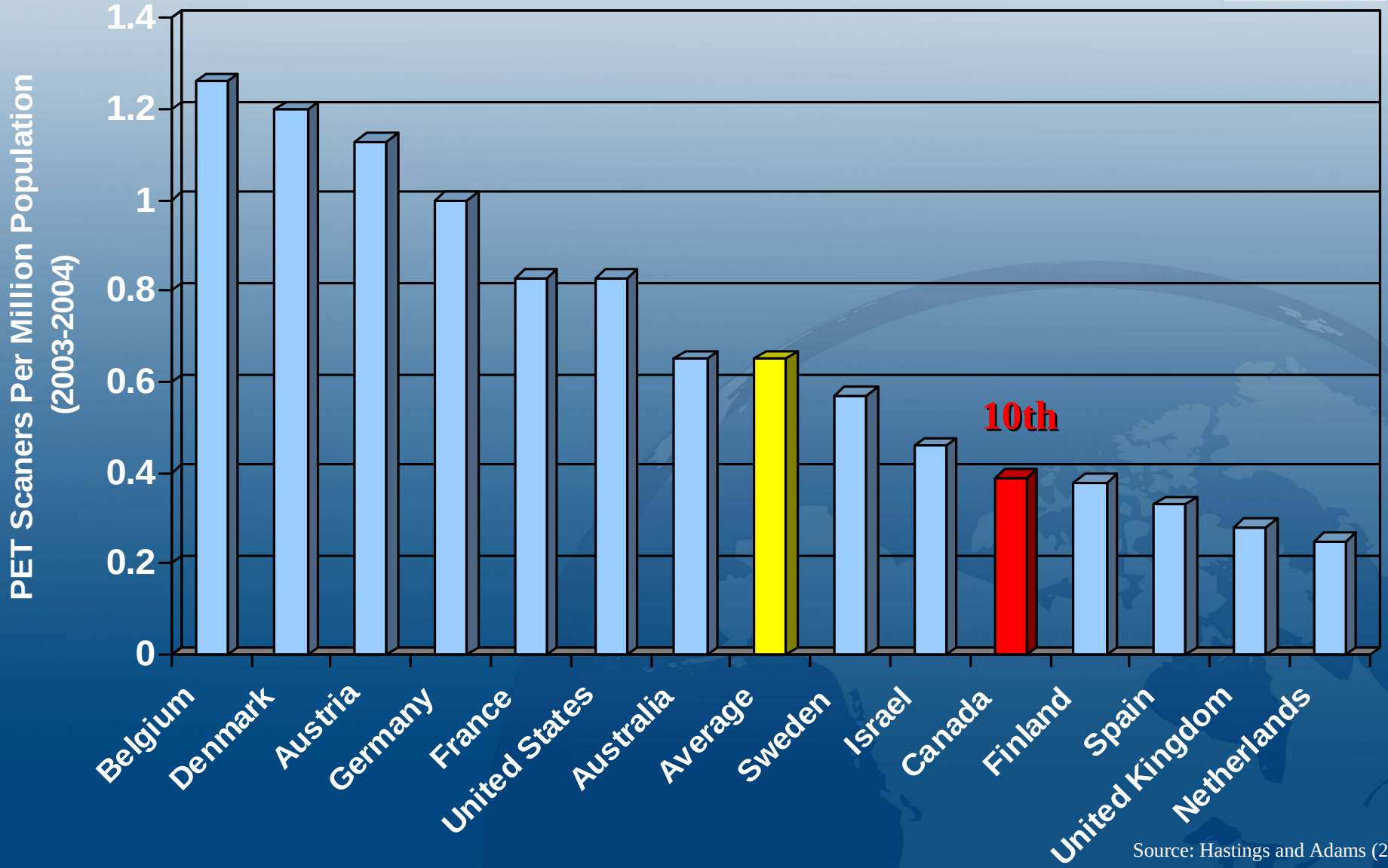
Source: OECD (2008)
Calculations by Authors

Lithotriptors in the OECD



Source: OECD (2008)
Calculations by Authors

PET Scanners in the OECD



Source: Hastings and Adams (2006)

International Comparisons

- Harriman et al., 1999
  - 21st out of 28 OECD nations in CT scanners
  - 19th out of 22 in lithotriptors
  - 19th out of 27 in MRIs
  - Technological diffusion of MRIs much less rapid in Canada than other countries
- OECD, 2008
  - MRIs: 6.2 in Canada vs. 10.2 per million avg.
  - CT scanners: 12.0 in Canada vs. 19.2 per million avg.

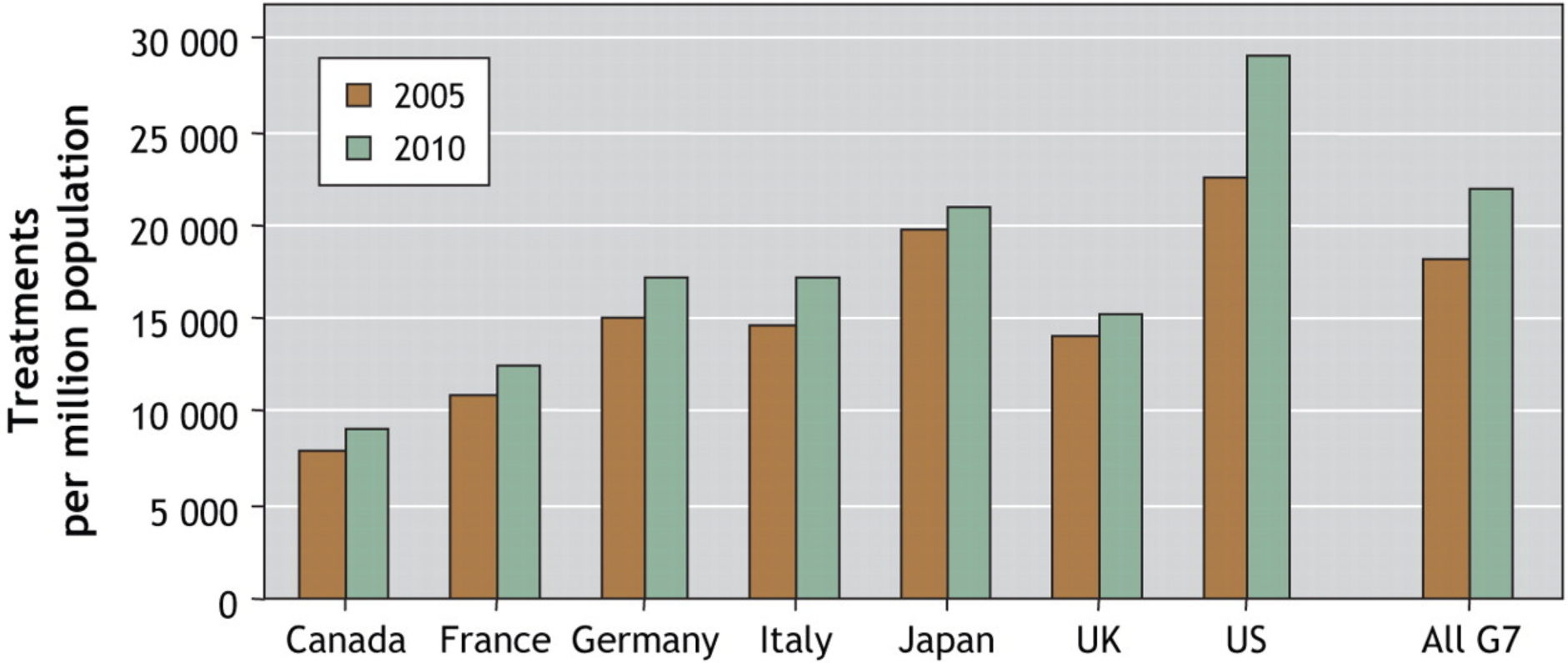
International Comparisons

- CIHI, 2008
  - MRIs: 6.1 in Canada vs. 6.9 per million median
  - CT scanners: 12.1 in Canada vs. 14.7 per million median
- Rublee, 1994
  - Out of 6 selected medical technologies, US outperformed Canada in all, Germany outperformed Canada in 3

International Comparisons

- Birnie et al., 2007
  - Rate of implantation of ICD in Canada: 16.6% on average 94/95 – 2002/03 (5.4% in 1994/95 to 26.7% in 2002/03)
  - Rate of implantation in US: 30.2% on average (9.7% in 1994/95 to 42.0% in 2002/03, and greater than the rate in Canada each year)
- TECH Research Network, 2001
  - Canada: late adopter in use of intensive heart attack care procedures
  - Rate of adoption slower than other nations in late adopter/rapid expansion group (Australia, Belgium, France, Italy, Singapore, and Taiwan) – expansion rate too slow to catch up to US.

Estimated numbers of interventional radiology treatments per million population in G7 nations in 2005 and predicted numbers for 2010



