

INR Point of Care Testing in an Outpatient Anticoagulation Clinic and the Impact on the Patient Experience: A Quality Improvement Study

Karin M Chisholm, BSc(Pharm); Celia L Culley, BSP, ACPR, PharmD; Sean P Spina, BSc(Pharm), ACPR, PharmD, FCSHP



Introduction

The Anticoagulation Therapy Clinic (ATC) at Royal Jubilee Hospital (RJH) is an outpatient clinic providing care to patients requiring anticoagulation to help prevent hospital admissions and facilitate hospital discharges. Patients are enrolled for initiation and stabilization of anticoagulants, but not for chronic management.

Many outpatients attending the ATC are taking vitamin K antagonists (VKA), most commonly warfarin, that require ongoing monitoring. Traditionally, VKA therapy is monitored with international normalization ratio (INR) by laboratory venipuncture testing, occurring at a different location within RJH and requiring at least one hour of processing time.

Point-of-care testing (POCT) is defined as testing at or near where a patient is located, with potential benefits including enhanced patient convenience and comfort, and reduced wait times and utilization of health care resources. The ATC was interested in improving the patient experience by changing current practice of traditional laboratory INR testing to POCT with a blood analysis device (iSTAT®).

There is limited information on the impact of INR POCT devices on patient experience in outpatient anticoagulation clinics, indicating a need for this quality improvement project.

Study Objective

To determine how the implementation of an INR POCT device for the initiation and stabilization of VKA therapy in an outpatient anticoagulation clinic impacts the patient experience, in comparison to traditional laboratory venipuncture testing.



Methods

Design

- Prospective, before-and-after, quality improvement study
- Single center: ATC at RJH (Victoria BC, Canada)
- Participant survey
 - Including point Likert scales (PLS) and an open-ended, narrative feedback question

Inclusion Criteria

- Patients (or caregiver) attending ATC in person, and:
 - ≥18 years old
 - Receiving warfarin therapy
 - Requiring INR testing during appointment

Exclusion Criteria

- Patients attending first or second ATC appointment

Statistical Methods

- Independent samples t-test (primary outcome and secondary outcomes demonstrating difference with descriptive statistics)
- Descriptive statistics with 95% confidence intervals (secondary outcomes)

Outcomes

Primary Outcome

- Total time spent at RJH on day of survey for anticoagulation-related care

Secondary Outcomes

- Additional parameters that may affect patient experience
 - Cost to patient (i.e. parking, bus and/or taxi fees, income loss)
 - Pain and discomfort of patient
 - Overall patient satisfaction with INR blood testing experience
- Health care cost difference between laboratory INR testing and INR POCT using iSTAT®

