INTRODUCTION

- Approximately 900,000 new cases of hematological malignancies are diagnosed globally each year.
- In Canada, it is estimated that hematological malignancies make up 9% of all new cases of cancer [2].
- Furthermore, in 2008 it was estimated that the direct healthcare costs related to cancer were $3.8 billion [2].
- Proper management of hematological malignancies relies heavily on diagnosis [3].
- Diagnosis is comprised of multiple modalities, including flow cytometry. Current laboratory-developed testing (LDT) for flow cytometry is non-standardized and error prone.
- Insufficient research has been published evaluating the cost and errors in this space. Manual work, including steps such as antibody selection, compensation, and pipetting have been identified as potential sources of error in flow cytometry.

OBJECTIVE

- The aim of this study is to quantify the time and associated economic impact of manual work in a flow cytometry process for hematological malignancies. The total opportunity for error was captured as a secondary outcome.

RESULTS

- The process for running a flow cytometry laboratory for the diagnosis and monitoring of hematological malignancies is complex. The quality control and compensation aims to ensure consistent and reproducible results across time and occurs monthly. This laboratory prepares cocktails for screening of myeloid and lymphoid lineage malignancies. Cocktails are prepared weekly (48 weeks) to reduce pipetting errors and improve efficiency.
- The workflow evaluated in this study was divided into five major categories (Figure 1).
- The processes evaluated for the purpose of this study represent specimen preparation and the steps involved in running the screening and reflex testing were the most time consuming (Figure 2).
- A total of 365.1 hours were spent on compensation, screening tests for lymphoid and myeloid lineage malignancies and associated reflex tests.
- Based on an hourly human resource cost of $50 CAD per hour, it was calculated the manual steps involved in the aforementioned workflow costs $18,255 in labour.
- Running the screening and reflex tests had the most error prone steps (Figure 4).
- The preparation of the screening cocktail had the highest percentage of error prone steps, primarily due to the amount of pipetting involved in this process (Figure 5).

CONCLUSIONS

- Based on this case study, manual work resulted in substantial cost to the laboratory in indirect costs and opportunities for error. This suggests that in addition to reducing the potential for error, minimizing unnecessary manual steps in the flow cytometry workflow could also reduce laboratory indirect costs and improve efficiency.
- Future research is warranted to quantify the frequency of errors in manual steps in LDT for flow cytometry.

REFERENCES