Baerlocher, M. O. CMAJ 2007;176:616

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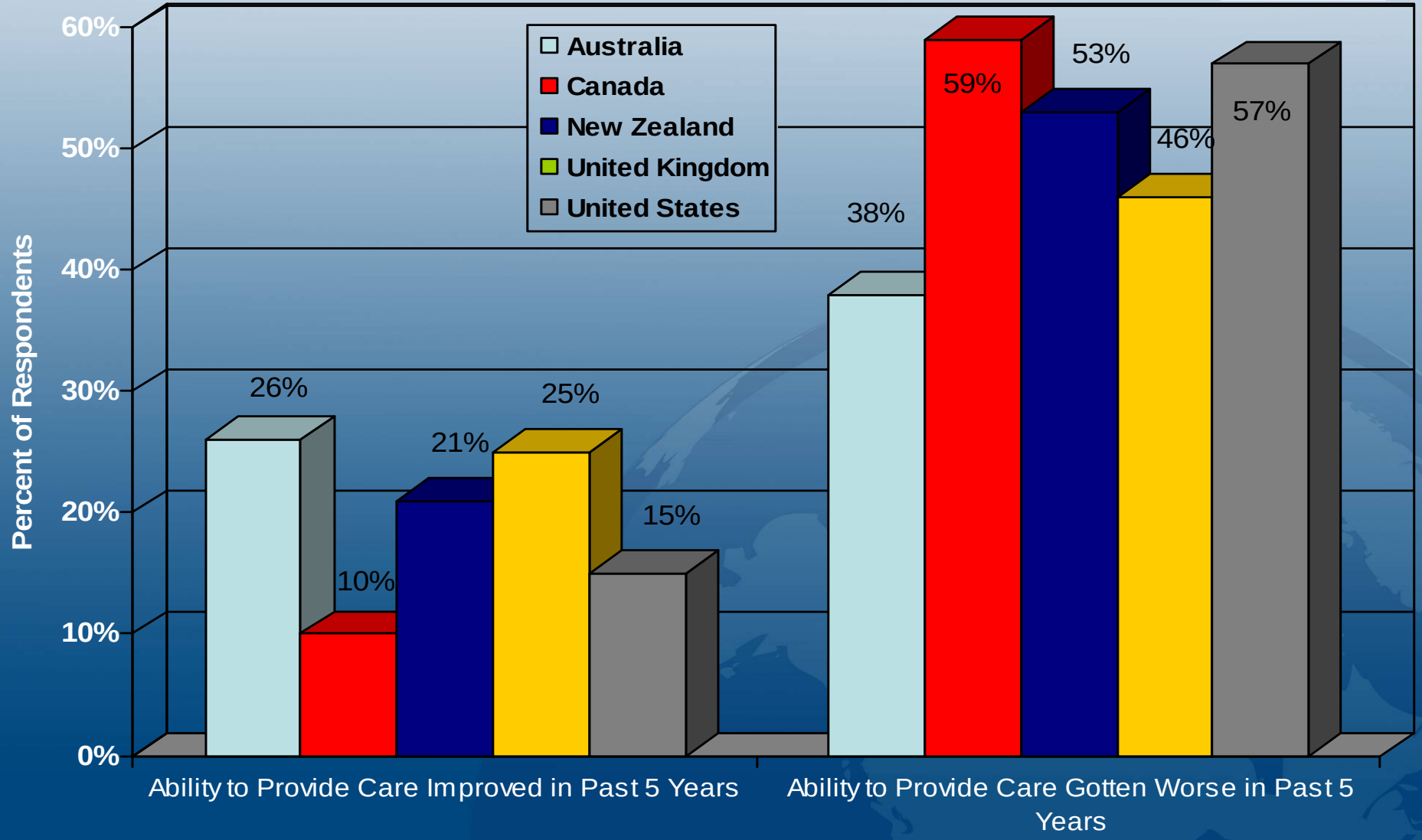
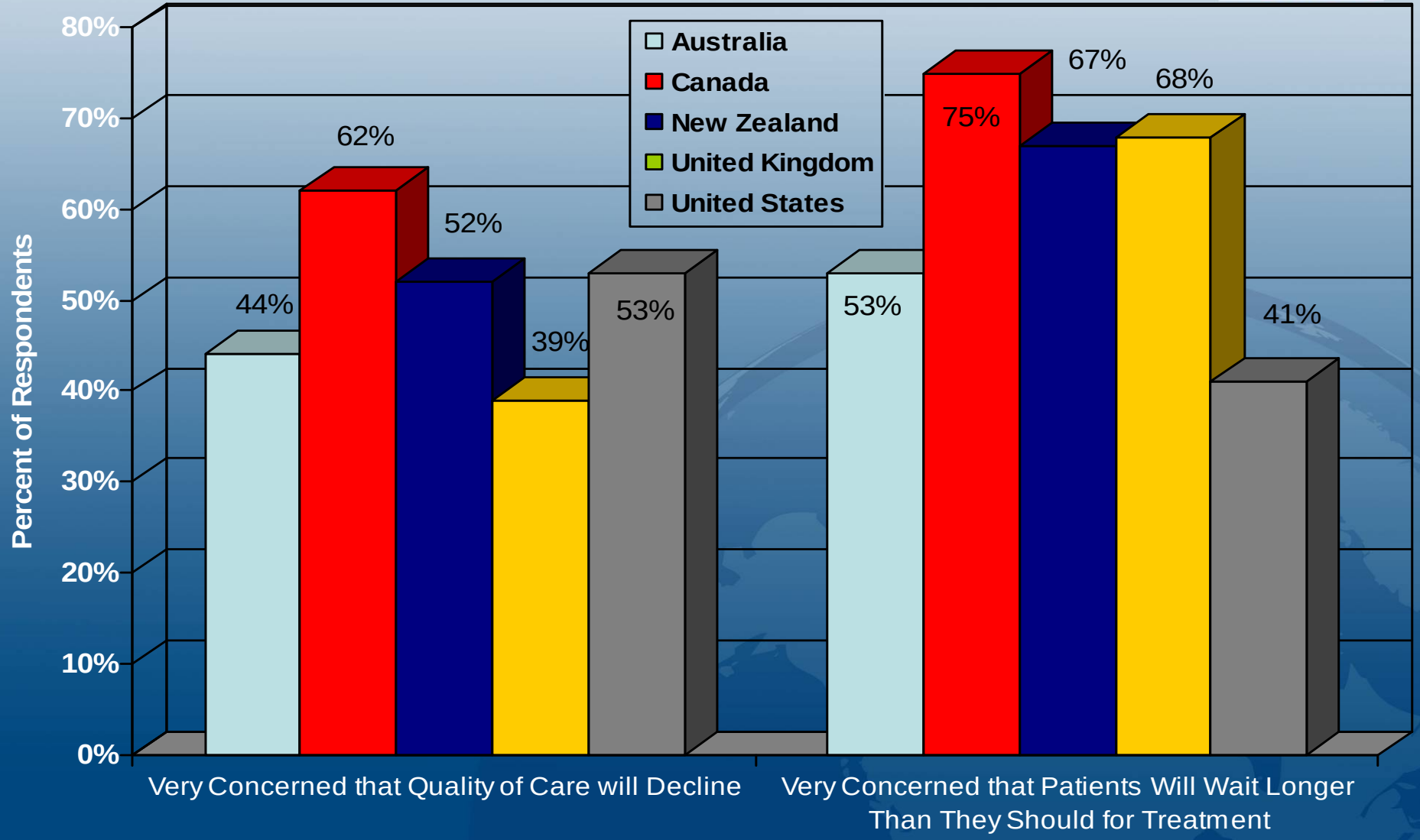
Physician's Views: Ability to Provide Care



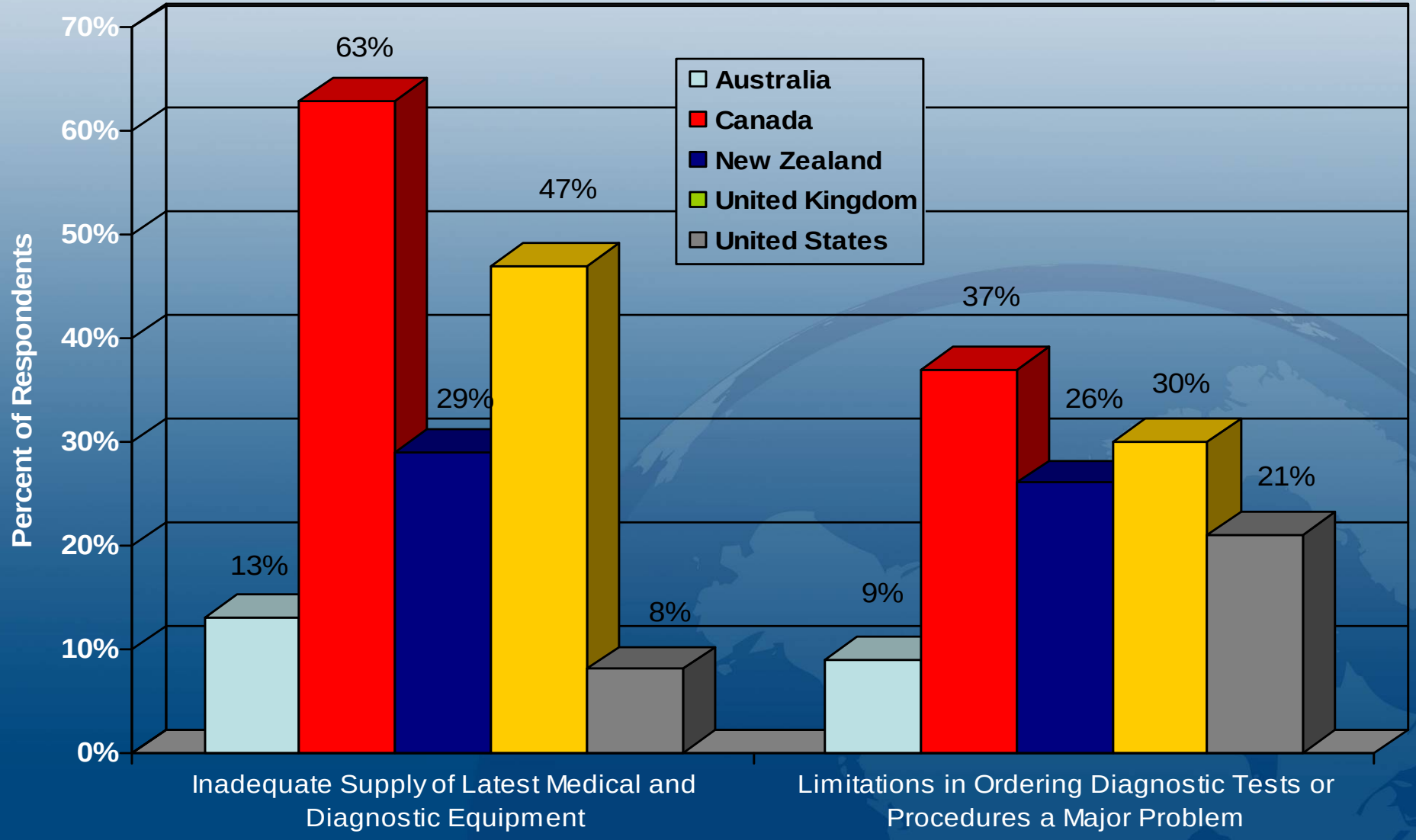
Source: Blendon et al. (2001)

Physician's Views: Quality and Queues



Source: Blendon et al. (2001)

Physician's Views: Access to Technology



Source: Blendon et al. (2001)

Access to Technology in Canada

- Canada often lags other developed nations in access to modern medical technologies
- Canada is a late adopter of advanced medical technologies
- Canada lags a number of other nations in the rate of expansion in inventories or applications of technology, after they have been introduced

