LEARNING FROM EXPERIENCE

Improving the Process of Internationally Educated Nurses' (IENs) Applications for Registration

Pre- and Post-Implementation Data Analyses Report

March 2016
Executive Summary

Health regions in Alberta, Canada launched international recruitment initiatives in 2007 and 2008 in response to global nursing shortages. As a result of these initiatives, the College and Association of Registered Nurses of Alberta (CARNA) experienced an approximately ten-fold increase in the number of applications from internationally educated nurses (IENs). Respite from the heavy demand following changes to the employment market in Alberta provided CARNA with the opportunity to analyze the large amount of data collected during this peak period of applications to identify evidence to support the IEN application for registration process.

Consistent with evidence-informed regulation principles, the Learning from Experience: Improving the Process of Internationally Educated Nurses’ Applications for Registration (LFE) project included the analysis of administrative data to identify application characteristics related to success or challenges in the IEN application for registration process, as well as process timelines; implementation of policy and practice changes based on the data findings; and evaluation of those changes.

This report highlights findings from the pre- and post-implementation data analyses to inform the evaluation of the policy and practice changes, which were based on baseline statistical analysis and were implemented at CARNA in August 2013. The changes included the development of guidelines for initial assessment; the introduction of an option for some applicants to proceed directly to bridging education; a shift in the management of bridging education; revisions to process time limits; and the review and revision of communication tools to improve clarity and transparency. The pre- and post-implementation analyses included exploratory, confirmatory, timeline and exemplar analyses of complete application files received at CARNA from IENs during the pre-implementation time period (January 1, 2012 to August 26, 2013) and post-implementation time period (August 27, 2013 to May 29, 2015).

The exploratory analysis highlighted demographic differences between applicants in the pre- and post-implementation study samples. While the majority of the demographic, education and employment characteristics were similar between the two study samples, there was a larger percentage of applicants who had a degree similar to an Alberta baccalaureate in the post-implementation study sample. The post-implementation study sample also had a discernably higher percentage of applicants educated in the Tropics/Caribbean and lower percentage of applicants educated in the Philippines than the pre-implementation study sample.

There were differences at some of the key outcome points between applicants in the two data time periods. At the initial assessment, the percentage of applicants who were referred to a Substantially Equivalent Competency (SEC) Assessment dropped considerably in the post-implementation study sample. However, when added to the percentage of the post-implementation study sample that was eligible to choose between completing an SEC Assessment or proceeding directly to a full bridging education program the percentage was
similar to the pre-implementation data. As well, at the SEC Review Outcome, the percentage of applicants referred to bridging education in the post-implementation time period decreased and the percentage of applicants deemed ineligible increased. However, with the LFE changes many of the applicants who would have likely been referred to bridging education were offered the option to proceed there directly without completing an SEC Assessment, which would have affected the SEC Review Outcome percentages.

While the percentage of applicants who passed the national-entry-to-practice exam was lower in the post-implementation study sample, all of the applicants who failed in the post-implementation study sample were eligible to write the exam again, and fewer applicants had written the exam at the time of the data extraction. This may have accounted for the higher failure rate as some applicants who failed the exam may have passed on subsequent attempts. As well, a policy change during the post-implementation period recognized previous passing national entry-to-practice exam results and allowed a number of applicants to bypass writing the exam. The percentage of applicants who passed the exam was similar between the pre- and post-implementation study samples when external exam results were considered. Other key outcome points reflected the study sample timeframes in relation to the elapsed time before the data extraction with more than half of the applicants in the pre-implementation study sample and eighty percent of applicants in the post-implementation study sample still active in the process.

Statistical modeling of the pre-implementation data and initial assessment outcome in the post-implementation data showed that education credential, education received where the scope of nursing practice is similar to Canada and number of years since last practice may have been related to success in the IEN application for registration process. The other outcomes in the post-implementation data were not modeled due to the small sample sizes.

Most of the timelines for the post-implementation study sample were shorter than the corresponding pre-implementation timelines. However the majority of the post-implementation applicants were still in the process therefore timelines for outcomes later in the process for the post-implementation timeline analysis may have been skewed by applicants who completed the process quickly. As well, it is important to consider that there are many external factors that impact the IEN application for registration process therefore a direct causal relationship between the LFE changes and the decreases in timelines in the post-implementation analysis cannot be determined.

In order to reduce the potential sample bias, an analysis of an exemplar group of applicants was conducted. The majority of the applicant characteristics and outcomes were not significantly different between the pre- and post-implementation exemplars which confirmed that the exemplars were similar and the characteristics and outcomes were not associated with intervention effect.

The exemplar timeline analysis demonstrated that, with the exception of a few phases of the process, the timeframes for the IEN application for registration process were significantly reduced from pre-implementation to post-implementation. Overall, applicants with these similar characteristics and outcomes took 137 less calendar days for the post-implementation
exemplar group than for the pre-implementation exemplar group to receive an initial registered nurse (RN) registration.

The findings from the pre- and post-implementation data analyses will be used in association with qualitative feedback from stakeholders and other jurisdictions to inform the evaluation of the LFE policy and practice changes and may guide further revisions to the IEN application for registration process.

These findings can also be used as statistical evidence to address the gap in evidence to support the IEN application for registration process. The findings can also contribute to evidence-informed policies for nurse regulators, educational institutions, employers and governments. It is recommended that this analysis is conducted again in one to three years to increase the statistical power of the conclusions.
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1.0 Introduction

1.1 Background

As evidence-informed practice becomes engrained in the health system, likewise there is an increasing call for evidence-informed regulation\(^1\),\(^2\). However, historically there has been little research available to inform decision-making on policies for health professional regulation.

In response to global nursing shortages, health regions in Alberta, Canada launched international recruitment initiatives in 2007 and 2008 leading to the College and Association of Registered Nurses of Alberta (CARNA) experiencing an approximately ten-fold increase in the number of applications from internationally educated nurses (IENs) over a short period of time. Following changes to the employment market in Alberta, respite from the heavy demand provided CARNA with the opportunity to analyze the large amount of data collected during the peak period of applications to identify evidence to support the IEN application for registration process.