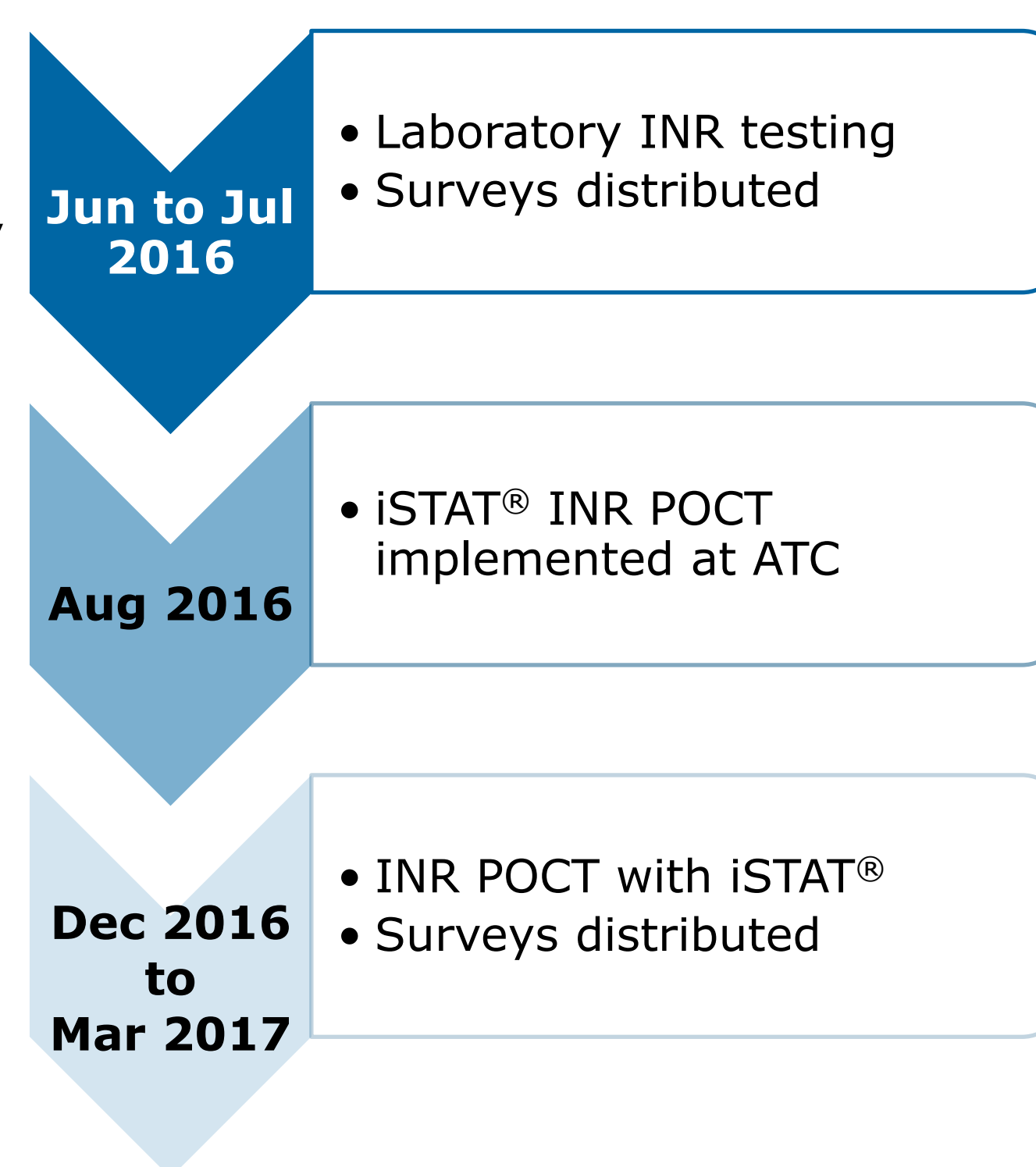
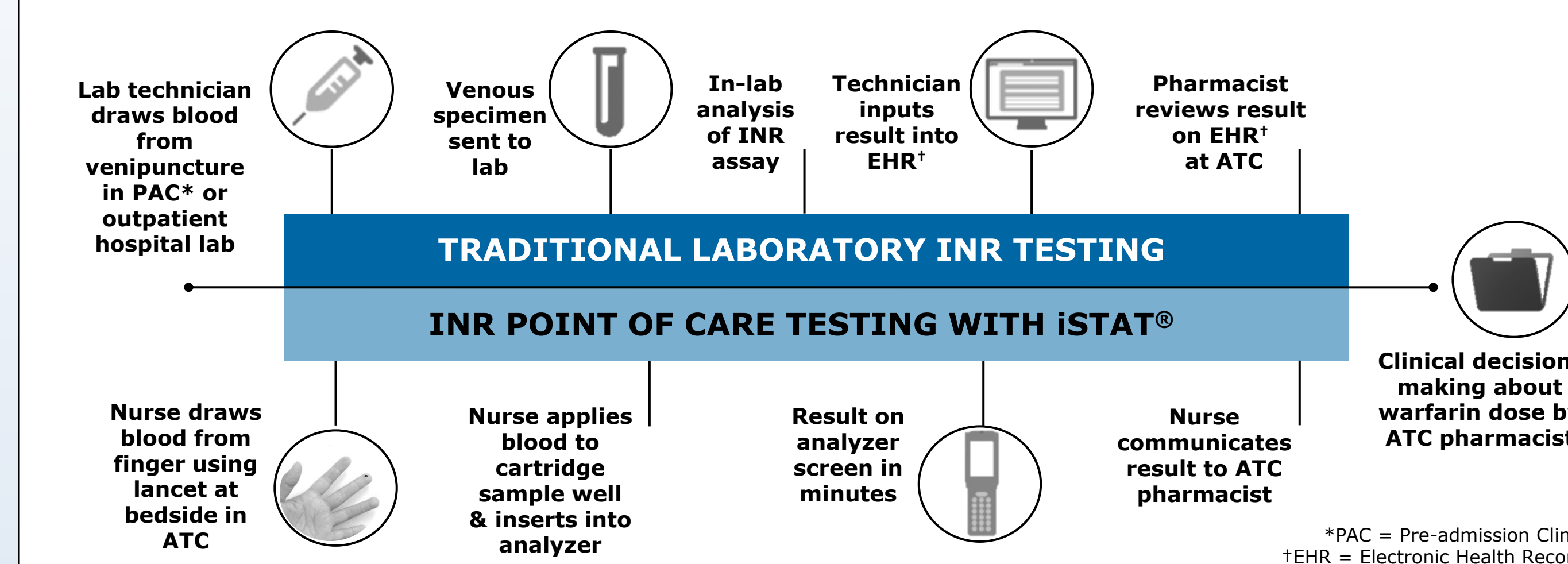


