

## CE DEPARTMENT STAFFING SURVEY

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### INTRODUCTION

A recent survey of Canadian Clinical Engineering (CE) departments was conducted between the months of July 2017 to February 2018. The survey involved feedback from various managers and directors from a sample of approximately **22** CE departments from various provinces across Canada. This paper summarizes initial findings and benchmarks against a range of published and accepted CE departmental metrics.

### PROFILE OF RESPONDENTS



Figure 1: Distribution of Respondents

The relatively small sample was determined to be a reasonable representation of the Canadian acute-care hospital system, given: 1. The percentage of CE leaders sampled is estimated to be on the order of **6%** to **11%** of the entire Canadian CE Leadership population; 2. Most provinces were represented (**7** of the

**10** provinces and **3** territories); 3. Respondents were responsible for supporting approximately **265 (34%)** of the **775** acute-care hospitals estimated to be operating within Canada; 4. Respondents were responsible for supporting approximately **20,933 (23%)** of the **91,136** acute-care beds estimated to be operating in Canada; 5. The teaching to non-teaching hospital ratio amongst respondents (**15:85%**) was reasonably similar to the Canadian ratio (**9:91%**); 6. The small, medium, and large hospital ratios amongst respondents (**77.8:5.6:16.7%**) was reasonably similar to the Canadian ratios (**78.2:11.4:10.4%**). It is recognized the sample was relatively small and not all provinces and territories have been represented. However, it was deemed acceptable to assume, the respondents studied, form a somewhat reasonable representation of all Canadian Clinical Engineering departments.

### CE DEPARTMENTAL METRICS

Note: All range estimates provided below were determined using basic statistical analysis using t-distributions at a **95%** confidence level.

#### CE & Information Technology (IT) Departments

Given the responsibilities of both CE and IT departments continue to evolve and overlap significantly, some health care executives have formally merged both departments to improve alignment and coordination of overlapping activities. Of the CE departments sampled: about **two-thirds (68%)** remain independent of their respective IT departments; about **one-fifth (21%)** remain relatively independent of IT departments (i.e. share a common VP); and approximately **one-tenth (10.5%)** have

formally merged with IT departments at the director level.

### CE Operational Budgets

The operating budgets of the participating CE departments averaged about **\$4.526 million**. Statistically, we are **95%** confident, the average Canadian CE departmental budget lies between **\$2.636 and \$6.416 million**.

### CE Parts Budgets

Not all CE departments have a centralized parts budget for equipment replacement parts. For some CE departments, this budget is decentralized (their clients are responsible to pay for parts). Approximately **65%** of respondents indicated they were responsible for a centralized parts budget (i.e. **35%** were not). Statistically, we are **95%** confident, **43% to 87%** of CE depts. on average have a centralized parts budget (**13% to 57%** don't).

On average, the centralized parts budgets (for those departments with centralized parts budget) was about **37%** of their total CE operational budgets (i.e. **63%** was non-parts related and mostly labour). Statistically, we are **95%** confident, the average Canadian CE department's centralized parts budget lies between **28% and 46%** of their total CE department's operational budgets (i.e. the non-parts related portion of budgets would lie between **54% and 72%**). It is not clear if these numbers included parts costs that may have been associated with service contracts.

### CE Budget as Percentage of Hospital Budget

The respondents' total CE budget as a percentage of hospital operating budgets averaged about **0.34%** of the hospital operating budgets. Statistically, we are **95%** confident, the average Canadian CE departmental budget as a percentage of hospital operating budgets lies between **0.28% and 0.41%**.

These numbers align reasonable well with the **0.5%** average indicated in a 2008 benchmarking analysis of US hospitals<sup>[4]</sup>. It is suspected the value was lower as the previous calculation included a mix of CE budgets that did and did not have parts budgets.

### CE Non-Parts Budget as % of Hospital Budget

Given, not all CE departments have a centralized parts budget, but all would know their non-parts related budgets, we calculated the respondents' non-parts budget as a percentage of hospital operating budget. The new average did decrease as expected, to about **0.26%** of hospital operating budgets. Statistically, we are **95%** confident, the average Canadian CE departmental non-parts budget as a percentage of hospital operating budgets lies between **0.18% and 0.33%**.