Aligning with evidence-informed regulation principles, CARNA conducted the Learning from Experience: Improving the Process of Internationally Educated Nurses’ Applications for Registration (LFE) project which:

- analyzed administrative data to identify application characteristics related to success or challenges in the IEN application for registration process, as well as process timelines;
- implemented policy and practice changes based on the data findings; and
- evaluated the policy and practice changes.

The statistical analysis of data from IEN applications received at CARNA during a peak period was used as a baseline to inform the development of policy and practice revisions. These revisions were developed over 19 facilitated discussions and included the:

- revision of the IEN application for registration policy;
- development of guidelines for initial assessment based on the project findings;
- provision of the option for some applicants to proceed directly to bridging education without completing a competency assessment;
- reconsideration of the approach to bridging education management;
- revision of process time limits; and
- review and revision of communication tools to improve clarity and transparency.


The LFE policy and practice changes were implemented at CARNA on August 26, 2013. Pre- and post-implementation data analyses were conducted to evaluate the changes.

This report highlights findings from the baseline, pre- and post-implementation data analyses to allow for comparisons over time. The report is based on data from separate technical reports for each data analysis which provide more detailed data findings and may be used as references in interpreting the data in this report.

The research project was led by CARNA and funded by Alberta Health through Health Canada’s Internationally Educated Health Professionals Initiative. The views expressed herein do not necessarily represent the views of Health Canada or Alberta Health.

1.2 Project Purpose and Objectives

The LFE research project sought to improve the efficiency of the IEN application for registration process, while upholding CARNA's commitment to public safety and to the principles of fairness and transparency.

The LFE project aimed to:
1. Develop an evidence-informed model for the assessment of IEN applications for registration.
2. Make CARNA processes as transparent, simple and efficient as possible from receipt of a complete application to eligibility for registered nurse (RN) registration.
3. Clearly articulate requirements and expectations of applicants.
4. Build capacity and leadership in the area of nursing regulation.

1.3 Project Research Strategies

The research strategies utilized in the project included:
1. Analyze IEN application data to inform the evaluation and improvement of CARNA policies and practices for the IEN application for registration process.
2. Identify trends, strengths and gaps in IEN groups applying for RN registration in Alberta.
3. Observe application characteristics as related to the outcomes of the Substantially Equivalent Competency (SEC) Assessment and to the need for additional education.
4. Compare the success rates on the national entry-to-practice examination and registration outcomes of groups of applicants.
5. Review and evaluate any process changes based on data analysis.
2.0 Methods

2.1 Data Collection and Variables

With the exception of the exemplar analysis, the same methodology was used for all three data analyses. However, due to the sample size, confirmatory modeling in the post-implementation analysis was limited. The LFE Research Team reviewed all of the application files received from IENs during each of the following study periods:

- **Baseline data** – complete applications (all application documentation received) received between January 1, 2008 and December 31, 2011;
- **Pre-implementation data** – complete applications received between January 1, 2012 and August 26, 2013; and
- **Post-implementation data** – complete applications received between August 27, 2013 and May 29, 2015.

The following inclusion criteria and considerations were also applied to the data sets:

- IEN (entry-level nursing education received outside of Canada);
- Assessed under the current legislation (Health Professions Act);
- Applications that were active, assessed or lapsed (according to CARNAs lapsed policy) after the application was considered completed; and
- The applicant’s most current data was used in place of the original application data (for re-applications).

All information was collected as part of routine data collection during the IEN application for registration process and was recorded within CARNAs administrative database and/or paper applicant files. Each file was individually reviewed, entered and cleaned, and data entry was audited to ensure accuracy.

2.2 Data Analysis

Exploratory and confirmatory data analyses were conducted to examine the association of characteristics variables with outcomes. A timeline analysis was also conducted for all three data analyses. Exemplar analysis was conducted to enable comparisons between the pre- and post-implementation study periods.

2.2.1 Exploratory Analysis

Data analyses were conducted using the SAS 9.2 and SPSS (Version 20) statistical programs. Descriptive statistics (frequency, cross tabulation, chi-square test, variance, mean, histograms) were generated for each variable. Continuous variables were evaluated both as continuous and categorical variables, and were categorized and described by frequency and in cross tabulations. Outcome items with very high or low frequencies were considered for elimination since they may have been outliers. The pre- and post-implementation data analyses were limited to the variables identified as significant in the baseline data analysis.
Characteristic variables represented the applicants’ demographic, education, external registration and external employment practice information. Outcome variables representing bridging education courses, outcomes and process timeline data were also examined.

Timeline analysis was based on date information for the phases of the IEN application for registration process and descriptive statistics (variance, mean, histograms) were generated for each timeframe.

2.2.2 Confirmatory Analysis

Confirmatory statistics were conducted using the STATA 12 and SAS 9.2 statistical programs. Logistic regression modeling with stepwise selection was used to model the independent associations between multiple variables simultaneously. In the baseline data analysis, stepwise logistic regression provided a list of candidate variables for the model and the LFE Research Team selected an additional four to six variables for inclusion in the final model based on relevance, experience and logical rationale. Pre- and post-implementation models were limited to the variables identified as significant in the baseline data analysis and used to inform the policy and practice changes.

2.2.3 Exemplar Analysis

Considering sample sizes, exemplar analysis was conducted on the pre- and post-implementation data sets to allow for statistically significant comparisons between the two study samples. Exemplar analysis was not conducted on the baseline data set.

Since the elapsed time in the IEN application for registration process was limited for applications in the post-implementation study sample, the majority of applicants referred to an SEC Assessment and/or bridging education were still in the process at the time of data extraction. Therefore, the only group of applicants with a large enough sample size in both the pre- and post-implementation data sets to enable an exemplar analysis was the group of applicants who received their education where the scope of nursing practice is similar to Canada, who had a degree similar to an Alberta baccalaureate (three to four years post-secondary general nursing education following 12 years of primary and secondary school) and who had practice currency (graduation or 1125 hours of experience in the five years prior to application).

Univariate analyses were performed on both pre-implementation and post-implementation exemplar data. Comparison analysis was performed on both exemplar samples and overall samples by controlling confounding factors in order to measure the intervention effects and minimize bias due to applicants’ characteristics and other potential factors.

