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CLINICAL ENGINEERING STAFFING LEVELS ACROSS CANADA

Bill Gentles
BT Medical Technology Consulting

INTRODUCTION

This work is an extension of the work done to prepare a chapter for the new edition of the Clinical Engineering Handbook originally published in 2004 [1]. The chapter was entitled "Clinical Engineering in Canada" in both the edition published in 2004 and the 2018 edition that is yet to be published.

In communicating with Clinical Engineers across the country, it seemed that it would be useful if we all knew how our staffing levels compared with others. The comparisons in this paper are on a province-by-province basis. There will be inevitable variations within each province, with some hospitals well staffed while others are seriously understaffed.

Data on staffing levels was obtained by personal communication, while data used in the denominators (e.g. number of beds, population, etc) was obtained from Statistics Canada and the Canadian Institute for Health Information (cihi.org)

VARIATIONS IN THE ORGANIZATION OF CLINICAL ENGINEERING SERVICES IN EACH PROVINCE

One factor which could affect the staffing levels within a province is the way the service is organized across the province. Is it a single service for the province, with centralized management (New Brunswick)? Or is it a group of regional services (British Colombia)? Or is it a fragmented service, with a separate management structure within each hospital, or within small groups of hospitals (Ontario)?

The following table attempts to describe the organizational structures of Clinical Engineering Services within each province.

Table 1: Organization of Clinical Engineering Services by Province

Province	Organizational Structure	No. of Regions
BC	Regionalized	4
Alberta	Regionalized	5
Sask	Centralized	1
Manitoba	Regionalized	?
Ontario	Fragmented	N/A
Quebec	Regionalized	?
NB	Centralized	1
PEI	Regionalized	2
Nova Scotia	Regionalized	4
NFLD & Lab	Regionalized	4

VARIATIONS IN SERVICES PROVIDED

Not all Clinical Engineering Departments provide the same bundle of services. Individual departments often provide unique services determined by the skills and interest of the staff.

For each province, an attempt was made to determine if the following two clinical specialties were included in clinical engineering services or not: Haemodialysis, and Medical Imaging. In some cases, there was variation within the province as to whether individual hospitals or regions provided these services within Clinical Engineering. This is indicated in the table.

Table 2: Additional services provided by province

Province	Dialysis support	Imaging support
BC	Yes	Yes
Alberta	Yes	Mixed
Sask	Yes	Mixed
Manitoba	?	?
Ontario	Mixed	Mixed
Quebec	?	?
NB	?	?
PEI	Yes	Yes
Nova Scotia	Yes	Yes (mixed)
NFLD & Lab	Yes	Yes

STAFFING LEVELS

Each province in Canada faces unique challenges of geography and population distribution. There are many parameters that are correlated with engineering staffing levels as discussed by Wang [2]. In this paper, we will compare staffing levels to provincial population and number of hospital beds. These are the parameters that were readily available from Statistics Canada [3] and the Canadian Institute for Health Information [4]. The next table shows staffing levels by province along with population and number of beds.

Table 3: Total CE staff by province

Province	No. of CE staff	Population	# Beds
BC	340	4817200	13722
Alberta	204	4286100	11426
Sask	80	1163900	3087
Manitoba	?	1338100	4345
Ontario	?	14193400	30946
Quebec	?	8394000	?
NB	109	759700	2833
PEI	16	152000	487
Nova Scotia	80	953900	3149
NFLD & Lab	51	528800	2366

In Table 4 these staffing levels are normalized to the variables cited above, to show beds per CE and population per CE.

Table 4: Comparators

Province	Beds per CE	Pop per CE
BC	40	14168
Alberta	56	21010
Sask	39	14549
Manitoba	?	?
Ontario	?	?
Quebec	?	?
NB	26	6970
PEI	30	9500
Nova Scotia	39	11924
NFLD & Lab	46	10369

DISCUSSION

The data on clinical engineering staffing levels was obtained by personal communication with Clinical engineering managers in each province. Some data was not available by the deadline of paper submission, but additional data will be presented at the conference.

The average number of beds per CE was 40. Provinces with a lower number of beds per CE tended to be the smaller provinces.

This data is not intended to be used as a benchmark for staffing levels, but rather as a stimulus for discussion around the best way to organize clinical engineering services, and opportunities for expansion of services to better meet the needs of the healthcare system.

REFERENCES

[1] Dyro, J.,(ed.) "Clinical Engineering handbook," Elsevier Academic Press, 2004.

[2] B. Wang et al., "Clinical engineering productivity and staffing revisited. How should it be measured and used?" J. Clinical Engineering, vol.37 no. 4, pp. 135-145. October/December 2012

[3] Statistics Canada, "Population by year, by province and territory," http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm, accessed February 2018.

[4] Canadian Institute for Health Information, "CMDB Hospital Beds Staffed and In Operation, 2015–2016," https://www.cihi.ca/en/access-data-reports/results?f%5B0%5D=field_primary_theme%3A2048, accessed February 2018.