Figure 1. Study Design

INR Testing Process



Results

Table 1. Baseline characteristics.

Characteristics	INR Testing Type	
	Laboratory n=22	POCT n=36
Age, n (%)		
< 65 y	15 (68)	18 (50)
≥ 65 y	7 (32)	18 (50)
Female, n (%)	8 (36)	13 (36)
Reason for anticoagulation		
Deep vein thrombosis (DVT), n (%)	9 (41)	11 (31)
Pulmonary embolism (PE), n (%)	5 (23)	4 (11)
Atrial fibrillation, n (%)	4 (18)	6 (17)
Mechanical heart valve, n (%)	4 (18)	9 (25)
Arterial embolus, n (%)	2 (9)	6 (17)
Intracardiac embolus, n (%)	0 (0)	2 (6)
Other/unspecified, n (%)	0 (0)	2 (6)

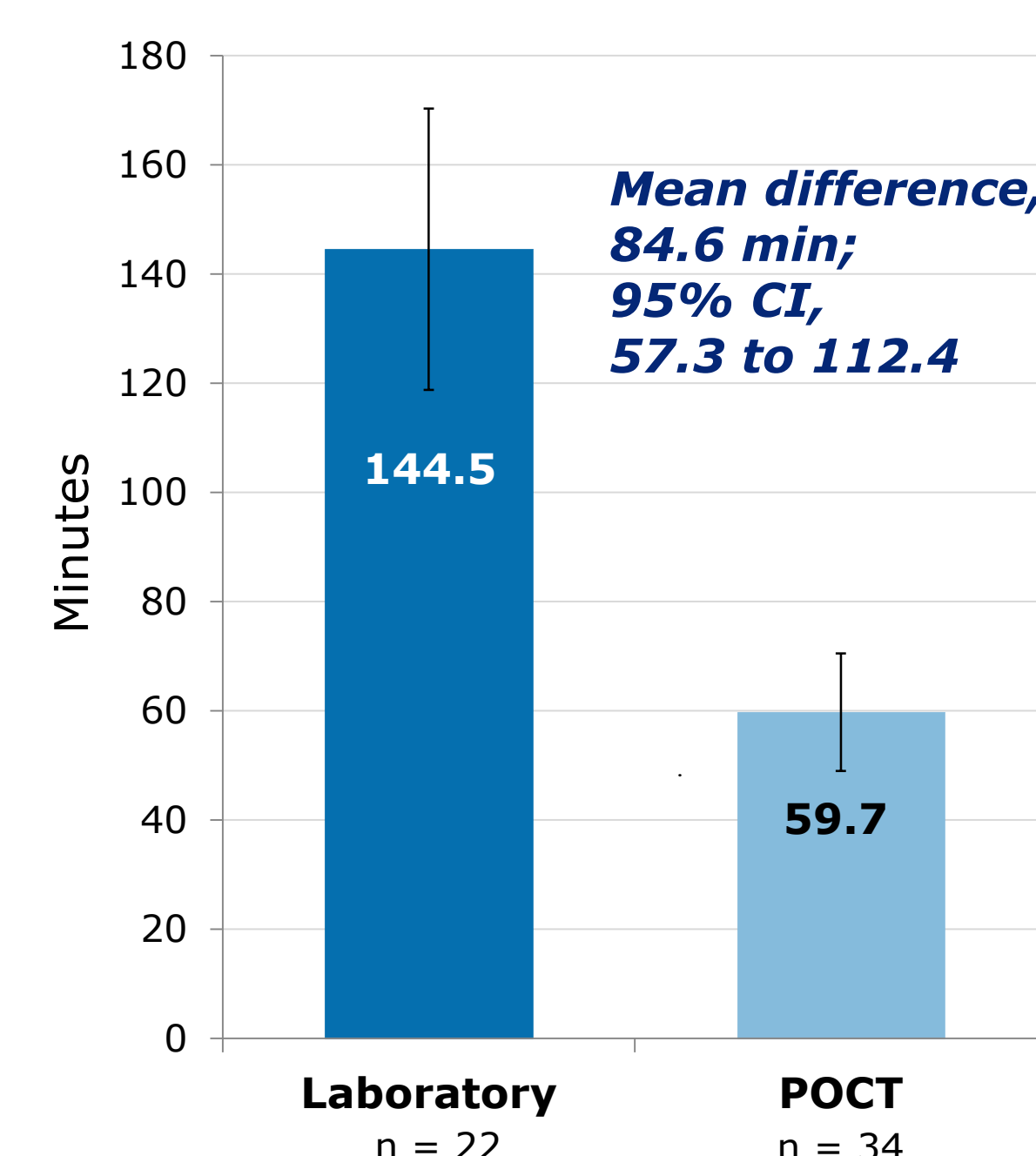


Figure 2. Mean total time spent at RJH in one day for anticoagulation-related care.