Statistical tests (nonparametric tests, Mann–Whitney U-tests) were used to compare the means of continuous outcomes for the exemplar samples. Frequency and chi-squared tests were also performed for categorical outcomes for both exemplar groups. Chi-squared tests were used to determine whether there was a significant difference between the expected frequencies and the observed frequencies in one or more categorical outcomes. If there was
a significant association between the differences in the two data sets and application outcomes through descriptive analysis, confirmatory analysis was performed with logistic models built on outcomes using demographics and intervention indicators as candidate variables.

Survival analyses was used to compare the timelines between the two exemplar groups. Log-Rank tests were used to compare the timeline intervals between pre- and post-intervention exemplars, analyzing covariates (such as demographic, intervention effects) that may have been associated with the outcome timelines. A Cox regression model was also built to estimate the relationship of multiple variables to process time intervals.

3.0 Results

3.1 Demographics

The LFE project analyzed data from 3504 applicants in the baseline study sample, 426 applicants in pre-implementation study sample and 287 applicants in the post-implementation study sample (Appendix A). The average age of applicants was similar in all three study samples ranging from 30-34 years of age, as were the percentages of male applicants (between 18.35%-18.82%). Fewer applicants in the baseline study sample resided in Canada at the time of the application (27.51%) compared to the pre-implementation (53.29%) and post-implementation (56.45%) study samples. This may have been related to off shore recruitment drives that were conducted during the baseline data timeframe.

The analysis of key educational demographics show the percentage of applicants with a basic education credential similar to a Alberta baccalaureate degree (three to four years of post-secondary general nursing education following 12 years of primary and secondary education) increased over time, from 26.66% of the baseline study sample to 31.92% of the pre-implementation study sample and 40.07% of the post-implementation study sample. While there were similar percentages of applicants with graduate education across the three study samples (2.11-4.18%), the percentage of applicants who met the thresholds for theory and clinical hours in education (150 hours of theory and 350 hours of clinical in medicine/surgery and 50 hours of theory and 100 hours of clinical in each of the specialty areas) decreased over time from 42.24% of the baseline study sample to approximately one-third in the pre- and post-implementation study samples. The percentage of applicants educated where the scope of nursing practice is similar to Canada increased from 15.35% in the baseline study sample to approximately forty percent in the pre- and post-implementation study samples.

While most applicants in each study sample were educated in the Philippines, the percentage decreased from almost half of the baseline study sample (48.94%), through 44.37% in the pre-implementation study sample, to 36.59% in the post-implementation study sample. Likewise, while applicants educated in India comprised almost a quarter of the baseline study sample (24.71%), there was a decrease to approximately ten percent in the pre- and post-
implementation study samples. The percentage of the study sample educated in Africa also decreased slightly from the baseline study sample. Conversely, the percentages of applicants educated in the United Kingdom, Tropics/Caribbean and United States all increased.

The analysis of employment characteristics showed a stark difference between the baseline study sample where 68.46% of applicants had only worked in the country of their education, compared to 13.38% and 11.50% in the pre- and post-implementation study samples respectively. The majority of the pre- and post-implementation study samples had worked in multiple countries. However, similar low percentages of applicants did not have practice currency, defined by CARNa as having graduated or practiced more than 1125 hours within the last five years, regardless of the study sample (2.35-3.62%). In addition, there were small percentages of applicants who indicated that they were registered as a licensed practical nurse (LPN) in Canada in all of the study samples. However, in the baseline study sample 88.76% of these applicants were educated in the Philippines and therefore the findings for this group may have reflected characteristics of the education country group as opposed to the Canadian LPN registration independently. Interestingly, the average number of years since last RN practice had increased from 0.32 years in the baseline data, to 0.92 years in the pre-implementation data, to 1.17 years in the post-implementation data.

3.2 Outcome Analysis

At several key points during the IEN application for registration process an assessment decision or an action by the applicant, such as passing the national entry-to-practice exam, is required in order for the applicant to progress. Outcome variable data provided information on key points in the IEN application for registration process as follows:

- **Initial Assessment Outcome**: The assessment decision made by CARNa following a review of the applicant’s education, registration history and nursing experience documents;
- **SEC Assessment Review Outcome**: The assessment decision made by CARNa following the review of the report from an assessment of the applicant’s nursing competencies;
- **Course Completion Outcome**: Whether the applicant had successfully completed assigned bridging education;
- **Temporary Permit (TP) Eligibility**: Whether an applicant had been deemed eligible for a TP (considered to have competencies that were substantially equivalent to an Alberta nursing school graduate) which enabled the applicant to write the national entry-to-practice exam and complete the remaining requirements for registration;
- **National Entry-to-Practice Exam Outcome**: Whether an applicant had passed or failed the national entry-to-practice exam; and
- **Initial RN Registration Achievement**: Whether an applicant obtained their initial RN registration in Alberta or was deemed ineligible during the process.

Not all of the applicants arrived at all of the outcome points. For example, if an applicant was not required to complete an SEC Assessment, his/her information was not analyzed at the point of the SEC Review Outcome. Other applicants may have lapsed at some point in the
process or were still in progress at the time of the data extraction and had not yet reached all the outcome points.

Initial Assessment Outcome

Carna’s Registration Services department reviewed all completed applications to determine if the applicant’s education and experience encompassed competencies that could be considered substantially equivalent to an RN in Alberta. Prior to the implementation of the LFE policy and practice changes, there were three primary initial assessment outcomes:

1. Substantially equivalent and eligible to write the national entry-to-practice exam and apply for a TP to work in Alberta to achieve a positive reference based on 225 hour of experience in an Alberta setting (“TP Eligible”);
2. Ineligible for registration (“Ineligible”); and
3. Decision deferred pending further assessment in which the applicant was referred an SEC Assessment which may have then required the applicant to complete assigned bridging education (“Referred to SEC”).

Based on findings from the baseline data analysis and feedback from IENs, the LFE project introduced a fourth initial assessment outcome in August 2013:

4. Eligible for the option to complete an SEC Assessment or proceed directly to a full bridging education program (10 courses) (“SEC Assessment or Direct to Bridging Education Option”).