Age and Sophistication of Canada's Technology Inventory

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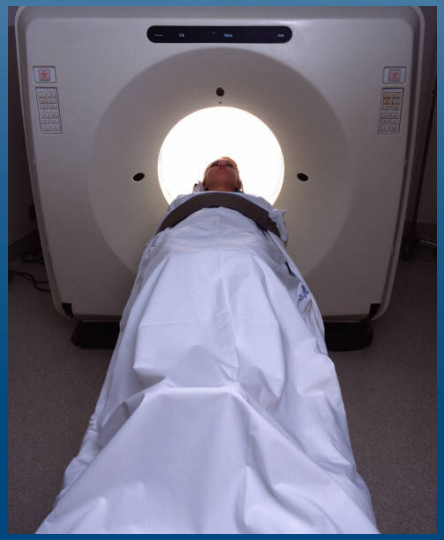
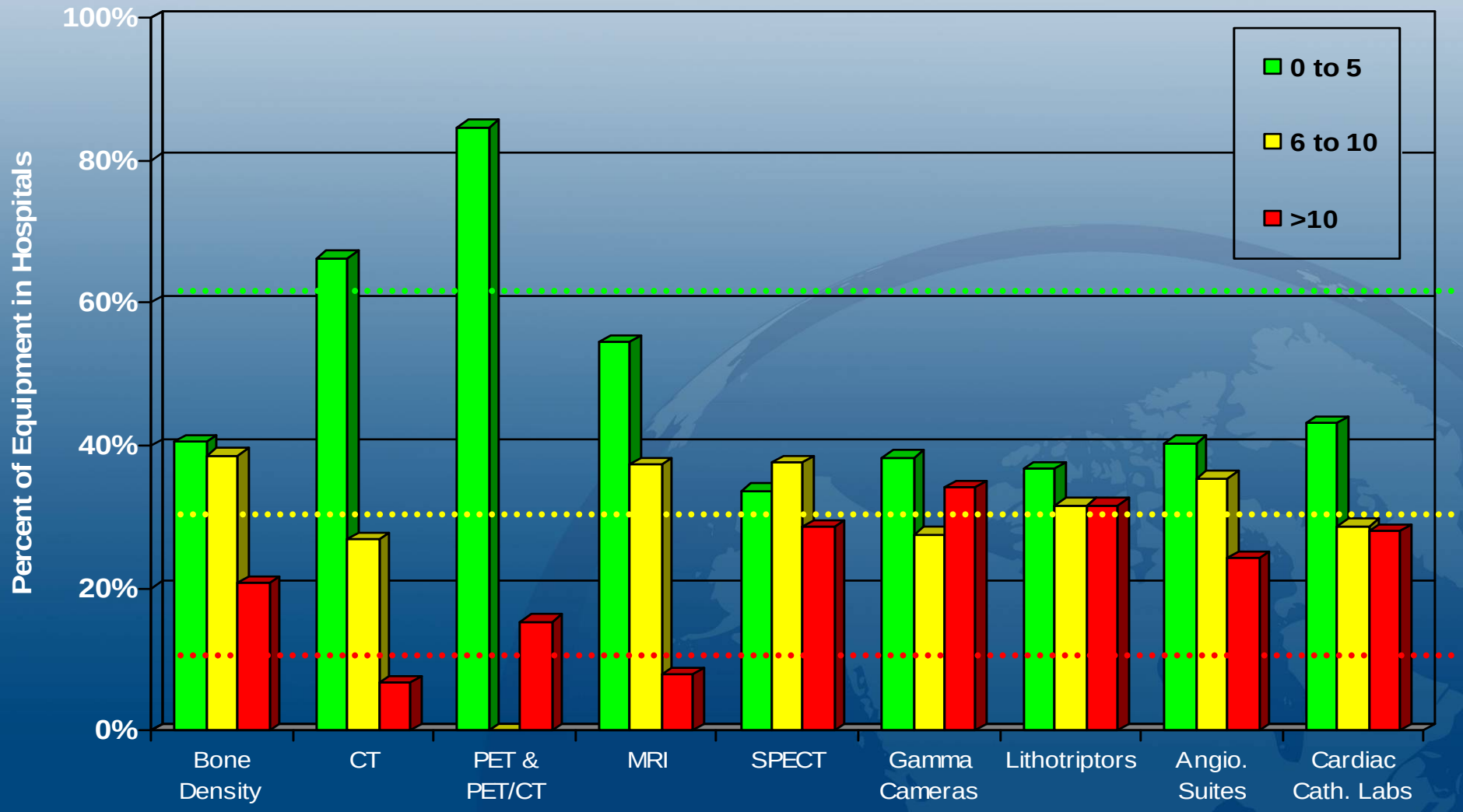


Quality is More than Numbers

- Older medical technologies…
  - Are less reliable
  - Need more maintenance
  - Produce lower quality output & are less accurate
  - Can be less safe for patients and operators

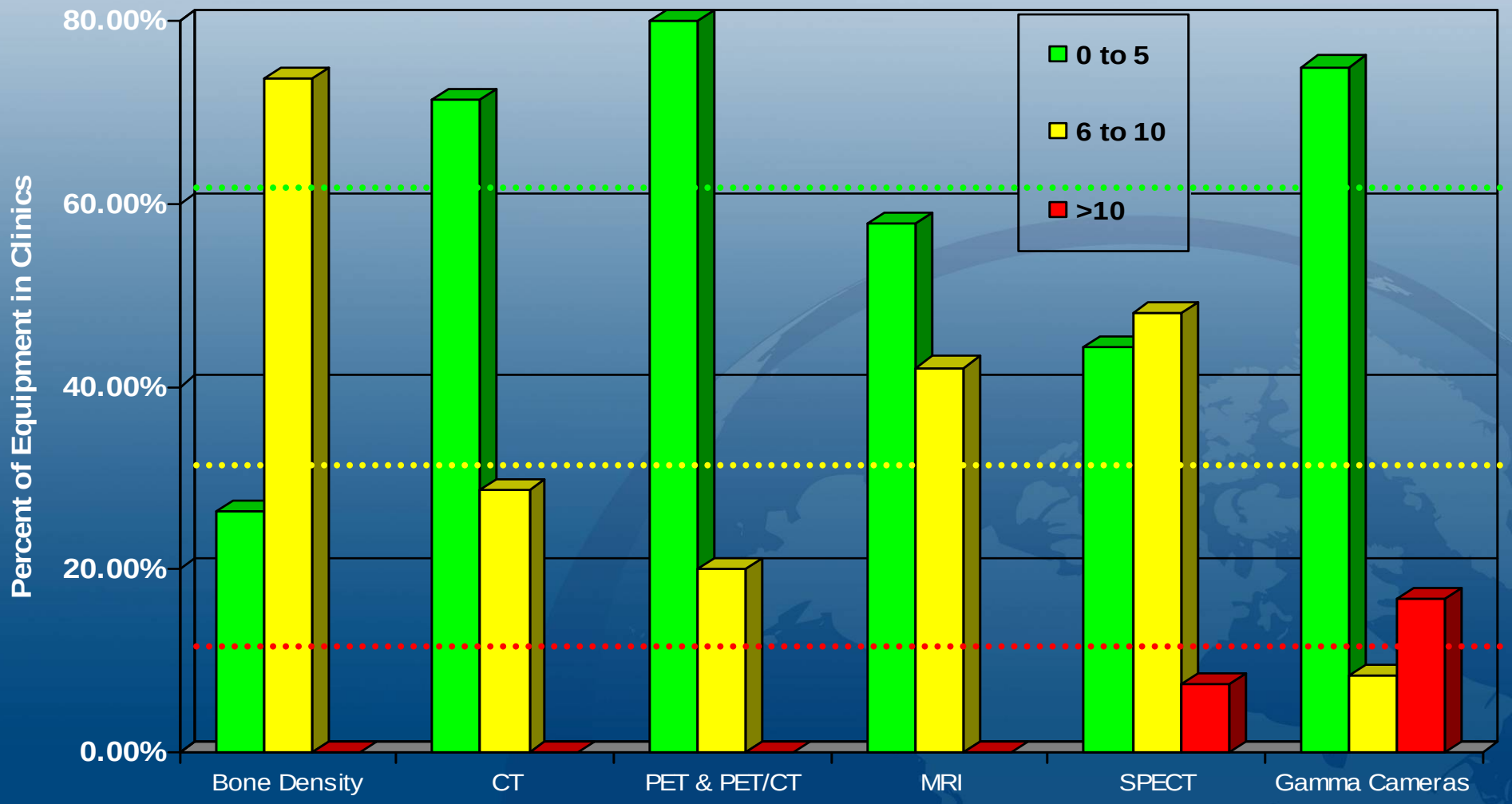
- Newer, more sophisticated technologies…
  - Can allow for shorter examination / operation times
  - Produce higher quality output
  - Allow for additional services

Age of equipment: ECCREI Guidelines



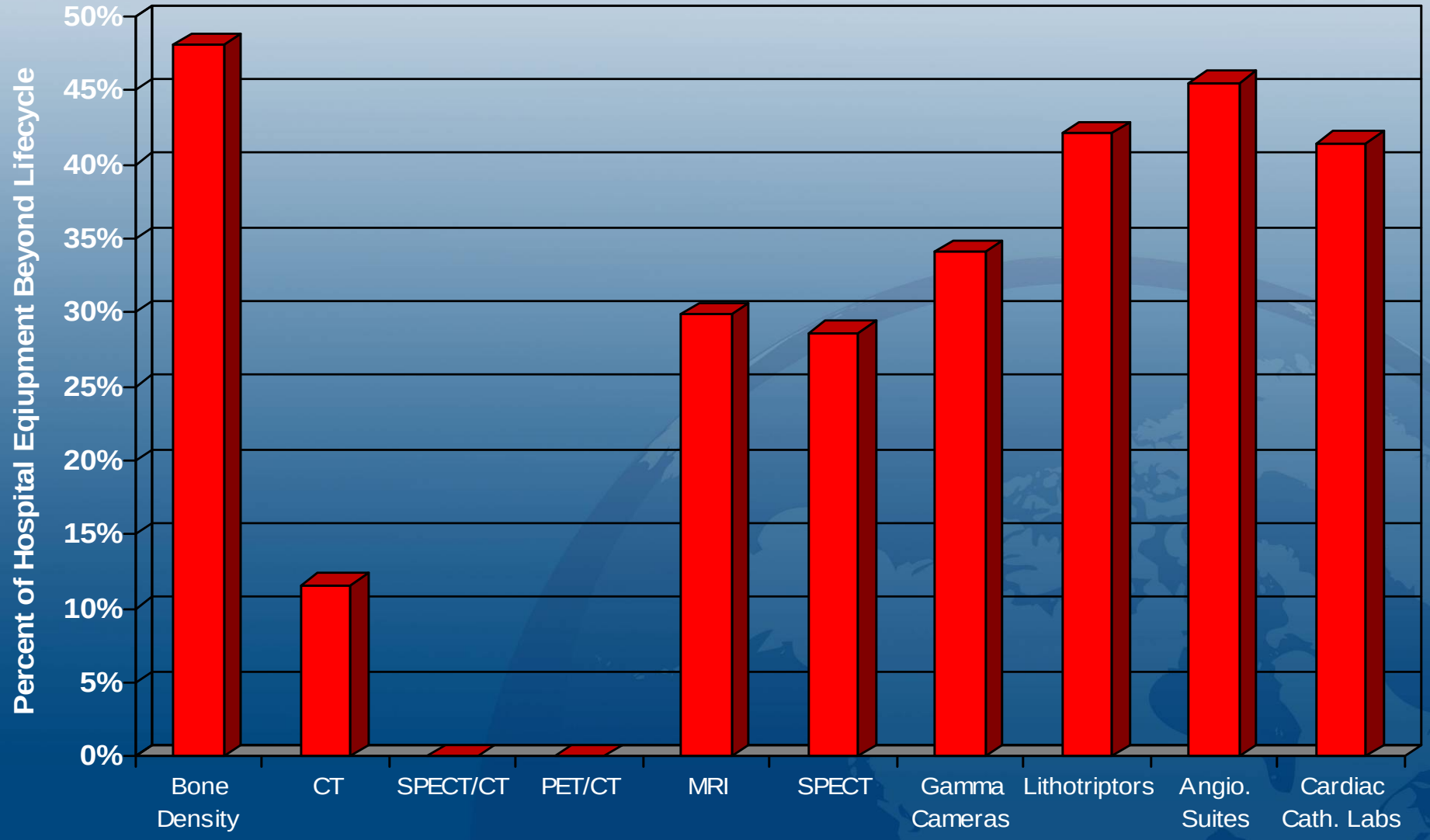
Source: CIHI. (2008), calculations by authors

