ORIGINAL INVESTIGATION

Exploring the Effects of System-Wide Echocardiography Accreditation on Patient Care: A Case Study
Exploring the Effects of System-Wide Echocardiography Accreditation on Patient Care: A Case Study

Alexandra Kushman1,2, Mishan Ramukwella1,2, Claire Price1,2, Karan Sethi1,2, Jordan Ellis1,2, Jon Chilingarian PhD3, Mylan C. Cohen MD MPH4,5

1M.D. Candidates, Tufts University School of Medicine; 2MBA Candidates, Heller School of Management, Brandeis University; 3Professor, Heller School of Management, Brandeis University; 4Clinical Professor of Medicine, Tufts Medical School, Medical Director; 5Cardiac Imaging and Diagnostics, Maine Medical Center

ABSTRACT

Background: Multi-site healthcare organizations such as MaineHealth are challenged by providing consistent patient care across geographically distant sites. MaineHealth undertook an initiative in 2016 to accredit sixteen separate echocardiography laboratories through one single application. The goal of this initiative was to establish imaging laboratory standardization across sites to improve collaboration, communication and efficiency. The purpose of this study is to assess the projected impact of System-wide Accreditation (SWA) at MaineHealth and examine employees’ perceptions of whether SWA affects patient care.

Methods: Twenty field interviews were conducted with MaineHealth staff. Responses were analyzed for overlapping themes. To quantify perceptions of SWA, researchers administered a brief, anonymous survey answered by 11 employees. Researchers conducted site visits to Maine Medical Center (MMC) and Maine Medical Partners MaineHealth Cardiology, Scarborough Office to observe the practices at MaineHealth echocardiography facilities.

Results: We found that MaineHealth employees believed SWA would standardize and elevate the quality of patient care, enhance staff knowledge and training, and reduce repeat echocardiograms. Employees interviewed also believed that the collaboration resulting from SWA could catalyze widespread organizational change. Researchers calculated that SWA would save between 496 and 736 hours in accreditation application compilation time and would produce modest fee savings. However, MaineHealth has yet to demonstrate the benefit of accreditation empirically.

Conclusion: This study identified, through an interview process, that MaineHealth employees anticipate SWA to reduce the number of repeated echocardiograms through standardization and increase imaging study quality, benefitting patients and MaineHealth. The employees also perceived that other hospital systems may benefit from the efficiencies realized by similar system-wide initiatives to accredit other imaging laboratories at MaineHealth. While this study is exploratory, it surfaced several testable hypotheses. As more data becomes available, further research can be undertaken to assess the effectiveness of SWA in comparison with traditional accreditation procedures. This can, in turn, guide system-wide, and even state-wide accreditation initiatives.

INTRODUCTION

In healthcare, accreditation is playing an increasingly important role in reducing inappropriate variations among sites to improve overall healthcare quality.1] Accreditation
encourages standardization, which increases the quality and comprehensiveness of studies, improves efficiency, and delivers more effective care.[2-6] Maine Health Management Coalition considers accreditation a mechanism to improve the quality of diagnostic imaging. Accreditation standards hold healthcare organizations accountable to minimal and achievable levels of performance for safety, quality, equipment, examination specifications, qualifications, and continuing medical education.[7] Such accreditation requirements encourage sites to perform clinical tasks by qualified clinicians who obtain appropriate outcomes using the fewest number of resources. There are four agencies that conduct accreditation reviews: the Intersocietal Accreditation Commission (IAC), the American College of Radiology, RadSite, and The Joint Commission.[8] Accreditation agencies conduct reviews at individual sites to ensure evidence-based practices, efficiency, affordability, and quality of healthcare. Approval indicates a minimum level of performance compared to established industry standards.

MaineHealth is northern New England’s largest integrated health system, reaching over 1.1 million residents in Maine and eastern New Hampshire, with ten member organizations and four affiliated health systems. Before 2016, this organization accredited over half of its echocardiography facilities separately (Fig 1). Such piecemeal, or, decentralized accreditation, however, creates inefficiency in a healthcare system. Clinical and managerial personnel produce redundant application materials, detracting from time that could otherwise be spent on patient care.