Figure 3.2.1 depicts the outcome frequency percentages for all of the applicants in the three study samples at the Initial Assessment Outcome. The percentage of applicants deemed “TP Eligible” ranged between 22.30-32.75%. The majority of applicants in the baseline and pre-implementation study samples (approximately three quarters) were “Referred to SEC”, the percentage dropped to 15.68% in the post-implementation study sample in relation to the introduction of the new “SEC Assessment or Direct to Bridging Education Option” outcome. Half of the post-implementation study sample (51.22%) was eligible for this option however all of these applicants would likely have been “Referred to SEC” prior to the LFE changes. Small percentages of applicants (0.14-1.41%) were deemed ineligible in all three study samples.
Of the applicants who were offered the “SEC Assessment or Direct to Bridging Education Option” in the post-implementation study sample (n=147), 42.86% chose to complete an SEC Assessment and 37.41% chose to proceed directly to bridging education. The remaining 19.73% of applicants had not made a choice at the time of data extraction.

**SEC Review Outcome**

Once an applicant completed an SEC Assessment, CARNA reviewed the results and the application documents to determine whether an applicant could be deemed: 1) “TP Eligible”; 2) “Ineligible”; or 3) required bridging education (“Referred to Bridging Education”).

The percentage of applicants who were “TP Eligible” following an SEC Assessment remained around two percent in all three study samples with a small percentage of applicants in the baseline study sample referred to a second SEC Assessment. However, the percentage of applicants “Referred to Bridging Education” decreased and the percentages of applicants deemed ineligible increased over time. Prior to the LFE changes, half or more of the baseline and pre-implementation study samples were referred to bridging education whereas only 35.42% of the post-implementation study sample had the same outcome. Conversely, less than half of the baseline and pre-implementation study samples were deemed ineligible but 62.50% of the applicants who completed an SEC Assessment in the post-implementation study sample were deemed ineligible. With the LFE changes, many of the applicants who would have previously completed an SEC Assessment and would have likely been “Referred to Bridging Education” were offered the option to proceed to bridging education directly without completing an SEC Assessment which likely would have had significant effects on
the post-implementation data percentages. Applicants who were “Referred to SEC” in the post-implementation study sample received the decision due to concerns that gaps in their competencies may not have been able to be bridged by the available bridging education. Consequently the SEC was required, rather than optional. As well, some applicants who chose to complete an SEC Assessment rather than proceeding to bridging education may have done so assuming their competency levels were comparable or due to wait times for the bridging program.

**Figure 3.2.2: SEC Review Outcome Frequencies**

![SEC Review Outcome Frequencies](image)

**Post-Bridging Education Outcome**

The successful completion of bridging education resulted in an applicant becoming substantially equivalent and eligible to proceed with the remaining requirements however if an applicant failed any course two or more times the applicant was deemed ineligible for registration. This policy aligned with the educational institution’s policy on course failures.

Overall, there was a decrease in the percentage of courses completed between the baseline (52.09%), pre-implementation (42.77%) and post-implementation (6.94%) study samples. However, applications in the pre-implementation study period had less elapsed time between the inclusion time period and the time that data was extracted than applicants in the baseline study sample. Applicants in the post-implementation study sample had even less elapsed time. Therefore, the majority of the applicants in the later time periods were still in the process of completing bridging education. There was also an increase in the average number of courses assigned to applicants in the study samples over time (from 6.04 courses for the baseline study sample, to 7.46 courses for the pre-implementation study sample, to 8.83 courses for the post-implementation study sample). This was due to the new initial
assessment outcome offering some applicants the opportunity to proceed directly to bridging education. If applicants chose this option, they were required to complete the full bridging education program (10 courses). Overall, the percentage of applicants who failed courses was low for all three study samples.

Almost all of the applicants who completed bridging education passed their courses and were deemed “TP Eligible” in all three study samples. However only 5 applicants in the post-implementation study sample had completed bridging education at the time of data extraction so caution should be exercised in interpreting this result.

**Figure 3.2.3: Post-Bridging Education Outcome Frequencies**

![Post-Bridging Education Outcome Frequencies](image)

**Outcome: TP**

An applicant may have been deemed substantially equivalent and eligible to apply for a TP at any of the previous three outcome points. A TP allows an applicant to work in Alberta temporarily as a Graduate Nurse, for the purpose of obtaining a positive Alberta employer reference based on 225 hours of experience, and write the national entry-to-practice exam. Each TP was valid for six months and could be renewed twice for a total of 18 months in order to complete requirements.

The percentages of applicants who were deemed “TP Eligible” following an initial assessment, SEC Assessment review, or bridging education was similar for all three study samples. However, the pre-implementation study sample had more than double the percentage of applicants deemed ineligible at any one of the TP decision points. The percentages of active and lapsed applicants in the three study samples reflected the time periods defining the study samples. The number of lapsed applications in the baseline data (36.22%) reflected the
recruitment initiatives in 2007 and 2008 where a large percentage of applicants applied but did not have any forward movement for two or more years. As well, more than half of the applicants in the post-implementation study sample were still active in the process which reflected the short amount of time between the post-implementation study time period and the date of data extraction (maximum 20 months).

**Figure 3.2.4: Outcome: TP Frequencies**

![Outcome: TP Frequencies](image)

**Exam Outcome**

Applicants were required to pass the national entry-to-practice exam within three attempts to proceed with the application process and obtain registration. On occasion some applicants may have been granted an additional writing however applicants who failed the exam after their last attempt (third or fourth) were deemed ineligible.

While the baseline and pre-implementation study samples had similar percentages of applicants who passed and failed the national entry-to-practice exam, the percentage of applicants who passed was lower in the post-implementation study sample. However, all of the applicants in the post-implementation study sample who failed were eligible to write the exam again. In addition, in January 2015 the national entry-to-practice exam changed from the Canadian Registered Nurse Examination (CRNE) to the NCLEX-RN. The United States has used the NCLEX-RN as its national entry-to-practice exam for several decades and Canadian jurisdictions retroactively recognize all passing NCLEX-RN results back to 1982. Therefore applicants who passed the exam through an external registration process in another jurisdiction did not have to rewrite the exam in their application to CARNA. Figure 3.2.5 depicts the Exam Outcome frequencies for applicants who wrote the exam through
Carna only whereas Figure 3.2.6 accounts for passing results from a CRNE or NCLEX-RN exam written in another jurisdiction.