Age of equipment: ECCREI Guidelines



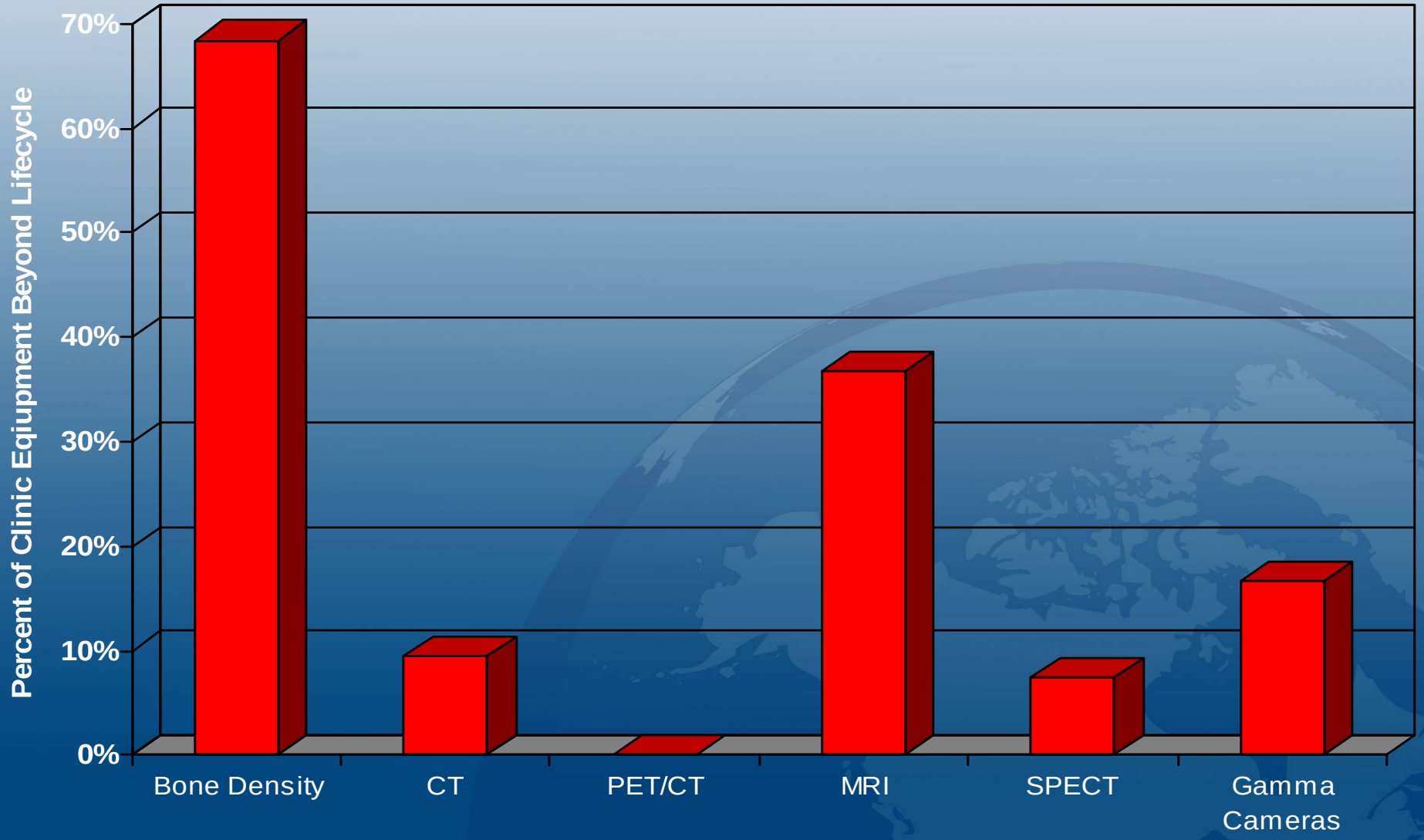
Source: CIHI. (2008), calculations by authors

Age of equipment: CAR Guidelines



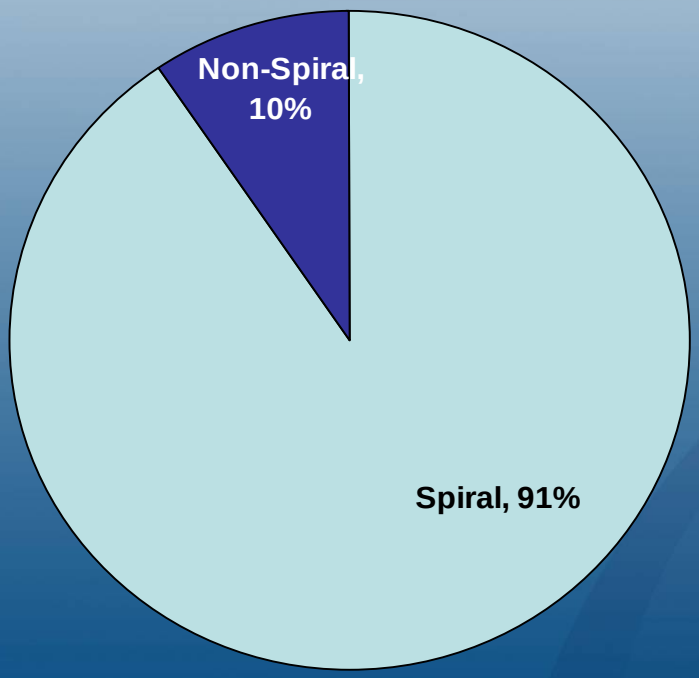
Source: CIHI. (2008), calculations by authors