### CE Funding Formula

Of the respondents (n=19) that responded to questions regarding if there is a funding formula or mechanism to increase or decrease their department's funding when workload increases or decreases, most (**84.2%**) indicated there was NO formal method or formula. Each year these CE departments developed budgets and business cases for additional funding to address increasing workload, but were often faced with general cuts / increases, relatively independent of workload. However, there was a small percentage (**15.8%**) of CE departments whose budgets were adjusted based on a funding formula ranging from **3%-7%** of the total value of assets supported. These numbers align with published cost of service ratios of **4%**<sup>[3]</sup>, **4%**<sup>[4]</sup>, **4.7%**<sup>[1]</sup>, and **5.46%**<sup>[2]</sup>.

### Average Ratio of CE Managers to CE Staff

On average the complement of managers represented about **5.7%** of the entire CE staff complement (i.e. **5.7** managers overseeing **94.3** staff). Statistically, we are **95%** confident, within Canadian CE departments, management complement is between **4.3% and 7.0%** of the entire CE staff complement.

### Average Ratio of Supervisors to CE Staff

On average **63%** of CE departments utilize supervisors (i.e. **37%** don't). Statistically, we are **95%** confident, on average, between **39.9% and 86.4%** of all Canadian CE departments staff utilize supervisors (i.e. between **13.6% and 60.1%** don't utilize supervisors).

For those CE departments with supervisors, on average the complement of supervisors represented about **9.8%** of the entire CE staff complement. Statistically, we are **95%** confident, within Canadian CE departments, supervisory complement is between **7.5% and 12.2%** of the entire CE staff complement. On average the span of control for one supervisor is **7.4** techs. Statistically, we are **95%** confident, within Canadian CE departments, the span of control for supervisors is between **5.8 and 10.1** techs.

Average Ratio of Management to CE Staff

On average the complement of the "management pool" (i.e. managers and supervisors combined) represented about **11.9%** of the entire CE staff complement. Statistically, we are **95%** confident, within Canadian CE departments, "management pool" complement is between **9.7% and 14.1%** of the entire CE staff complement. These numbers are somewhat lower than the **18.1%** average indicated in 2010 in a North American CE metrics study<sup>[2]</sup>.

On average the span of control for one member of the "management pool" is **7.4** staff. Statistically, we are **95%** confident, within Canadian CE departments, the span of control for one member of the "management pool" is between **6.1 and 9.4** staff. These numbers correlate extremely well with average span of controls of **8 and 7.8** indicated in 2010 and 2011 North American studies<sup>[1,2]</sup>.

Average Ratio of Techs to CE Staff

On average the complement of techs represents about **76.0%** of the entire CE staff complement. Statistically, we are **95%** confident, within Canadian CE departments, tech complement is between **72.2% and 79.9%** of the entire CE staff complement. These numbers correlate extremely well with the **75.7%** average indicated in a 2011 North American staffing metrics study<sup>[2]</sup>.

Average Percentage of CBET Certified Techs

On average about **12.4%** of techs within CE departments were CBET certified. Statistically, we are **95%** confident, within Canadian CE departments, the average

percentage of techs that are CBET certified is between **4.9% and 19.8%**. The upper limit of this confidence interval correlates reasonably well (although slightly lower) with the **21% and 22.1%** averages indicated in 2010 and 2011 North American studies<sup>[1,2]</sup>.

Ratio of Admin. Assistants (AAs) to CE Staff

On average **84%** of CE departments utilize administrative assistants (i.e. **16%** don't). Statistically, we are **95%** confident, on average, between **66.6% and 100%** of all Canadian CE departments staff utilize AAs (i.e. between **0% and 33.4%** don't).

On average the complement of AAs represents about **5.5%** of the entire CE staff complement. Statistically, we are **95%** confident, within Canadian CE departments, on average the AA complement is between **3.6% and 7.4%** of the entire CE staff complement.