**Figure 3.2.5: Exam Outcome Frequencies**

<table>
<thead>
<tr>
<th>Exam Outcome</th>
<th>Baseline</th>
<th>Pre-Implementation</th>
<th>Post-Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>81.93</td>
<td>84.35</td>
<td>87.50</td>
</tr>
<tr>
<td>Fail</td>
<td>18.07</td>
<td>15.65</td>
<td>12.50</td>
</tr>
</tbody>
</table>

**Figure 3.2.6: Exam Outcome Frequencies Including External Exam Pass Results**

<table>
<thead>
<tr>
<th>Exam Outcome</th>
<th>Baseline</th>
<th>Pre-Implementation</th>
<th>Post-Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
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</tr>
<tr>
<td>Fail</td>
<td>18.07</td>
<td>15.65</td>
<td>12.50</td>
</tr>
</tbody>
</table>
Outcome: RN

The percentages of applicants who received their initial RN registration or were deemed ineligible across all three study samples reflected the characteristics of each study sample. In the baseline study sample, half of the applicants were lapsed which reflected the recruitment drive activity at the time. The majority of post-implementation study sample was still active in the process since a limited amount of time had elapsed between the post-implementation time period and the data extraction.

The baseline data analysis encompassed complete applications received between January 1, 2008 and December 31, 2011 and was extracted in August 2012. Pre-implementation data included complete applications received between January 1, 2012 and August 26, 2013 and was extracted on May 29, 2015. Post-implementation data encompassed complete applications received between August 27, 2013 and May 29, 2015 and was extracted on May 29, 2015. The baseline data analysis showed an average of 656 days in the process from complete application to initial RN registration. Applications in the pre-implementation study period had a shorter elapsed time (maximum 1244 days) than applicants in the baseline study sample (maximum 1675 days), with applicants in the post-implementation study sample having even less elapsed time (maximum 640 days). Therefore, the majority of the applicants were still completing the IEN application for registration process and had not reached the later timelines in the process.

Figure 3.2.7: Outcome: RN Frequencies

![Outcome: RN Frequencies](image-url)
3.3 Confirmatory Analysis Modeling

Logistic regression models were used to measure the association between variables and outcomes. The models analyze the odds ratios for each of the variables and provide information about probability. Models for the pre- and post-implementation data were limited to the variables previously identified as significant in the baseline data analysis and used in the development of the policy and practice changes.

3.3.1 Pre-Implementation Models

Pre-implementation confirmatory analysis models were analyzed at the Initial Assessment Outcome, SEC Review Outcome, Outcome: TP, Exam Outcome and Outcome: RN.

There was strong evidence across that applicants with an Education Received Where the Scope of Nursing Practice is Similar to Canada of applicants who had a degree similar to an Alberta baccalaureate were also significantly more likely to be “TP Eligible” at the Initial Assessment Outcome and Outcome: TP, and to obtain an initial RN registration at Outcome: RN. As well, the number of years since last practiced or graduated was a significant factor as applicants who were less than a year out of practice were more likely than applicants with 2+ years since last practiced or graduated to be referred to bridging education after an SEC Assessment, and be “TP Eligible” rather than be deemed ineligible at Outcome: TP. Applicants less than two years out of practice were significantly more likely to pass the national entry-to-practice exam than applicants with 2+ years since last practiced.

Age was the only variable significantly related to applicants being “Referred to SEC” at the Initial Assessment Outcome. Applicants aged 25-29 were more likely to be “Referred to SEC” than applicants age 45+.

3.3.2 Post-Implementation Model

Post-implementation confirmatory analysis modeling was only conducted at the Initial Assessment Outcome due to small sample sizes at the other outcome points. As well, due to sample sizes, some categorical variables were re-categorized for the post-implementation model.

At the Initial Assessment Outcome, there was evidence to suggest that applicants with a degree similar to an Alberta baccalaureate or who received their education where the scope of nursing practice is similar to Canada were significantly more likely to be deemed “TP Eligible” rather than “Referred to SEC” or offered the “SEC Assessment or Direct to Bridging Education Option”. Conversely, there was evidence to suggest that applicants age 20-29 were more likely to be “Referred to SEC” or offered the “SEC Assessment or Direct to Bridging Education Option” compared to applicants age 40+. Applicants who had 2+ years since they last practiced or graduated were also more likely to be “Referred to SEC” or offered the “SEC Assessment or Direct to Bridging Education Option” than be deemed “TP Eligible” compared to applicants who were out of practice for less than two years. While the education credential, education where the scope of practice is similar to Canada and years
since last practice variables identified in the model were reflected in the assessment checklist that was implemented during the LFE changes, assessment decisions were not made on the basis of age.

3.4 Timeline Analysis

Timeline data analysis reflected the time between two dates for each phase of the IEN application for registration process. The times reflected calendar days and were the average time calculated for all applicable applicants. When interpreting findings for the pre- and post-implementation data it is important to consider the elapsed times between the inclusion time period and the data extraction date. The majority of the applicants in both the pre- and post-implementation study samples were still active in the process at the time of data extraction, however while 52.35% of applicants in the pre-implementation study sample were active in the process at the time of data extraction, a larger percentage (80.49%) of the post-implementation study sample was still in the process. Therefore timelines for phases later in the IEN application for registration process for the post-implementation timeline analysis may have been skewed by applicants who completed the process quickly. Appendix B depicts the IEN application for registration process phases.

Cumulative timelines reflected the average or median total amount of time from the receipt of a complete application to CARNA to the end of each phase of the process. Timelines decreased between the baseline data analysis and pre-implementation data analysis for almost all the phases, likely in relation to decreases in application volumes. Due to the short elapsed time between the post-implementation study period and data extraction, later timelines in the IEN application for registration process for the post-implementation data analysis showed discernable decreases from pre-implementation timeframes but were heavily weighted towards applicants who proceed through the process quickly. However the time for applicants to complete the Initial Assessment and SEC Assessment timeframes demonstrated a decrease in the time required for those phases from pre- to post-implementation. Timelines later in the process indicate that the LFE policy and practice changes contributed to decreased timelines, however it is important to consider that the LFE changes did not occur in isolation so a direct causal relationship cannot be determined.

Timelines for each of the longer phases of the IEN application for registration process decreased between the baseline and pre-implementation study periods, and the post-implementation study period. While the SEC Review Time decreased from the baseline data analysis to the pre- and post-implementation analyses, Post-Bridging Education Review, and TP and RN Approval Times remained fairly consistent between the baseline and pre-implementation study samples and all were likely primarily impacted by volumes and workloads.