Age of equipment: CAR Guidelines

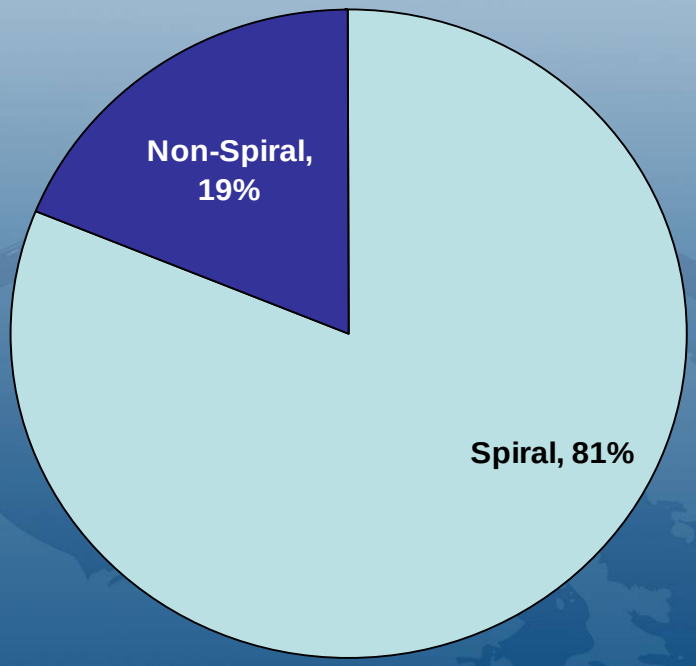


Source: CIHI. (2008), calculations by authors

Sophistication of CT Scanners: Spiral vs. Non-Spiral



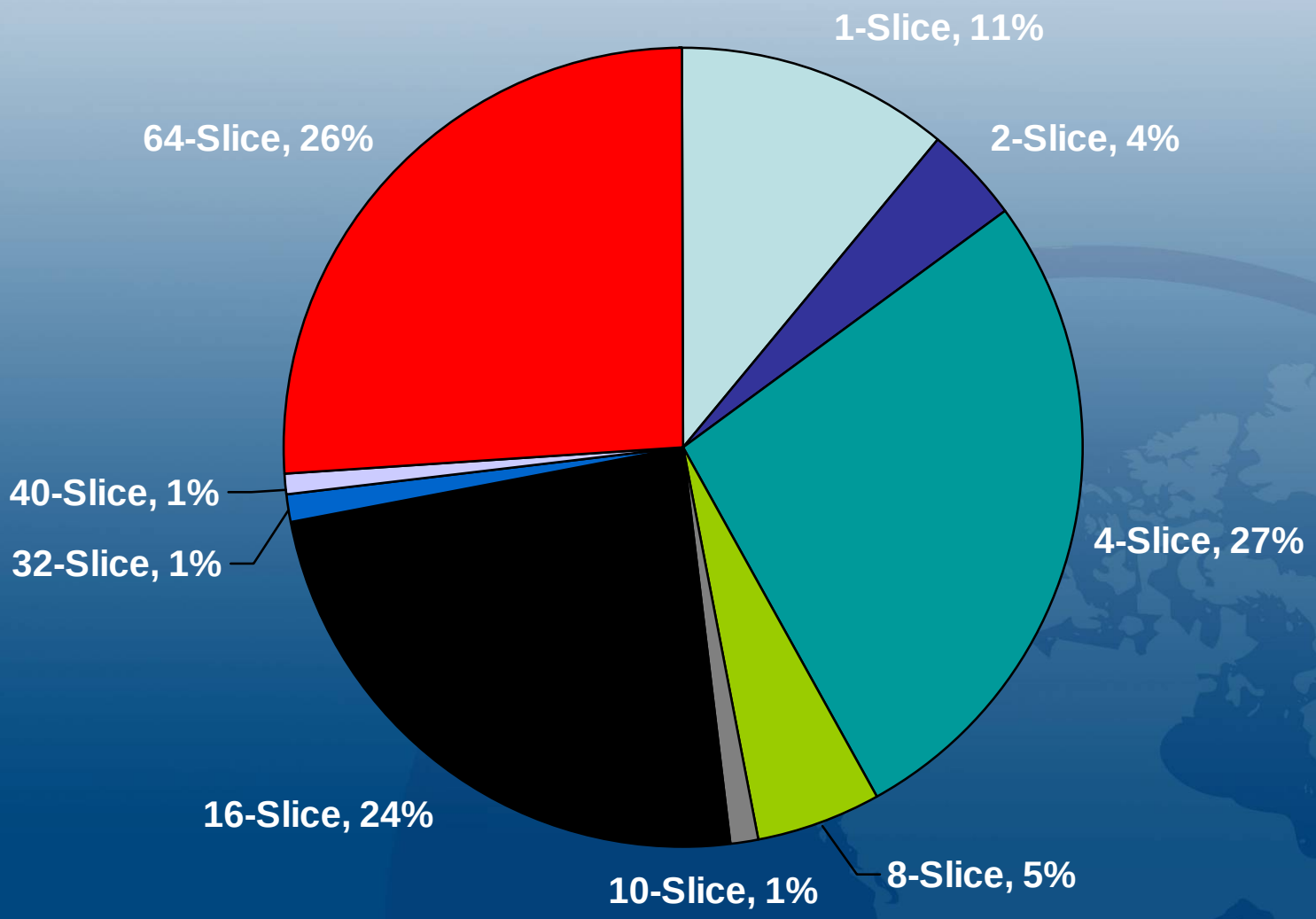
Hospital-Based



Free-Standing Facility-Based

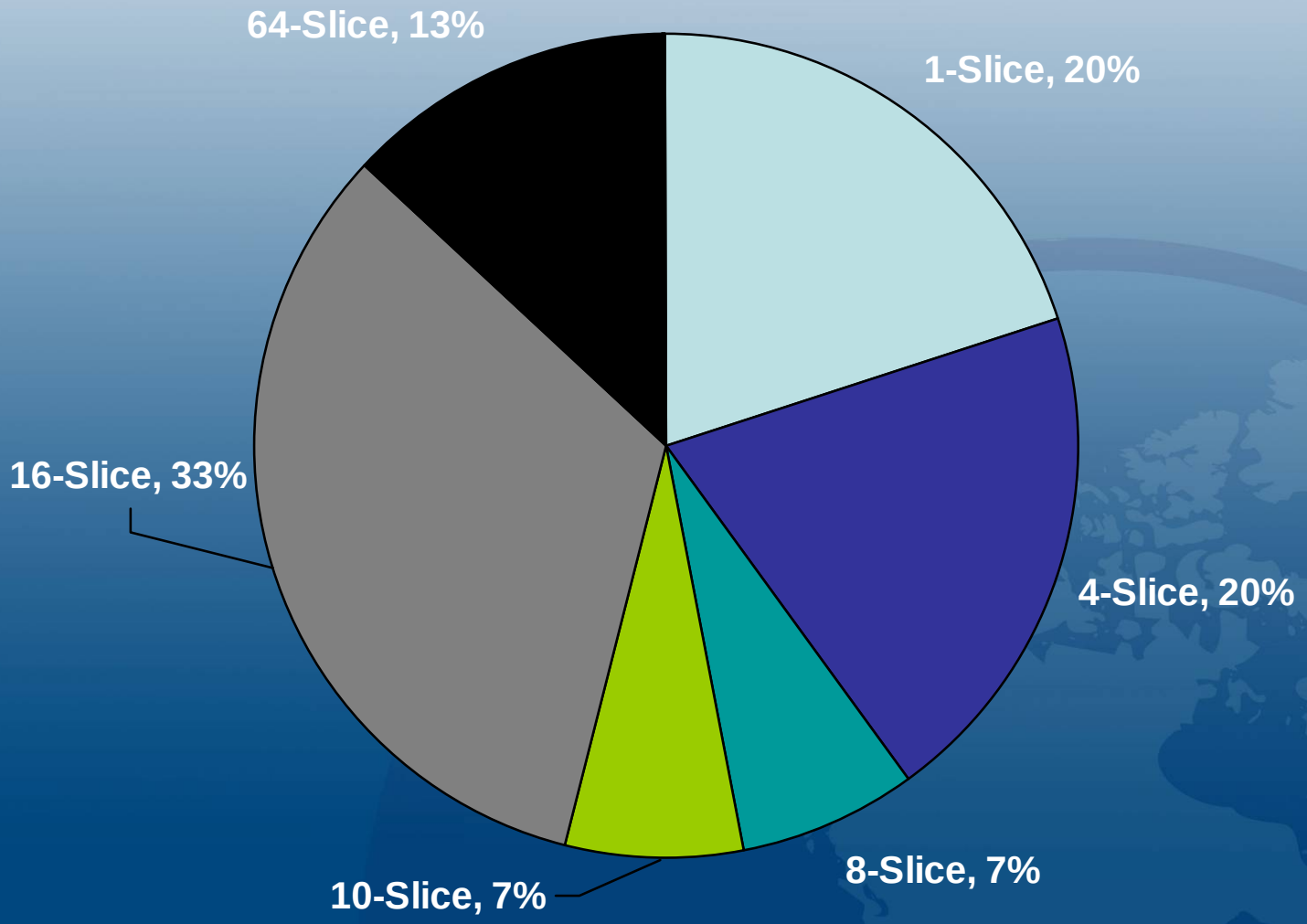
Source: CIHI. (2008)

Sophistication of CT Scanners: Hospital-Based Inventory



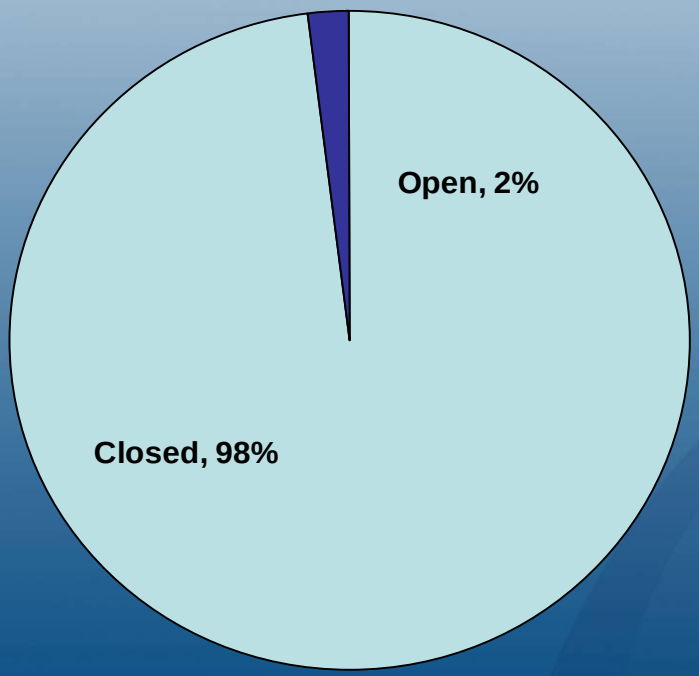
Source: CIHI. (2008)

Sophistication of CT Scanners: Clinic-Based Inventory

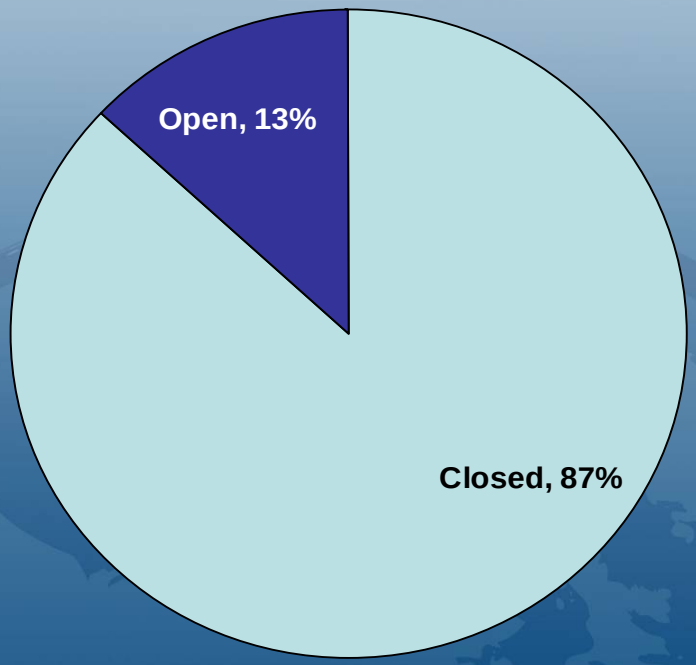


Source: CIHI. (2008)