Efforts at unifying accreditation applications into a single application have rarely been attempted at MaineHealth or other large healthcare systems. In 2016, MaineHealth experimented with a single accreditation application for all sites with echocardiography facilities.[9] This pilot study was undertaken to improve quality of care across geographically dispersed locations by implementing standardized laboratory procedures and increasing clinical integration. [6]

This research study was conducted to understand the employee perceptions of the value of System-wide Accreditation (SWA) at MaineHealth, specifically regarding financial savings, efficiency, communication across sites, and ultimately quality of patient care. We explored two questions. First, do key informants at MaineHealth believe that SWA is promoting efficiency, savings, and collaboration among MaineHealth sites? Second, are there any unexpected or potential new benefits of SWA for patient care?

**MATERIALS AND METHODS**

To explore perceptions about SWA, this study combined qualitative and semi-quantitative methods. Twenty field interviews were conducted in July 2017 with key informants: five hospital administrators, six vice presidents, two physicians, four physician administrators, one marketing employee, and two IAC employees. Interviews were conducted individually with word-by-word transcriptions under the condition of anonymity to encourage honesty. Researchers employed an informal interview format to understand interviewees’ experiences and opinions about SWA. Audio recordings of the interviews were made for review and quality assurance. Separately, a
brief, anonymous survey with additional questions was answered by eleven (61.1%) of the MaineHealth interviewees (Table 1). Responses from the survey and interviews were categorized into the following themes: repeat studies, communication and collaboration, staff training, financial gains, standardization, reputation advantage, and measurement.

Researchers conducted site visits to Maine Medical Center (MMC) and Maine Medical Partners MaineHealth Cardiology, Scarborough Office, to observe the practices at these two facilities. Researchers calculated personnel hours saved through SWA.

RESULTS

Repeat Studies: A supervising cardiac sonographer estimated that over 90% of studies conducted at satellite MaineHealth sites are repeated when patients are referred to MMC, the largest MaineHealth site (oral communication, July 2017). One of the primary reasons for repeated echocardiograms is that physicians do not trust the image quality from partner sites. Indeed, during the site visit to MMC, sonographers presented examples of the disparate quality images from different MaineHealth sites. Interviewees explained image interpretation varies between MaineHealth sites due to different diagnostic criteria. Interviewees reported repeating tests because they did not know how personnel conducted studies at other sites (oral communication, July 2017). For these reasons, one vascular surgeon commented, “the safest thing to do is to repeat the study” (oral communication, July 2017). Interviewees were hopeful that SWA would reduce repeat testing. Eliminating repeat echocardiograms at MMC could potentially reduce annual echocardiogram scan time by approximately two hundred sixty hours (Appendix A).

Communication and Collaboration: The process of SWA requires MaineHealth sites to communicate with one another to gather accreditation application materials and coordinate imaging and interpretation protocols. One medical director commented: “I expect improvement, but not as a result of the accreditation process - it’s the communication that [results] as a byproduct that will promote better […] opportunities to share back and forth because people are working together across the system” (oral communication, July 2017). Seven of ten respondents who answered a single survey question indicated they believed SWA would have a high impact on building collaborative capability.

Staff training: One sonography supervisor reported that some sonographers at satellite sites who performed other types of ultrasound imaging (e.g., carotid or general ultrasound) also performed echocardiograms, although they were not echocardiography credentialed. This practice was performed to provide echocardiograms at a site where there was no echocardiography sonographer available (oral communication, July 2017). IAC accreditation requires all sonographers performing echocardiograms to be credentialed.

Employees believed accreditation would enhance staff knowledge and training. One interviewed vascular services attending physician commented, “Accreditation offers education, training, and guidance” (oral communication, July 2017). Survey results corroborated this statement, with nine of eleven survey respondents reporting they believed SWA would have some impact or a high impact on staff training and knowledge. Ten of eleven survey respondents believed SWA is effective at improving patient outcomes by improving imaging quality. Employees at unaccredited sites, however, perceived continuing medical education (CME) as burdensome, as the IAC requires technologists to complete fifteen CME credits per imaging modality every three years.