The time for the initial assessment decreased from an average of approximately three months to about one and a half months post-implementation. In addition to the clarification and formalization of the assessment criteria informing the initial assessment decision, decreased volumes and a shift in applicant characteristics may have contributed to the decrease in this timeframe.
The decrease in time between the date an applicant was notified they were required to complete, or chose to complete, an SEC Assessment and the date the SEC Assessment results were received at CARNA between the baseline and pre-implementation data analyses may have been related to decreased volume or increased efficiency at the SEC Assessment Centre. However, further decreases in time revealed in the post-implementation data was likely related to the decreased number of applicants referred to an SEC Assessment, as the majority of the applicants who were previously referred to an SEC Assessment had the choice of completing an SEC Assessment or proceeding directly to bridging education following the LFE changes. During the post-implementation time period, the SEC Assessments were conducted by a different institution, and outside of Alberta, which may have also had an impact on timelines.

While it appeared that Bridging Education Time decreased by almost half in the post-implementation data, it is important to remember that only five applicants in the post-implementation study sample had completed bridging education at the time of data extraction. The remainder of the 67 applicants who were referred to bridging education or chose to proceed directly to bridging education were in the process of completing courses or had not yet started.

The time between the dates that applicants were notified that they were “TP Eligible” and the dates the applicants applied for a TP decreased post-implementation. However, almost all of the applicants who were deemed “TP Eligible” received the decision after the initial assessment therefore this timeline may have been skewed. As well, TPs were valid for six months and an applicant could only have up to three TPs, therefore CARNA advised applicants not to apply for their first TP until they had arranged for graduate nurse employment. Unlike the baseline study sample where only 27.51% of the applicants were residing in Canada at the time of application, more than half of the applicants in the pre- and post-implementation study samples were residing in Canada at the time of application so it may have been easier for them to obtain employment as a graduate nurse in Alberta.

The time between the dates applicants were notified that they were “TP Eligible” and the dates the applicants wrote the national entry-to-practice exam also decreased during the post-implementation period. In January 2015, the national entry-to-practice exam in Canada changed from a written exam offered three times a year to a proctored computer-based exam, the NCLEX-RN, which was available year round. While the opportunity to complete the new exam was only available for the last five months of the post-implementation study period, it may have affected the exam start time. As well, with the change in exam regulatory bodies began retroactively accepting passing exam results from NCLEX-RN exams, which had been the national entry-to-practice exam in the United States for decades. Thus there were applicants in the pre- and post-implementation study samples who did not have to write the national entry-to-practice exam through CARNA which may have also contributed to decreases in the TP to RN Time.
3.5 Exemplar Analysis

Comparative analysis of pre- and post-implementation exemplar data can inform the evaluation of the policy and practice changes. The exemplar analysis followed groups of applicants with defined characteristics in order to reduce the potential sample bias. The exemplar characteristics were selected based upon key characteristics of the largest number of applicants who received an initial RN registration in the post-implementation study sample. Therefore, the characteristics that defined the exemplar groups were education received where the scope of nursing practice is similar to Canada, a degree similar to an Alberta baccalaureate and practice currency. The analysis of the exemplar groups was conducted with both the pre- and post-implementation data. In total, 175 applicants met the exemplar criteria, 96 applicants in the pre-implementation study sample and 79 applicants in the post-implementation study sample. Appendix A outlines the exemplar analysis data selection and pre- and post-implementation exemplar group flow charts.

Exemplar Demographic Characteristic Comparisons

Of the demographic characteristics analyzed, only Age and Education Country Group were significantly different statistically between exemplar groups in the pre- and post-implementation data. While the percentages of applicants educated in the United Kingdom and United States country groups were similar between pre- and post-implementation exemplars, the percentage of applicants educated in Australia/New Zealand decreased from 17.71% to 8.86% from pre- to post-implementation, whereas the percentage of applicants increased from 13.54% to 29.11% in the post-implementation exemplar group. The post-implementation exemplar group (average age = 34) was also slightly older than the pre-implementation exemplar group (average age = 31.5).

The demographics for the exemplar populations included:
- Approximately ten percentage of both exemplar groups were male;
- 30.38% of the exemplar group was residing in Canada at the time of application in the post-implementation data compared to 19.79% in the pre-implementation data, however this difference was not statistically significant;
- High percentages of the exemplar population had worked in at least one additional country other than their education country for both exemplar groups;
- Most of the applicants did not meet the thresholds for theory and clinical hours in education; and
- The average number of years since last practiced were almost identical for the pre-implementation exemplar group (0.19) and post-implementation exemplar group (0.20).

Exemplar Outcome Comparisons

At all of the outcome points, there was no significant difference between the percentages of applicants who received each type of decision between the pre- and post-implementation exemplar data. For example, similarly high percentages of applicants in the pre- and post-implementation exemplar groups were deemed “TP Eligible” (97.67% and 100.00%
respectively) rather than deemed “Ineligible” at any of the TP decision points. This difference was not statistically significant.

While there was a statistical difference in the Exam Outcome, Canada’s national entry-to-practice exam changed during the post-implementation study period. Included in the change, was a policy to accept exam results from previously written external exams of the same type retroactively to 1982. When the passing external exam results were considered for both exemplar groups, there was no significant difference in the Exam Outcome between pre- and post-implementation.

It is also important to consider that 54.17% of the pre-implementation exemplar group and 78.48% of the post-implementation exemplar group were still active in the process at the time of data extraction and therefore did not have data for outcome points later in the process.

**Exemplar Timeline Comparisons**

Timeframes were compared for each phase of the process, and cumulatively, between the pre- and post-implementation exemplar groups. There were no significant statistical differences in the median times between the dates CARNA received applicants’ complete applications and the dates CARNA notified applicants of the initial assessment decision, or the median times between the dates CARNA notified applicants that they were “TP Eligible” and the dates they wrote their first national entry-to-practice exam between the pre- and post-implementation exemplar groups. However, applicants in the post-implementation exemplar group took less time to apply for their first TP after CARNA notified them that they were eligible (90 calendar days less), and less time to apply for their initial RN registration after they were deemed “TP Eligible” (139 calendar days less). Both of these differences were statistically significant.