Sophistication of MRI Machines: Open vs. Closed-Bore



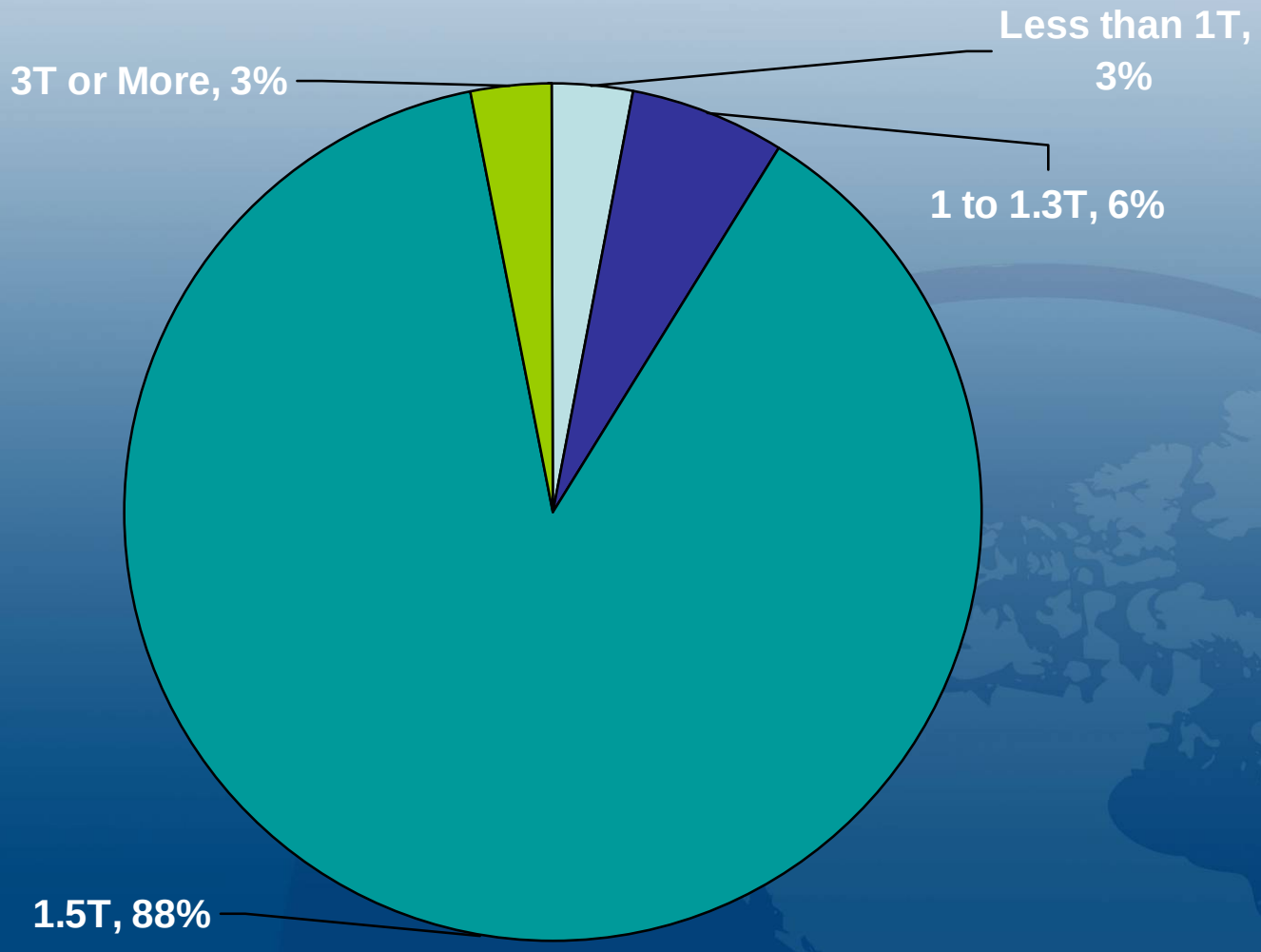
Hospital-Based



Free-Standing
Facility-Based

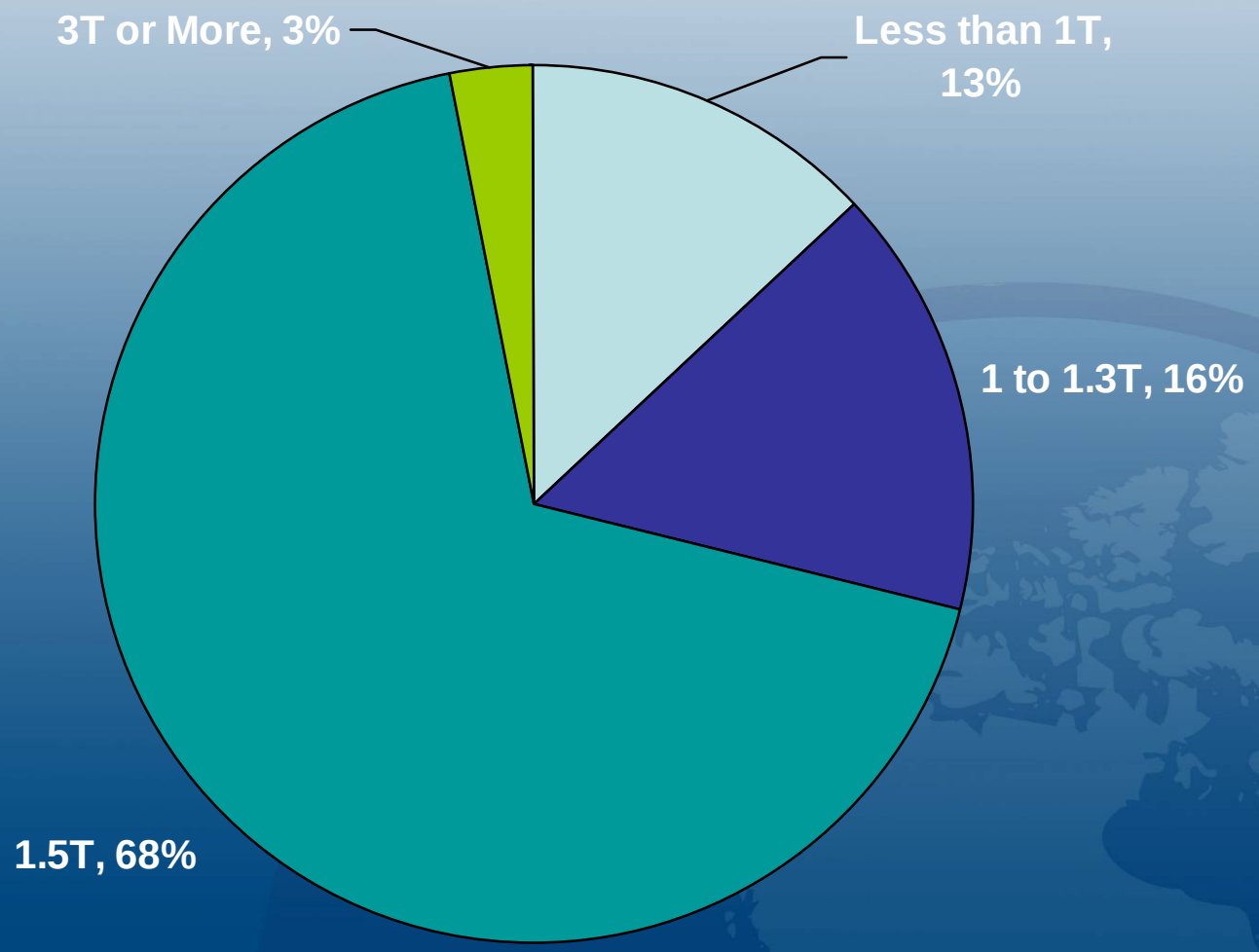
Source: CIHI. (2008)

Sophistication of MRI Machines: Hospital-Based Inventory



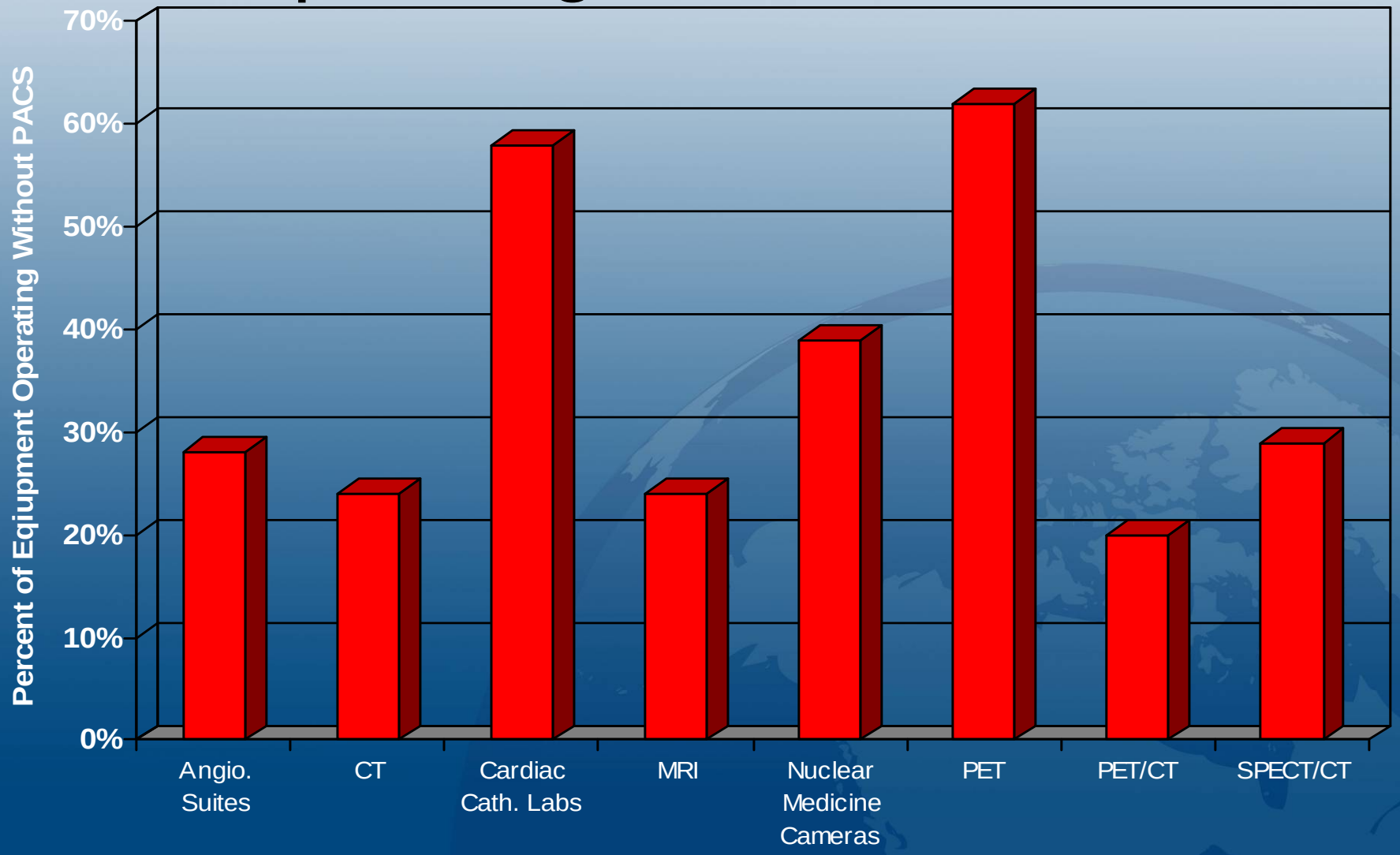
Source: CIHI. (2008)

Sophistication of MRI Machines: Clinic-Based Inventory



Source: CIHI. (2008)

Sophistication: Operating Without PACS



Source: CIHI. (2008), calculations by authors

Availability of Cutting-Edge Medical Technologies

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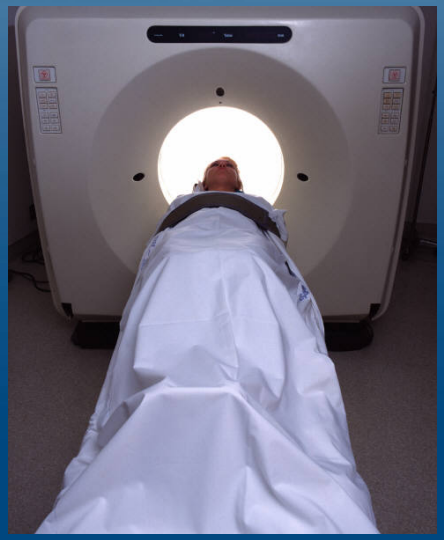
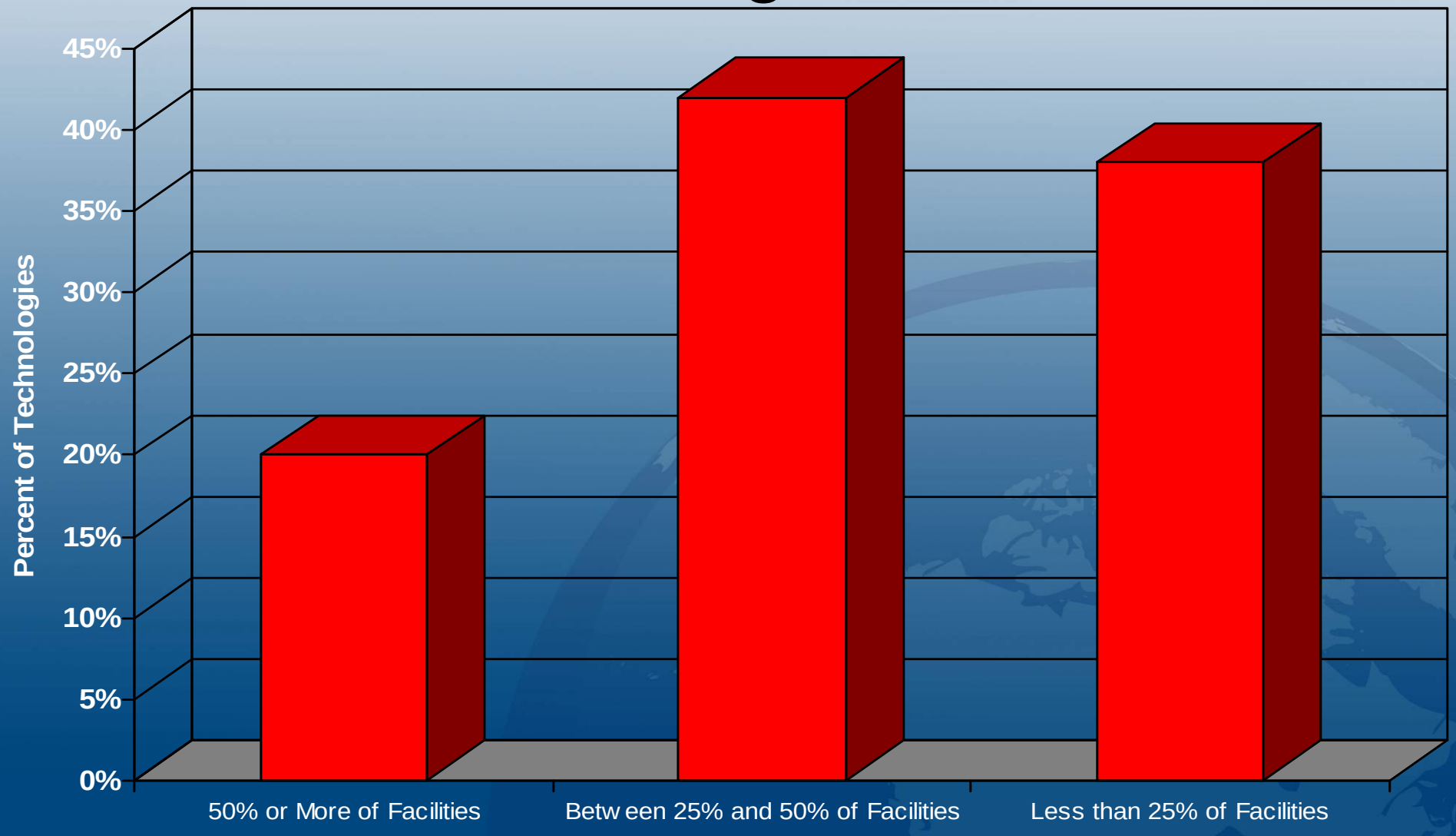