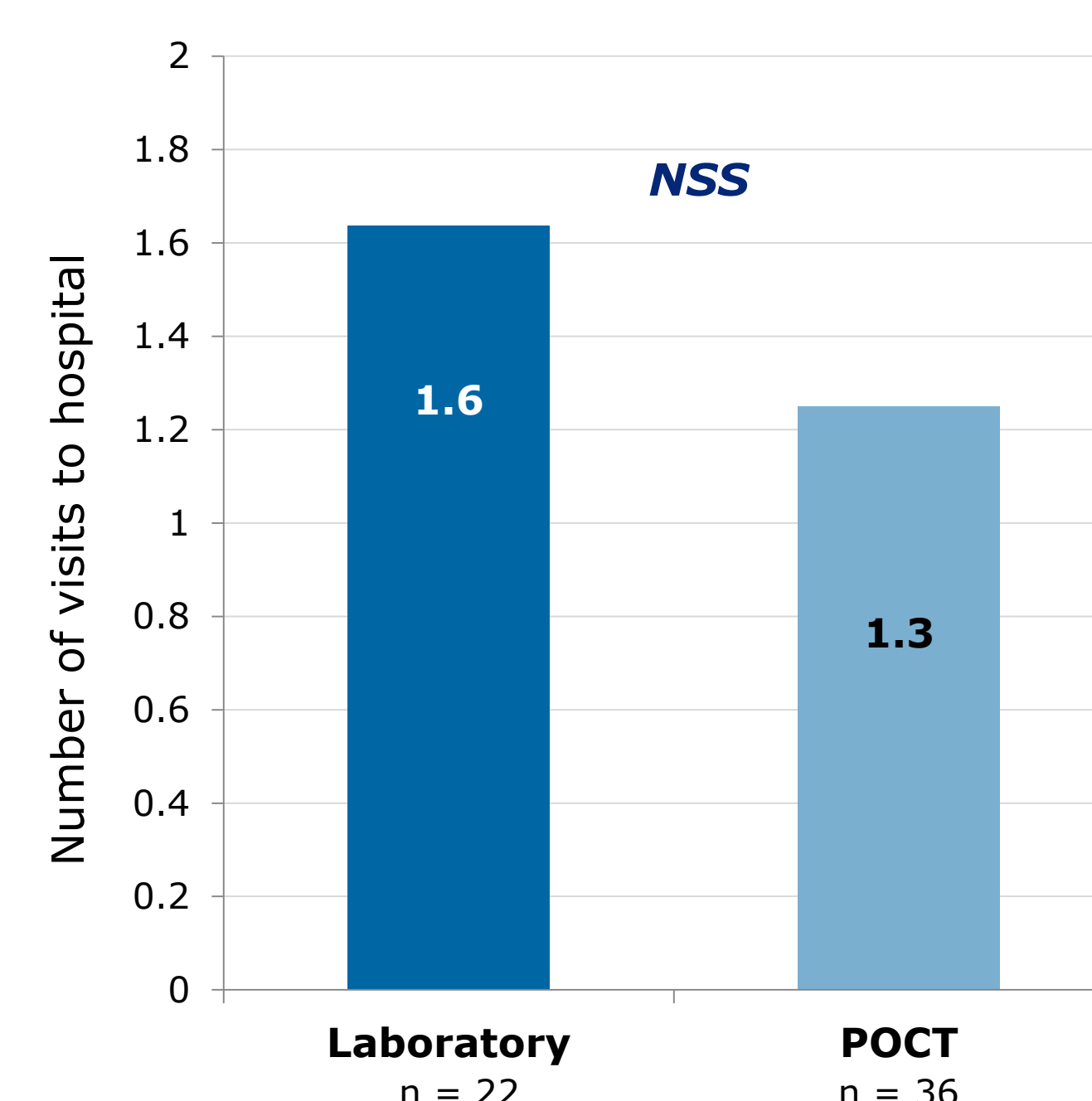