On average the span of support (i.e. the number of staff within CE departments AAs provide support to) for one AA is **17.2** staff. Statistically, we are **95%** confident, within Canadian CE departments, the span of control for one AA is between **12.5 and 26.8** staff.

These numbers appear to line up reasonable well with numbers indicated in a CE analysis of American hospitals<sup>[4]</sup>, which indicates the number of AA positions grows as CE departments get bigger, as outlined in Table 1 below.

Table 1: Admin Support within CE Departments

CE Dept. Size	AA Support
0 to 7 FTEs	Unlikely to have support
>8 & <16 FTEs	Only 50% of depts. have support
>=17 FTEs	Typically, all depts. have support

Average Ratio of Clinical Engineers to CE Staff

Not including managers, on average **42%** of CE departments utilized clinical engineers (i.e. **58%** didn't utilize clinical engineers). Statistically, we are **95%** confident, on average, between **18.3% and 65.9%** of all Canadian CE departments utilize clinical engineers (i.e. **34.1% to 81.7%** don't).

On average the complement of clinical engineers represents about **5.3%** of the entire CE staff complement. Statistically, we are **95%** confident, within Canadian CE departments, on average the clinical engineer complement is between **2.6% and 8.1%** of the entire CE staff complement. The upper limit of the confidence interval correlates reasonably well with **8% and 7.2%** averages indicated in 2010 and 2011 North American studies<sup>[1,2]</sup>.

#### Average Ratio of CE Staff to Hospital Beds

On average the ratio of total number of CE staff to the total number of hospital beds in acute care facilities supported was about **3.1%** (i.e. on average **3.1** CE staff per **100** hospital beds). Statistically, we are **95%** confident, within Canadian CE departments, the ratio of total number of CE staff to the total number of hospital beds in acute care facilities supported is between **2.2% and 3.9%** (i.e. **2.2 to 3.9** CE staff per **100** hospital beds). These numbers correlate extremely well with the **2.6%, 2.5%, and 2.2%** averages indicated in previous benchmarking studies<sup>[3,4,5]</sup>.

#### Average Ratio of CE Staff to Assets Managed

On average the ratio of total number of CE staff to the total number assets managed was about **0.17%** (i.e. **1** CE staff per **588** assets). Statistically, we are **95%** confident, within Canadian CE departments, the ratio of total number of CE staff to the total number of assets managed is between **0.15% and 0.20%** (i.e. **1** CE staff per **508 to 685** assets). These numbers correlate extremely well with the **0.19%, 0.17%, and 0.15%** averages (i.e. **1** CE staff per **520, 600, and 650** assets) indicated in previous benchmarking studies<sup>[1,2,3]</sup>.

#### Average Ratio of CE Techs to Hospital Beds

On average the ratio of total number of CE techs to the total number assets managed was about **0.13%** (i.e. **1** CE staff per **769** assets). Statistically, we are **95%** confident, within Canadian CE departments, the ratio of total number of CE techs to the total number of assets managed is between **0.11% and 0.15%** (i.e. **1** CE staff per **667 to 909** assets). These numbers correlate reasonably well with the **0.10% and 0.09%** averages (i.e. **1** CE

staff per **995 and 1,087** assets) indicated in previous benchmarking studies<sup>[1,2]</sup>.

#### Average Value of Assets Managed Per CE Tech

On average the ratio of the total number of CE techs to total value of assets managed was about **1** CE staff per **\$4.429 million** of assets managed. Statistically, within Canadian CE departments, the ratio of total number of CE techs to the total number of assets managed is between **1** CE staff per **\$5.553 and \$3.683 million** of assets managed.

#### Closing Remarks

It is recognized the sample was relatively small, with minimal representation from French only speaking CE groups, and not all provinces or territories were represented. However, the sample was relatively diverse and given the percentage of beds, hospitals and CE Leaders involved, deemed to be a reasonable representation of Canadian Clinical Engineering departments. It is recognized a larger sample set would narrow confidence intervals somewhat and improve accuracy of results. Overall, the results appear to reasonably align with accepted and published metrics.

### **ACKNOWLEDGEMENTS**

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