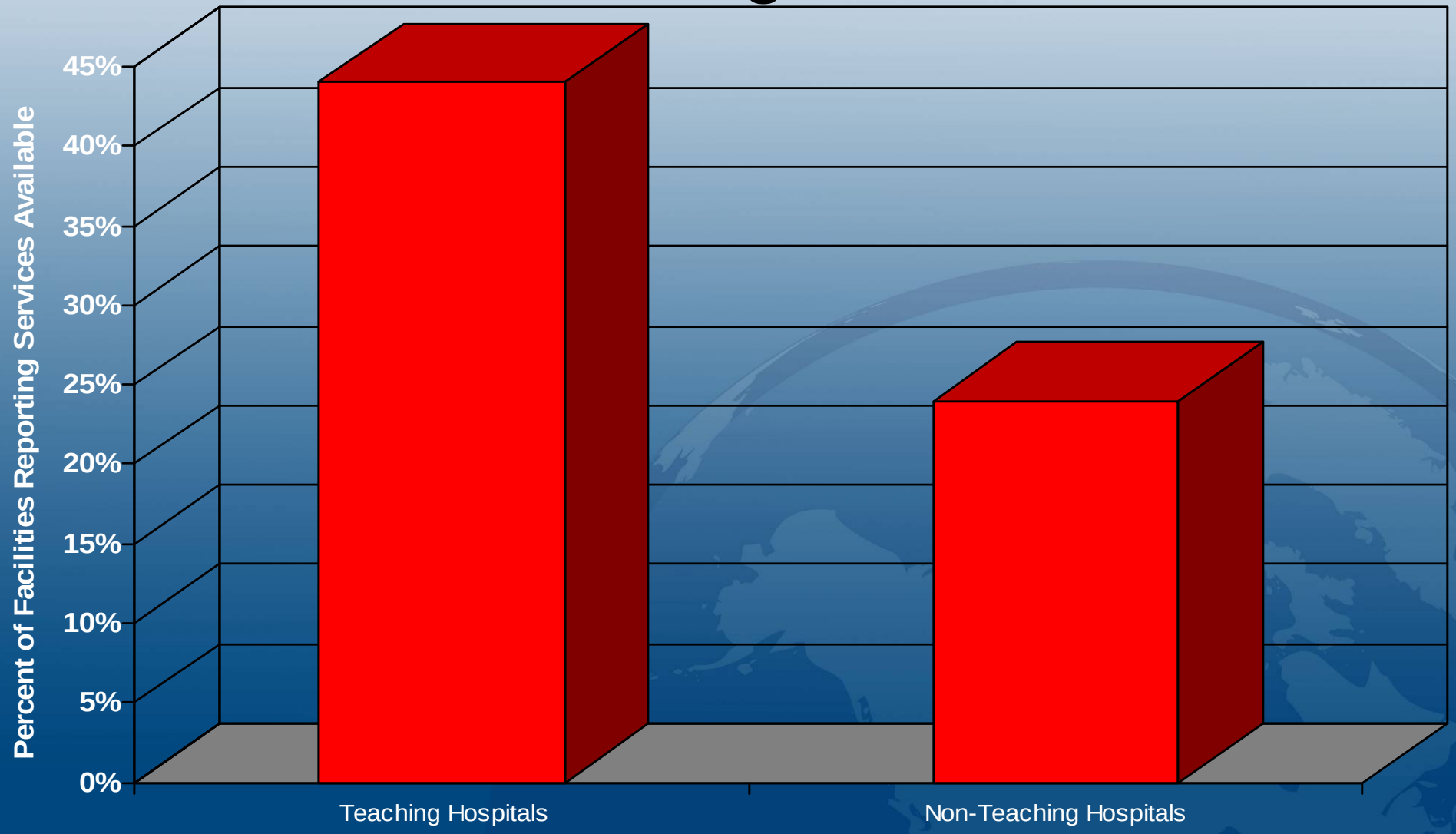
Survey of 50 Advanced Technologies

- Intraoperative Transesophageal Echocardiography
- Brachytherapy (Including the Use of Balloon Catheter)
- Cryotherapy
- Intraperitoneal Therapy for the Delivery of Chemotherapy
- Radiofrequency Ablation Systems
- Magnetic Resonance-guided Laser-Induced Interstitial Thermotherapy (MR-Guided LITT)
- Implantable Cardioverter Defibrillator
- External Counterpulsation
- Catheter Guided Retriever for Manual Removal of Blood Clots
- Coronary Brachytherapy
- Drug-eluting Stents
- Endovascular Stent Graft Repair
- Radiofrequency Ablation System for Clearing Coronary Arteries
- Positron Emission Tomography with Computer Tomography (PET/CT)
- Open MRI
- MRI Breast, Knee, and Hand and Forearm Coils
- Dynamic Contrast Enhanced MRI
- Magnetic Resonance Spectroscopy
- Echocardiography with Harmonic Imaging
- Computed Tomography (CT) Laser Mammography
- Ultrasound Transient Elastography System for Diagnosing Liver Fibrosis
- Percutaneous Vertebroplasty
- Automated Medication Dispensing Systems
- High Intensity Focused Ultrasound Machines
- Holmium Lasers
- CT Virtual Colonoscopy
- CT Virtual Angiography
- Intraoperative CT
- Intraoperative MRI
- Intraoperative Ultrasound
- Intraoperative Fluoroscope
- Computer-Aided Detection Systems for Diagnostic Scans and Images
- Genetic Testing (Adult, Children, Prenatal)
- Pharmacogenomic Therapy
- Wireless Capsule Endoscopy
- GI Endoscopic Ultrasound
- GI Endoscopic Ultrasound Guided Fine Needle Aspiration
- Surgical Robots
- Antibiotic-Coated Central Venous Catheters
- Minilaparoscopy 3 mm or less
- Gamma Knife
- Frameless Stereotaxy
- Coil Embolization for Aneurysms
- Optical Coherence Tomography
- 3-D Corneal Tomography
- Multifocal Electroretinography
- Retinal Nerve Fiber Analysis
- 3D Image Guided Sinus Surgery