Realized and Potential Financial Gains: The accrediting agency permitted MaineHealth
to pay a single, lower fee to accredit all echocardiography sites simultaneously. An IAC Director reported that MaineHealth saved $39,300 in accreditation fees by submitting a single echocardiography application to accredit twelve sites. Additionally, the IAC waived $6,750 in traditional site merging fees for MaineHealth's participation as a pilot SWA site (oral communication, July 2018). Staff and researchers alike believe that the small sites at MaineHealth benefit most from SWA. A shared application made SWA more financially feasible for smaller sites when compared with decentralized, or piecemeal accreditation,[1-4] because larger MaineHealth sites bore a larger portion of the fee.

MaineHealth executives perceived accreditation fee savings from SWA as insignificant. A MaineHealth finance executive, for example, commented that fees “[on the order of, for example] $100,000” are “just a drop in the bucket” (oral communication, July 2017). A senior vice president at MMC explained that time saved in composing a single application proved most valuable: “Piecemeal accreditation means [...] a lot of redundancy in work [...]. System-wide accreditation would reduce this” (oral communication, July 2017). Another MaineHealth executive agreed that the cost savings were nominal, commenting that wasted “staff resources and time” were of primary concern in implementing SWA. The system-wide approach saved 496-736 hours in time required to compile and submit application materials (Appendix B). This was an unexpected benefit.

Employee Perception of Standardization: MaineHealth staff expected SWA to enhance standardization of patient care. Eight of eleven survey respondents believed SWA would have a “high impact” on the standardization of protocols and services among sites. One medical executive commented: “the accreditation process [ensures] all echocardiography labs [meet] the same criteria. It ensures a standard of care no matter where the patient is seen across MaineHealth.” Similarly, a finance executive suggested, “our goal is to try to provide some assurance that a patient within our footprint will see the same level quality of care whether they’re in Rockland or the White Mountains of New Hampshire.”

Reputational Advantage: Staff questioned whether MaineHealth’s appeal to patients would change under SWA. For example, one MaineHealth executive did not think consumers looked at the accreditation status of healthcare facilities. One attending physician said: “I do think [sites] gain some enhancement of their reputation, but how much it’s going to impact their [patient] volume is hard to say. I think it would be fairly minimal” (oral communication, July 2017). One medical director commented: “I would be shocked if the patients are aware. I’d be even more shocked if they care” (oral communication, July 2017). A marketing staff member, by contrast, was confident that SWA would benefit MaineHealth’s promotional abilities: “seeing that all of the echo labs in the MaineHealth system are accredited would give [the consumer] a boost of confidence” (oral communication, July 2017).

Measurements: Interviewees universally reported that no metrics had been designed to measure improvements from SWA. One MaineHealth Vice President asserted: “We are using accreditation as a proxy for quality...If we want [...] a quality cardiac imaging program, the best way to do it is to [...] become an accredited program” (oral communication, July 2017).

DISCUSSION

The purpose of this study was to understand the effects of system-wide accreditation across multiple sites in a single health system in Maine. Through twenty field interviews with MaineHealth employees, and a short survey, researchers assessed a high incidence of repeat echocardiograms and redundancy associated
Table 1: MaineHealth employees were surveyed on their perception of system-wide accreditation (n=11). *10 out of 11 employees responded with a decentralized, or piecemeal accreditation. We conclude that SWA could substantially improve communication, collaboration, staff education, and standardization. Quantification of the benefits of SWA accreditation is limited by a lack of suitable measures.

One of the most important discoveries from this study related to the high number of and reasons for repeat echocardiograms. SWA offers the potential to reduce the volume of repeat imaging studies at MaineHealth. Research has shown that hospital employees believe accreditation decreases inappropriate echocardiograms, a finding consistent with interviewees' perceptions.[10]

Interviewees attributed the number of repeat

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Survey Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;How much of an impact would SWA have on staff training and knowledge?&quot;</td>
<td><img src="image" alt="Impact of SWA on Staff Training and Knowledge" /></td>
</tr>
<tr>
<td>1 – no impact</td>
<td>2 – minimal impact</td>
</tr>
</tbody>
</table>

\[ \text{Average = } \frac{\sum \text{rating}}{\text{number of respondents}} \]

| "How effective do you feel system-wide accreditation (all sites being accredited under a single accreditation application per imaging modality) is at promoting standardization, improving imaging quality, and thus patient outcomes?" | ![Effectiveness of SWA at Promoting Standardization and Improving Imaging Quality and Patient Outcomes](image) | Ten of eleven survey respondents believed SWA would be effective (rating of “4” or “5”) at promoting standardization, improving imaging quality, and patient outcomes. Average = 4.18 |
| 1-5 Rating Scale (1 = Not at all effective; 5 = Very effective) | 1 - not at all effective | 2 | 3 | 4 | 5 - very effective |

Spring 2020
“How much of an impact would SWA have on building collaborative capability?”