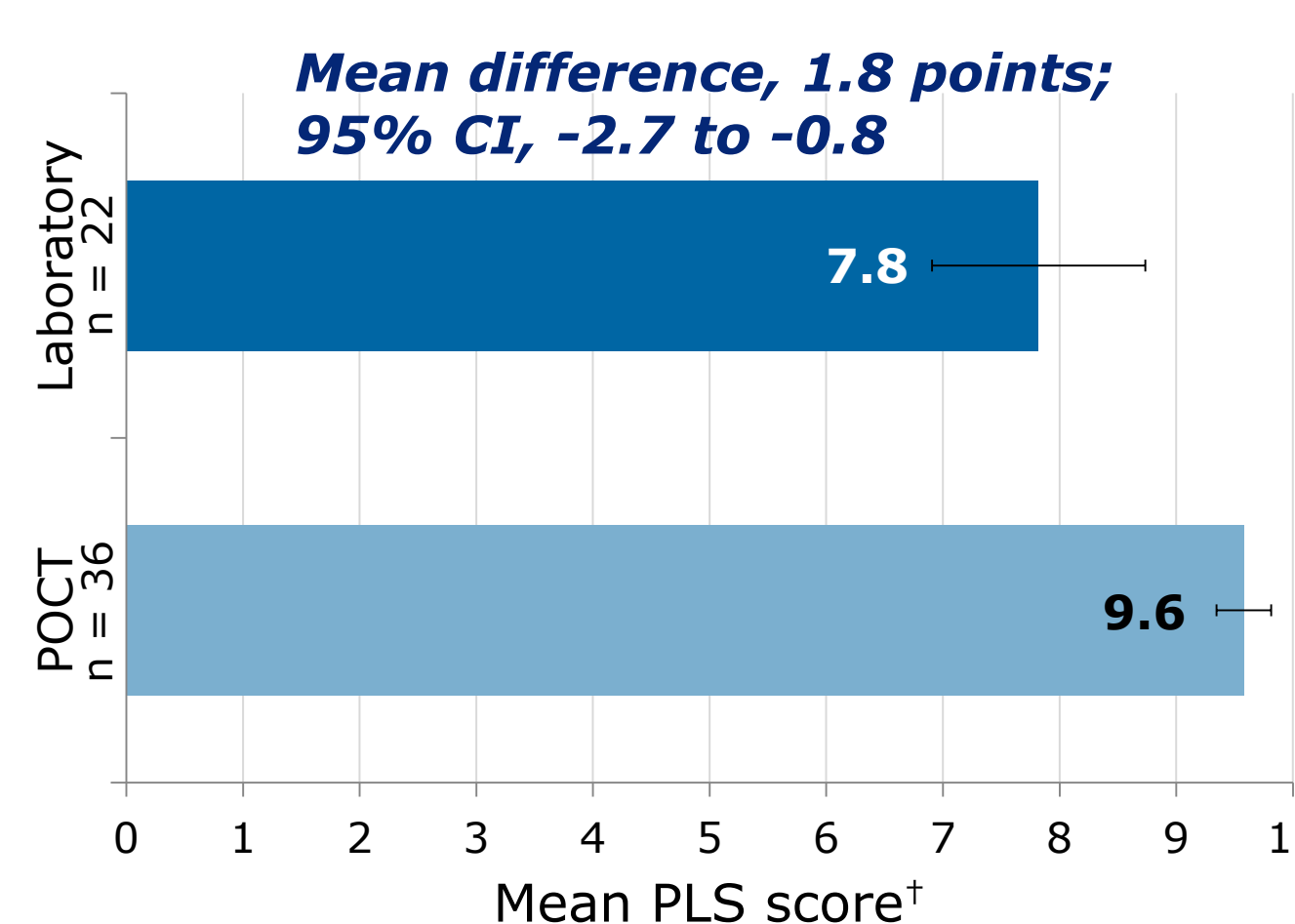