The median cumulative timeframes were significantly shorter statistically for the post-implementation exemplar group for the times between CARNA receiving a complete application and the applicants:

- Receiving their first TP (112 calendar days less);
- Writing their first national entry-to-practice exam (68 calendar days less);
- Receiving their national entry-to-practice exam results (78 calendar days less); and
- Receiving an initial RN registration (137 calendar days less).

It is important to note that the timeframes did not include the time required for the applicant to submit, or the source organizations to send, all of the documents required to complete the application. This may have comprised up to several years in addition to these timelines.
4.0 Conclusion

4.1 Discussion

The statistical analysis of pre- and post-implementation data was used to inform the evaluation of IEN application for registration policy and practice changes that were implemented in August 2013 based on findings from the baseline data analysis. The revisions included the development of guidelines for initial assessment; the introduction of an option for some applicants to proceed directly to bridging education; a shift in the management of bridging education; revisions to process time limits; and the review and revision of communication tools to improve clarity and transparency.

Demographically, the pre- and post-implementation study samples were similar. However, there was a larger percentage of applicants who had a degree similar to an Alberta baccalaureate in the post-implementation study sample. The post-implementation study sample also had a discernably higher percentage of applicants educated in the Tropics/Caribbean and lower percentage of applicants educated in the Philippines than the pre-implementation study sample.

The demographics of the pre- and post-implementation applicants reflected changes in the recruitment activity in the province between study periods. After the 2009, off-shore recruitment essentially halted. The lower percentage of applicants educated in the Philippines and higher percentage of applicants with a degree similar to an Alberta baccalaureate in the post-implementation data set may have been related to this change. As well, in 2013, the major employers in Alberta began conducting more targeted recruitment in limited markets. Some of the recruitment efforts were informed by the LFE Project baseline data analysis findings. For instance, one employer now makes concerted efforts to recruit degree prepared nurses from the United States in part because the LFE data showed that those applicants were more likely to be successful in obtaining registration.

There key outcome differences between applicants in the two data sets reflected the introduction of the new “SEC Assessment or Direct to Bridging Option” and the elapsed time between the study time periods and data extraction dates. At the initial assessment, the percentage of applicants “Referred to SEC” dropped considerably in the post-implementation study sample. However, when added to the percentage of the post-implementation study sample that was eligible for the “SEC Assessment or Direct to Bridging Option”, the percentage was similar to the pre-implementation data. The applicants who were offered the option would have likely been referred to an SEC Assessment prior to the changes.

At the SEC Review Outcome, the percentage of applicants referred to bridging education decreased and the percentage of applicants deemed ineligible increased in the post-implementation time period. However, with the LFE changes many of the applicants who would have likely been referred to bridging education were offered the option to proceed directly without completing an SEC Assessment which would have affected the percentage frequencies at this outcome point. While almost all of the applicants who completed bridging
education passed and were deemed “TP Eligible” in both study samples only five applicants had completed bridging education in the post-implementation study sample at the time of data extraction.

The percentage of applicants who passed the national-entry-to-practice exam was lower in the post-implementation study sample however, all of the applicants who failed in the post-implementation study sample were eligible to write the exam again and fewer applicants had taken the exam which could have accounted for the higher failure rate as the majority of the study sample had not received an final exam result. As well, recognition of previous passing national entry-to-practice exam results allowed a number of applicants to bypass writing the exam. When the previous passing exam results were considered in the Exam Outcome, the pass rate was similar between the pre- and post-implementation applicants. The Outcome: TP and Outcome: RN reflected the study sample timeframes in relation to the elapsed time before the data extraction with more than half of the applicants in the pre-implementation study sample active in the IEN application for registration process and 80.39% still active in the post-implementation study sample at the time of data extraction.

Statistical modeling of pre-implementation data showed that education credential, education received where the scope of nursing practice is similar to Canada and number of years since last practice may have been related to success in the IEN application for registration process. As well, post-implementation modeling of the Initial Assessment Outcome showed that there was evidence that the same characteristics were related to applicants being deemed “TP Eligible” rather than “Referred to SEC” or offered the option to proceed to bridging education. These findings confirm the baseline data analysis, and policy and practice changes. Due to the small sample size, post-implementation data was not modeled at the other outcomes.

While most of the timelines for the post-implementation study sample were shorter than pre-implementation timelines, the majority of the post-implementation applicants were still in the process therefore later timelines in the post-implementation timeline analysis may have been skewed by applicants who completed the process quickly. However, the Initial Assessment and SEC Assessment timelines demonstrated a decrease in those phases in the post-implementation periods, and later timelines indicated that the LFE policy and practice changes may have contributed to decreased timelines.

Comparative analysis of the pre- and post-implementation data can inform the evaluation of the policy and practice changes. In order to reduce the potential sample bias, the investigation of exemplar groups of applicants who received their education where the scope of nursing practice is similar to Canada, who had a degree similar to an Alberta baccalaureate and who had practice currency was conducted. The applicant characteristics and outcomes were not significantly different, with the exception of the average age and education country group, with the post-implementation applicants being slightly older and having a lower percentage of applicants educated in Australia/New Zealand and a higher percentage educated in the Tropics/Caribbean. This confirmed that the exemplars were similar, and the characteristics and outcomes were not associated with intervention effect.
Exemplar timeline analysis demonstrated that, with the exception of the Initial Assessment Time and time for the applicant to write their first national entry-to-practice exam following a “TP Eligible” notification, the timeframes for the IEN application for registration process were significantly reduced from pre-implementation to post-implementation. Overall, applicants with similar characteristics and outcomes took 137 calendar days less to receive an initial RN registration in the post-implementation exemplar group than in the pre-implementation exemplar group.

4.2 Key Limitations

The data analyzed in this study was collected from an active database as part of routine data collection during the IEN application for registration process. As data collection was not designed for research purposes, the data were not entered and cleaned in isolation, however the Project Manager, Data Entry Clerks and Data Analyst thoroughly reviewed and cleaned the data. As well, CARNA transitioned to a new client information management database with different functionality and coding in May 2013. A new data query was developed to extract the project data and, as the LFE Project data spanned both databases, an alignment of data codes was required.