1 – no impact
2 – minimal impact
3 – neutral
4 – some impact
5 – high impact

Nine out of ten* survey respondents indicated that SWA would have “some impact” (4) or a “high impact” (5) on building collaborative capability. Average = 4.5

“How much of an impact would SWA have on standardization of protocols & services between MaineHealth sites?”

1 – no impact
2 – minimal impact
3 – neutral
4 – some impact
5 – high impact

All survey respondents believed that SWA would have a “some” (4) or “high” (5) impact on the standardization of protocols and services among MaineHealth sites. Average = 4.72

Table 1 (cont’d): MaineHealth employees were surveyed on their perception of system-wide accreditation (n=11). *10 out of 11 employees responded

echocardiograms to the lack of standardization and high interobserver variability. Consistent with prior research, MaineHealth staff expected SWA to standardize patient care. Manning and colleagues reported that most hospital employees believe accreditation improves the degree to which reports are complete and standardized. [11] Other research has shown that most hospital employees surveyed believed accreditation improves the frequency with which technologists produce accurate images. [10] Observations of interobserver variability in echocardiography at MaineHealth are corroborated by literature, which reports intrarater discrepancies as high as 14%. [12, 13] As SWA standardizes practices and interpretations
across the health system, it is likely to elevate the quality of patient care and reduce repeat testing. This study also revealed the potential for financial savings resulting from SWA. The most appreciable savings are due to fewer repeat tests, less wasted staff time, and reduced accreditation fees. While reducing repeat imaging studies could initially produce less revenue for the hospital, it could ultimately allow MaineHealth to capitalize on a national trend towards value-based care. Hours freed by eliminating repeat imaging studies can reduce patient wait times, increase patient access to appointments, and create time for physician wellness activities.

Other indirect benefits of SWA are increased collaboration, communication, and staff education. Interviewees and survey respondents at MaineHealth believed that collaboration between sites resulting from SWA promotes greater communication between sites. A study by Pomey et al. found that accreditation can, in fact, be a catalyst for organizational change. That same study also showed a majority of employees believed accreditation helps develop shared values through networking with other partners of a healthcare system. In large hospital systems such as MaineHealth, communication is essential. Collaboration as a byproduct of SWA could encourage employees at different sites to communicate and share best practices with each other. Sites may then better leverage open lines of communication to enhance other aspects of patient care.

Related to collaboration and communication are benefits associated with staff education. MaineHealth employees believed SWA enhances staff knowledge, training, and encourages higher quality patient care. This finding is supported by other research, which shows survey respondents believe accreditation increased staff knowledge of image quality and accredited procedures.

While some MaineHealth staff perceived the credentialing and educational requirements of SWA to be burdensome, the benefits include development of a better educated and trained staff who can perform higher quality diagnostic imaging. Bremer and colleagues showed that credentialed sonographers achieved higher mean image quality scores than non-credentialed sonographers. This group also posits that hospitals may maximize revenue when technologists are properly credentialed, as Medicare and other payers reimburse hospitals for echocardiograms based on sonographer credentials, laboratory accreditation, or both. Increased staff knowledge can also reduce interrater variability through formalized or self-directed interpretation educational programs.

A final potential benefit of SWA is reputational enhancement. Frenz and Lambert suggested that newly accredited sites may benefit from enhanced reputation and greater ability to market clinical services. Similarly, Manning et al. found that 69% of hospital employees surveyed felt accreditation enhanced their imaging facility’s distinction. MaineHealth interviewees, however, with the exception of marketing staff, generally concluded that SWA was unlikely to advance MaineHealth’s promotional capability.

One shortcoming of SWA implementation identified in this study was a lack of metrics to assess the effects of SWA. MaineHealth staff generally agreed that SWA would improve patient care, but no measures were in place to quantify its effects. Selecting appropriate metrics to assess the impact of quality improvements is challenging. Thus, MaineHealth has not yet been able to demonstrate the benefit of accreditation empirically.