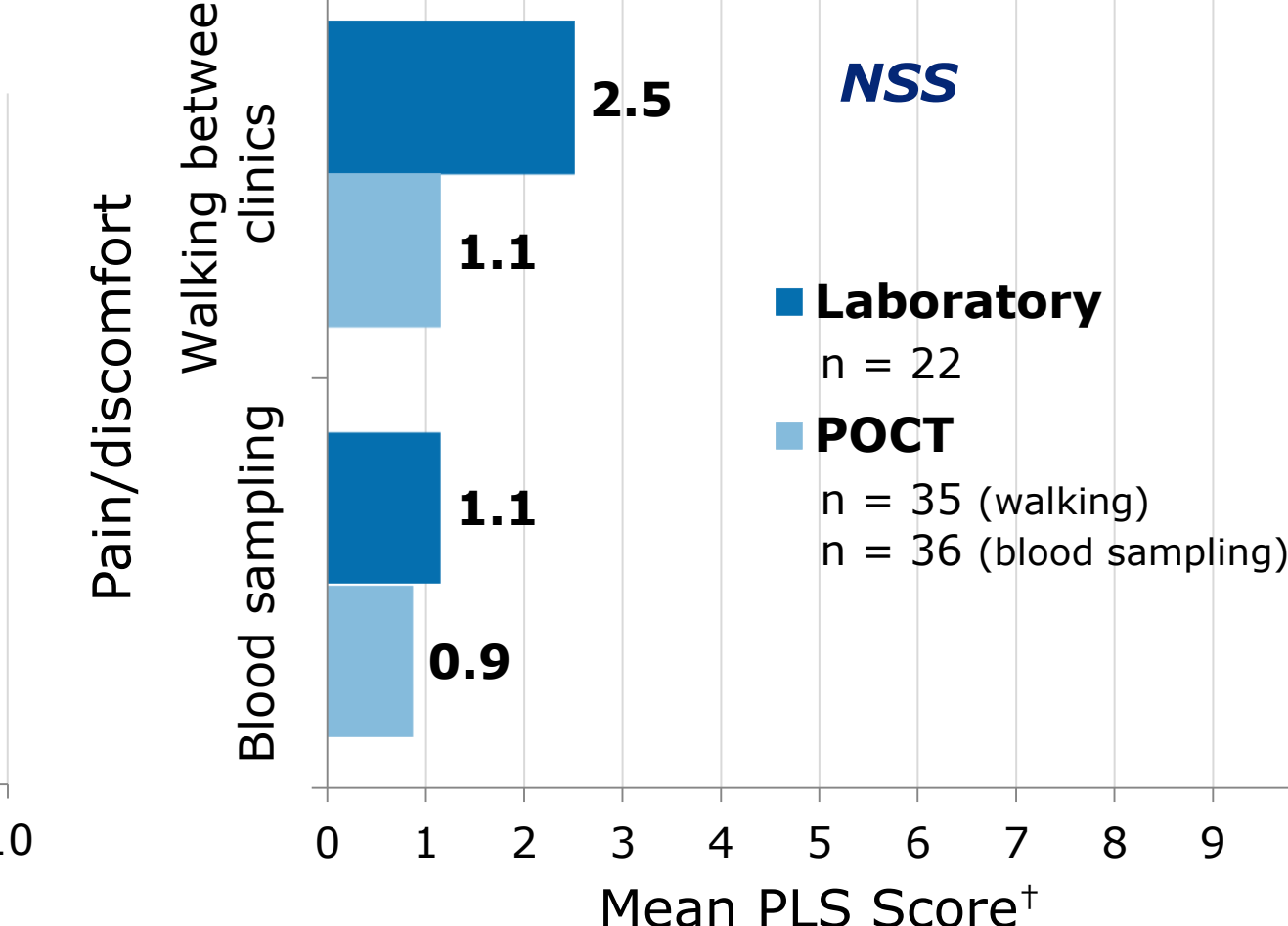