Post-implementation data analysis was limited by the sample size. Pre-implementation data analysis found that the average time for applicants to receive an RN registration in the period immediately prior to the post-implementation study inclusion period was 594 days. As the data for the post-implementation period was extracted on May 29, 2015, the majority of the applicants whose complete applications were received between August 27, 2013 and May 29, 2015 were still active in the process. Since the elapsed time between the start of the post-implementation period and data extraction was 640 days, the majority of the applicable study sample at the later process outcomes were applicants who submitted complete applications early in the post-implementation period or applicants who were deemed “TP Eligible” at the Initial Assessment Outcome and were not required to complete an SEC Assessment or bridging education. Timeline analysis was also impacted by this limitation as the majority of applicants who completed an SEC Assessment or bridging education were still in the application process skewing timelines at the Exam Outcome and Outcome: RN towards those who had completed the process quickly. It is recommended that the post-implementation data analysis be repeated in one to three years to allow more applicants in the study sample to progress through the process.

Timeline analysis also did not factor in the period prior to the applicant’s complete application (time required for the applicant to obtain, or for the source organization to send, all of the supporting documentation to complete their application, as well as to meet the English language requirement). This period may have ranged from several days to multiple years.

Outcome: TP and Outcome: RN were measured against the number of ineligible applicants at the corresponding process stages as ineligibility constitutes a final assessment decision. The majority of the post-implementation applications (80.49%) remained active in the IEN application for registration process; therefore, a determination of some of the outcomes of the active applications could not be made at the time of this analysis.
Literature investigating IEN transition into the workplace identifies culture, family support, immigration challenges, conflicting obligations, and language as key factors impacting success or challenges in transition. However, this study was unable to analyze those factors statistically. Information on English Language Tests was collected, however there was no requirement for applicants to submit failed English tests therefore attempts at analysis of the influence of language on outcomes would have been inconclusive.

The IEN application for registration process at CARNA does not operate in isolation and there were several external factors which may have also impacted the post-implementation data. During the post-implementation period, the national entry-to-practice exam in Canada changed from the CRNE to the NCLEX-RN. This change may have impacted the timeline data analysis as the CRNE was only offered three times per year whereas the NCLEX-RN was offered year round. As well, regulatory bodies across Canada began accepting passing NCLEX-RN results retroactively to 1982. For these applicants, the passing result was considered however the applicant still had to obtain a TP to meet the requirement of a good reference from an employer based on 225 hours of practice in Alberta. However, not having to write the national entry-to-practice exam would have also impacted timelines. There were 69 applicants across both study samples who were assessed as being “TP Eligible” and had previously passed a national entry-to-practice exam external to CARNA. CARNA does not collect any information on externally written national entry-to-practice exams except for the final exam result.

As well, changes to the locations of the SEC Assessment Centre and bridging education program may have impacted applicants in both the pre- and post-implementation study samples. The volume of applicants who required bridging education may have increased with the introduction of the “SEC Assessment or Direct to Bridging Education Option” and may have affected timelines when the program had a waitlist.

4.3 Impact

The statistical analysis of the pre- and post-implementation data will be used to inform the evaluation of the LFE policy and practice changes that were implemented at CARNA in August 2013. There were challenges with sample sizes in the post-implementation data for the later phases of the process so it is recommended that the analysis is conducted again in one to three years to increase the statistical power of the conclusions. However, in combination with qualitative feedback from stakeholders and other regulatory bodies, these results may guide further changes to CARNA policies and practices for the IEN application for registration process.

As well, in combination with the baseline data findings, the pre- and post-implementation data analyses could be used as statistical evidence to address the gap in evidence to inform the IEN application for registration process; and can contribute to evidence-informed policies for nurse regulators, educational institutions, employers and governments.
Appendix A  File Flow Charts

Pre-Intervention Data

Post-Intervention Data
Pre- and Post-Implementation Data Analyses Report

Pre-Implementation Exemplar Data

- Assessment Outcome N=96
  - SEC Assessment N=16
    - Active N=8
      - Eligible for Choice N=5
        - Bridging Education N=6
          - Bridging Education Completed N=3
        - Bridging Education in Progress/Lapsed N=3
      - Lapsed N=0
    - Lapsed N=0
  - Active N=3
  - Lapsed N=0
  - Total Lapsed N=2 (15.63%)

- CRNE/NCLEX (Exam) Results N=58
  - Fail Exam N=9
    - Re-Writing Exam N=9
  - Pass Exam N=49
  - Total Lapsed N=0 (0.00%)

Post-Implementation Exemplar Data

- Assessment Outcome N=79
  - SEC Assessment N=5
    - Active N=2
    - Lapsed N=0
  - SEC/Bridging Choice N=8
    - Active N=3
  - Bridging Education N=5
    - Bridging Education Completed N=3
    - Bridging Education in Progress/Lapsed N=2
  - Lapsed N=0
  - Total Lapsed N=0 (0.00%)

- CRNE/NCLEX (Exam) Results N=15
  - Fail Exam N=6
    - Re-Writing Exam N=6
  - Pass Exam N=9
  - Total Lapsed N=0 (0.00%)

- External Exam N=28
  - RN Granted N=17
    - Active N=5
    - Lapsed N=0
Pre- and Post-Implementation Data Analyses Report

Appendix B  IEN Application for Registration Process Phases

1. Application
   - Complete Application/Ready for Assessment
     - CARNA, Applicant, Source Organizations, CARNAC
     - Initial Assessment Notification
       - Applicant, SEC Assessment Centre, Government
       - SEC Results Received
         - CARNA
         - Notification of Decision after SEC
           - Applicant, Educational Institution(s), Government
           - Bridging Education Transcript Received
             - CARNA
             - Notification of Decision after Bridging Education

2. TP Eligible
   - Group 1: Following Initial Assessment
   - Group 2: Following SEC Assessment
   - Group 3: Following Bridging Education Completion

3. Applicant, Employer, Government
   - TP Application
     - TP Approved
       - Applicant, Employer, Government
       - 225 Hours of Work Experience in Alberta with a positive reference
         - CARNA
         - Additional TPs
           - Applicant, Employer, Government

4. Applicant, NCEX-RN, Government
   - NCLEX-RN
     - Applicant, NCEX-RN
     - Additional Writings

5. Applicant, CARNA
   - CARNA
   - RN Permit Application
     - RN Permit Approved
     - CARNA
Appendix C  Research Team and Acknowledgments

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