LIMITATIONS AND THE FUTURE

There is no existing literature on system-wide accreditation. Therefore, there was no comparative survey to serve as a control for this study. The number of physicians and managers identified for interviews was limited (n = 20) and

Spring 2020

AMSRJ.org
a small number (n=11) of key informants were surveyed. Selection bias may have affected the results of the survey and interviews as respondents with a more positive view of accreditation may have been more likely to participate than those with a negative view. Quantitative outcomes of accreditation were not measured, with employee perception chosen as a surrogate.

The IAC accreditation process was assumed to be an accurate assessment of facility quality and best practice adherence. Finally, research on SWA for imaging services in any form is lacking, so this analysis is limited to comparison with literature on accreditation rather than on SWA, an initiative, which to our knowledge, did not exist prior to this initiative. Future instances of SWA warrant further research, especially those under other accrediting bodies, should they offer such an accreditation package. Thorough evaluation of SWA at MaineHealth is appropriate to evaluate long-term effects.

**CONCLUSION**

This research study revealed some of the potential benefits of SWA. System-wide Accreditation may build trust by increasing communication, collaboration, and knowledge across multi-site health systems such as MaineHealth. MaineHealth employees expect SWA to reduce the number of repeated echocardiograms through standardization, and increase the quality of imaging studies, benefiting patients and MaineHealth.

System-wide accreditation is a novel approach to imaging accreditation that could be overlooked by health care organizations if the only perceived benefits are relatively miniscule cost savings. In fact, one finance executive interviewed in this study remarked that projects that result in a savings on the order of $100,000 represent “a drop in the bucket.” In this study, however, SWA was associated with reduced application fees, 260 hours less of echocardiogram scan time (Appendix A) and over 700 hours in saved personnel hours (Appendix B). Together, the combined savings from reduced personnel hours, repeat testing, and accreditation fees could be substantial. This economic opportunity must be studied and measured empirically so that assumptions about small cost savings do not entrap health care organizations in a culture of inefficiency.

This study has a larger implication for the management of health care organizations. In many health care systems, there are highly decentralized, independent, and piecemeal approaches to managing care programs, such as cardiovascular care that uses technologies such as echocardiography. It is likely that there are dozens of opportunities in complex health care delivery systems to save $100,000 or more: little “drops in the bucket” may add up.

**RECOMMENDATIONS**

Hospital systems pursuing similar SWA processes may benefit from recommendations aimed at improving evaluation, encouraging collaboration, and promoting efficiency as uncovered in this case study of MaineHealth. To evaluate SWA’s impact on patient care, hospitals can use metrics to measure improvements, such as recording the number of studies repeated both before and after SWA implementation. To encourage intrasite communication and trust, hospital systems could create common imaging standards (e.g., image angle and composition standards) that would allow sonographers to compare studies from different sites. A shared bank of images from multiple sites could be compiled to catalyze discussions about best practices. To improve efficiency, health systems can designate points of contact at each site to relay information to a central application compiler.

This study is exploratory and surfaced several testable hypotheses. Once more data
becomes available, further research can be undertaken to assess the effectiveness of SWA in order to guide system-wide, or even state-wide accreditation initiatives. Thinking beyond the health system level, state-wide accreditation demonstrations could be undertaken to determine if a more comprehensive effort can improve the quality of care and save substantial amounts of money, especially in states like Maine, with a smaller number of hospitals.

REFERENCES


---

**APPENDIX**

**(A) Annual Reduced Echocardiogram Scan Time**

An MMC cardiology director reported that the department repeated four echocardiograms from other MaineHealth sites weekly (oral communication, July 2017). A senior sonographer reported seventy-five minutes were allotted for each echocardiogram (oral communication, July 2017). Thus, 260 hours were spent annually conducting repeat echocardiograms.

**(B) Personnel Hours Saved in the System-Wide Application**

A cardiology director who supervised the compiling of the necessary information and materials for the SWA application submission estimated that each of twelve accredited sites spent 60-80 hours on its application (oral communication, July 2017). Thus, staff spent 720-960 hours compiling a system-wide application. The sonographer who compiled the SWA application materials spent 224 hours on the SWA application (oral communication, July 2017). Between 496 and 736 personnel hours were saved in compiling a system-wide application as compared with twelve individual applications for submission to the IAC.