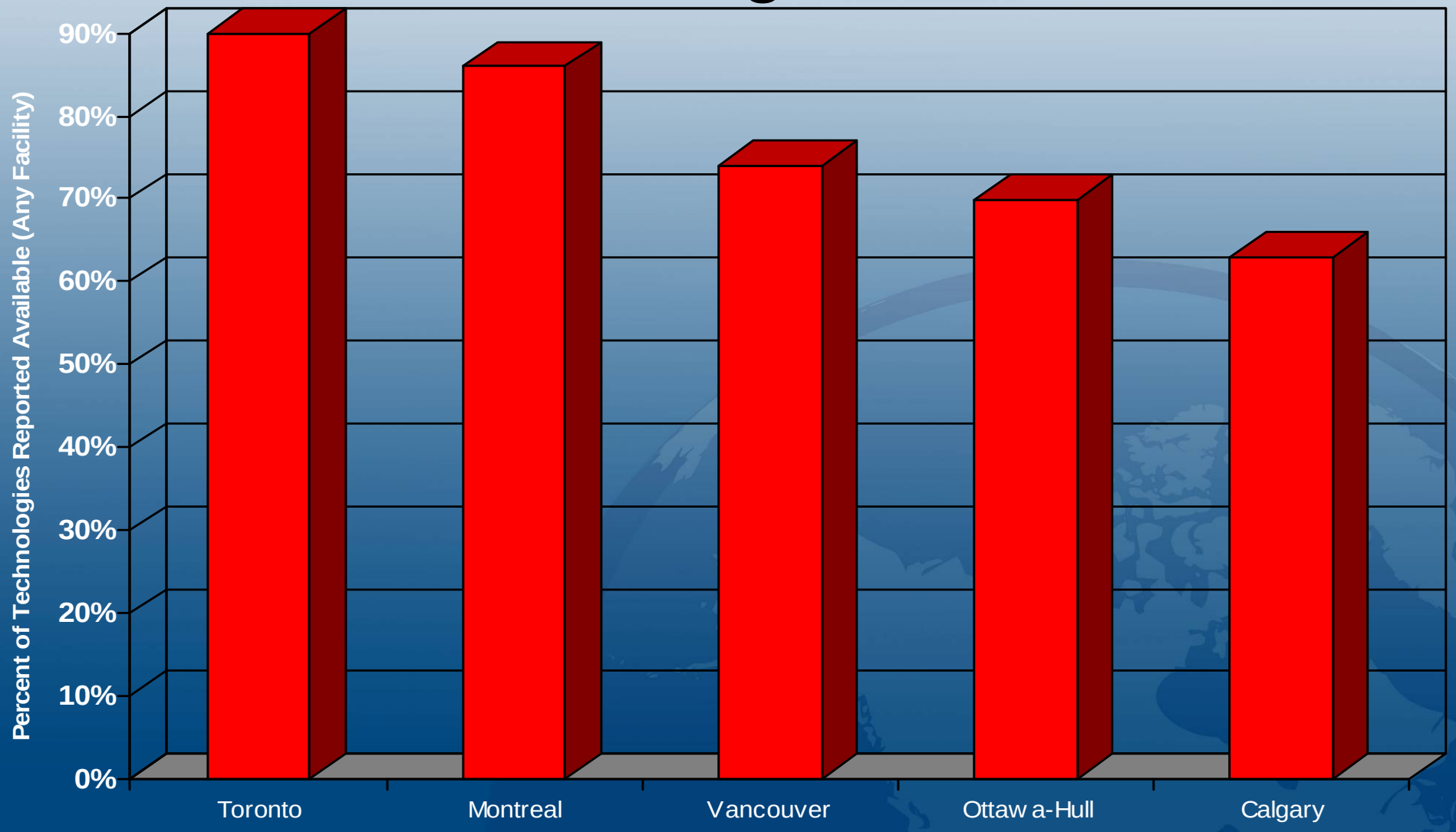
Availability of Advanced Technologies



Availability of Advanced Technologies



Availability of Advanced Technologies



Consequences

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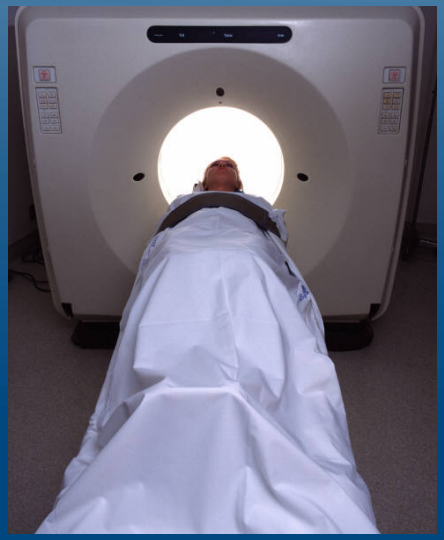
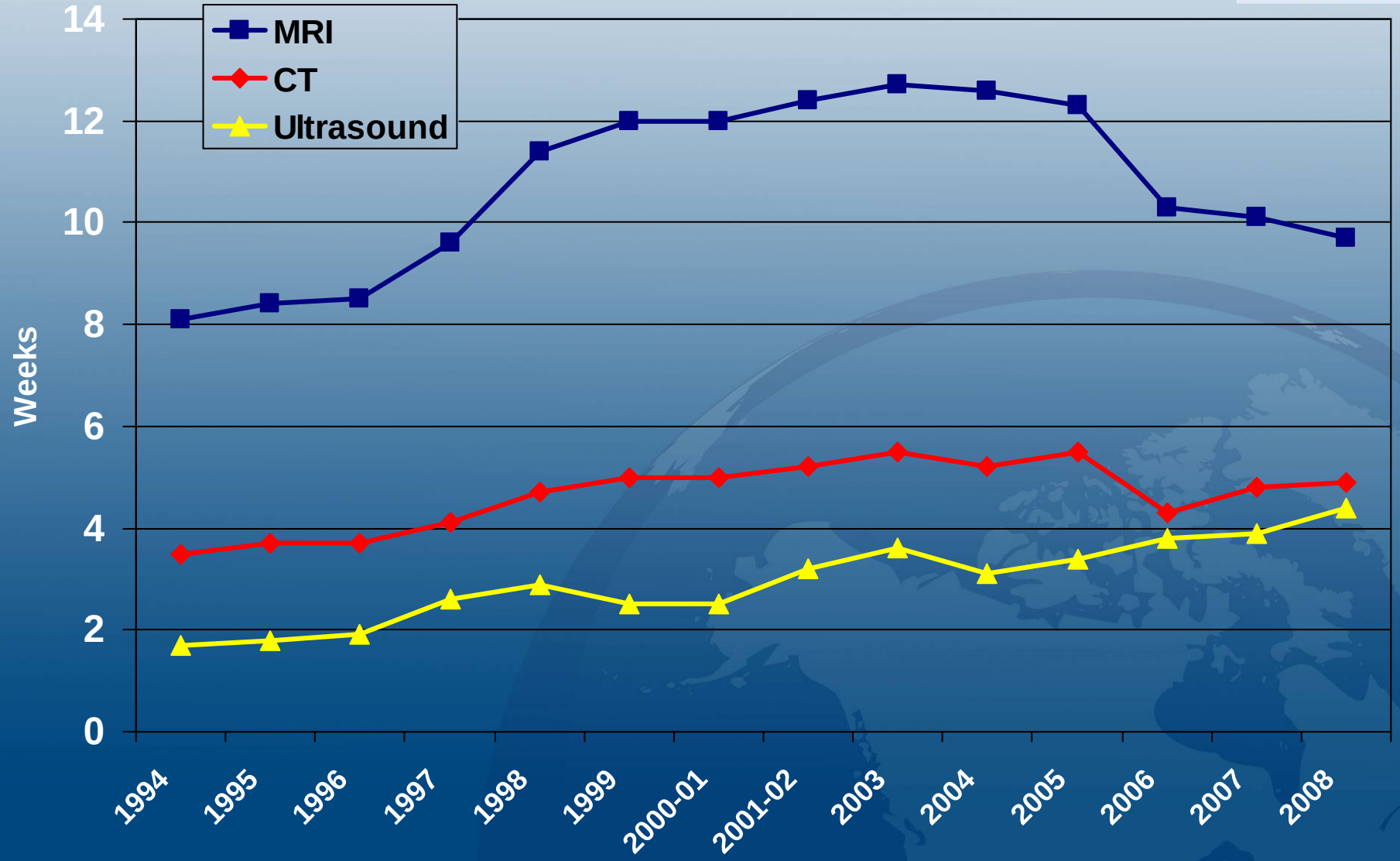


The Patient's Perspective

- Less sophisticated diagnosis
- More invasive treatments
- Need to travel abroad for life-saving and life-extending care
- Wait times/later diagnosis

Wait Times for Diagnostic Technology



The Students' and Payers' Perspectives

- Lack of equipment in Canada affects training/expertise
- Inefficient use of professionals
- Inefficient use of available operating time

How Did This Happen?

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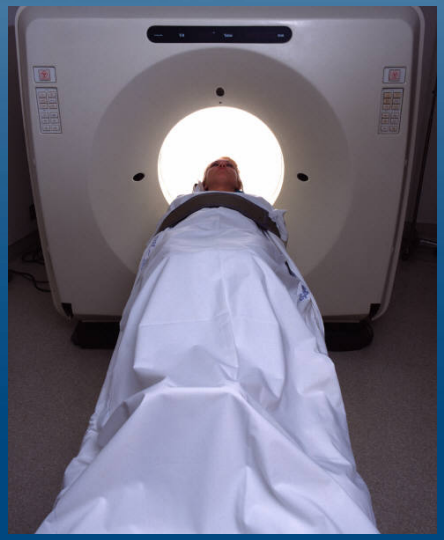
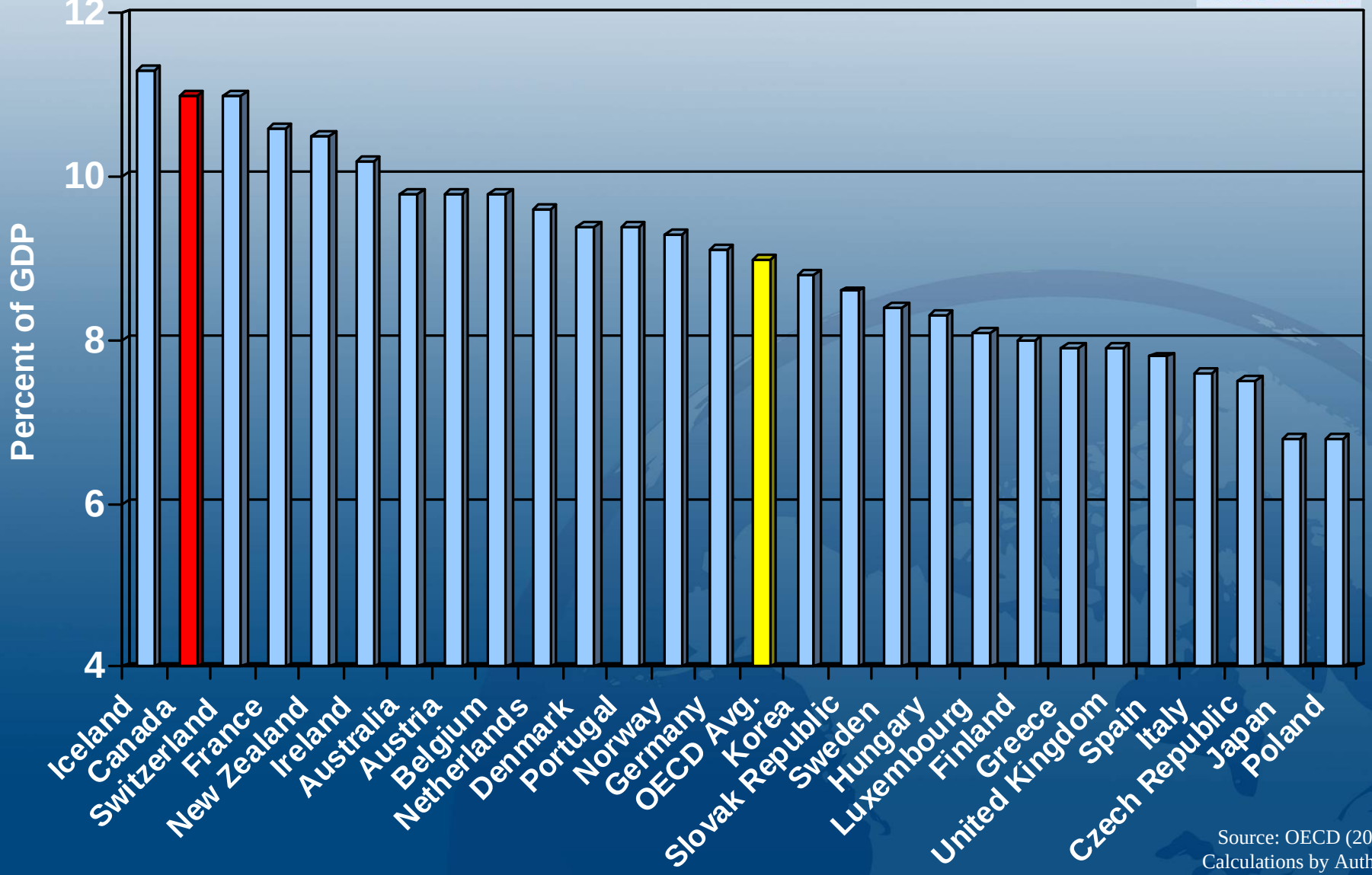


Age-adjusted Health Spending in the OECD 2005



Source: OECD (2008)
Calculations by Authors

Money is Not the Problem

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Table 29 Federal transfers for diagnostic and medical equipment, 2000-2004

Year and fund name	Amount	Details
2000—Medical Equipment Fund	$1 billion	Funds available over 2 years (2000-01 and 2001-02)
2003—Diagnostic and Medical Equipment Fund	$1.5 billion	Funds accounted for in 2002-03, and available to provinces through 2005-06 Investment permitted in defined categories: acquisition of new equipment with established safety, efficacy, and effectiveness; replacement/updating of existing equipment; and direct installation costs of equipment
2004—10-Year Plan to Strengthen Health Care	$500 million	Included as part of the $41.3 billion 10-Year Plan to Strengthen Health Care Funds available in 2004-05

Sources: Canada, Department of Finance, 2007a and 2007b.

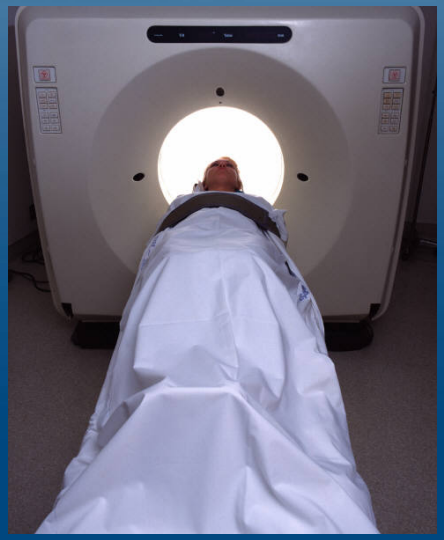
Source: Esmail and Wrona (2008)

No Lack of Demand

- Canadians have a relatively higher interest in new medical discoveries, new inventions and technology, and new scientific discoveries, than their counterparts in Europe and are similar to Americans in this regard
- Canadians view access to the most advanced medical technology as essential
- More than 40 percent of Canadians disagreed that “it is impossible for any government or public or private health insurance to pay for all new medical treatments and technologies,” putting Canadians among the most likely to disagree among nations surveyed

Source: Kim et al. (2001)

Canada's Policies are the Problem



Policies that Have Reduced Access to Medical Technologies

- Lack of private competition in hospital sector
- Budget-based funding of hospital care
- Prohibitions on privately financed health care
- Bureaucratic and governmental control over what health care is delivered, where, and how

Medical Technology in Canada

- Medical technologies can increase longevity, reduce mortality, and improve quality of life.
- Canada is a late adopter; is slow to expand the inventories or applications; and relies too heavily on older, outdated, and relatively unsophisticated medical equipment
- While some cutting-edge technologies are commonly available to patients, many such technologies are relatively scarce and are sometimes unavailable in this country.