Figure 3. Mean number of visits to RJH in one day for anticoagulation-related care.



†Point Likert scale (PLS) score: 0 = highly dissatisfied; 10 = highly satisfied

Figure 4. Participant overall satisfaction with INR blood testing experience.



†Point Likert scale (PLS) score: 0 = no pain/discomfort; 10 = worst pain/discomfort imaginable

Figure 5. Participant pain/discomfort as result of visit.

Results (continued)

Table 2. Participant comments about overall experience and process.

Laboratory INR Testing

"...difficult to schedule appointments and be here **an hour early** for blood tests..."

"Wait times are not too long. However, multiple **trips to and from hospital take time.**"

"**Good.**"

"**Very quick, painless.**"

"...spending my **whole day at the hospital** to avoid making the drive twice."

INR POCT with iSTAT®

"**Much easier and timely** to use machine rather than have it done at lab..."

"This service is **far preferable** to doing this in the lab."

"...first time blood taken was a bit shocking. A little **more warning will make it less startling.**"

"...very **simple and efficient** process."

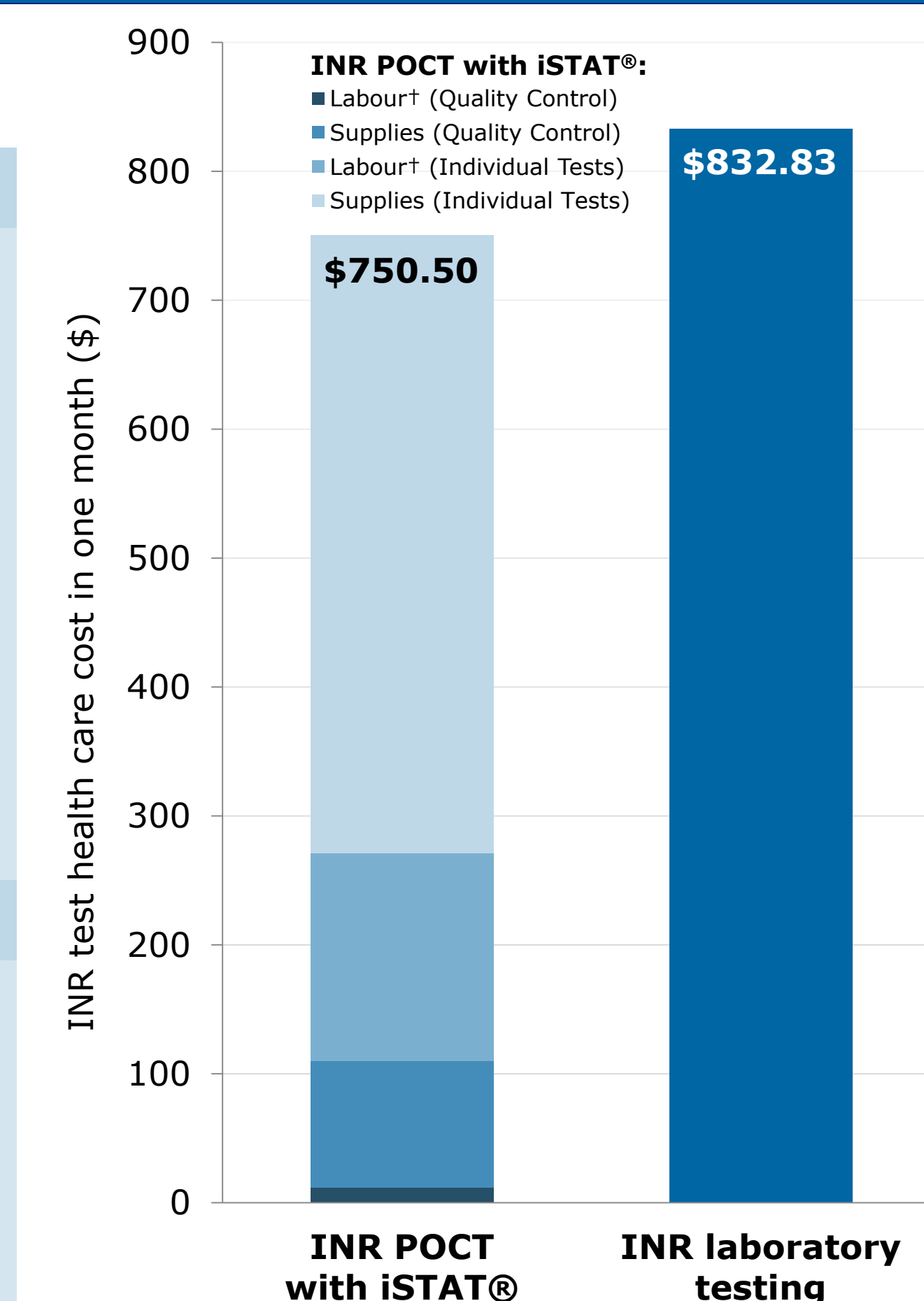


Figure 6. Monthly cost of ATC INR testing (laboratory vs POCT). Based on March 2017 (69 iSTAT® tests performed at the ATC), compared to 69 INR laboratory tests (MSP billable amount \$12.07/test). †Licensed practical nursing (LPN) labour costs only.

Discussion

- Those undergoing POCT spent less time at RJH for one day of anticoagulation-related care, compared to traditional laboratory INR testing. This difference likely reflects improved efficiency of POCT over laboratory venipuncture testing, and more than an hour of time saved at the hospital may mean additional time for school, work, or other personal activities.
- Although we would expect that those undergoing POCT would require only one visit to the hospital for anticoagulation care, the total number of visits to RJH in one day did not differ significantly between groups.
- POCT was associated with greater satisfaction with the overall INR testing experience by 1.8 points; however, the clinical relevance of this is unknown.
- Pain or discomfort was uncommon in all participants. Although these findings contradict other studies, pain is subjective, and participants' overall satisfaction may have resulted in an underestimation of pain. Participants also completed the survey after at least two days of treatment, at which point pain may have been subsiding due to treatment.
- Initial costs for implementation of the iSTAT® are over \$10,000, but an economic analysis for one month (March 2017) found INR test health care costs to be no more expensive with POCT compared to laboratory testing. This may be an additional incentive for utilization of INR POCT in anticoagulation clinics.
- Potential limitations include our small sample size, limited generalizability (site-specific), the potential for recall and response biases, and results reflecting only one day of ATC experience.

Conclusion

- Patients undergoing initiation and stabilization of VKA therapy following the implementation of INR POCT at the outpatient ATC spent less time at the hospital for one day of anticoagulation-related care.
- Patients were also more satisfied with their overall INR blood testing experience with INR POCT, in comparison to traditional laboratory venipuncture testing.
- INR POCT with iSTAT® was also no more expensive than traditional laboratory testing over one month of economic analysis.

Implications for Practice

- This study provides evidence to support the continued use of INR POCT during the initiation and stabilization of warfarin therapy in the ATC.