

# Baseline Assessment of Clinical Information Systems Infrastructure and Functionality at Rhode Island Hospital

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## Abstract

Emergency Department (ED) providers are inextricably dependent on the continuous uptime of clinical information systems (CIS). In this study, investigators conducted inventory, mapping, and function testing for 134 essential ED CIS devices including 106 fixed workstations and 28 mobile workstations. Critical issues were identified at 1% of fixed workstations (one non-booting device) and 15% of mobile workstations (three non-booting devices, one without network connectivity). Of 97 fixed workstations with designated print paths, 81% printed properly. Where necessary, tap-in/-out user authentication was available on 81% of fixed workstations and 50% of mobile workstations; digital signature capture was available on 58% and 74% of these devices, respectively. Microphones and speech recognition software were installed on 73% of 44 dictation workstations. This baseline assessment of ED CIS infrastructure identified barriers to patient care workflow and will guide scheduled interventions including hardware upgrades, device reallocation, information systems work-order entry facilitation, and weekly “tech rounds” by assigned ED personnel.

## Introduction

Rhode Island Hospital Emergency Department

- Level I trauma center
- Approx. **100,000** patient visits in 2015<sup>1</sup>
- 90+ beds in 7 patient care areas

## Technology Performance & Patient Flow

- Caregivers heavily dependent on consistent uptime of CIS
- CIS troubleshooting occupies caregivers’ time, delaying delivery of care

## CIS Infrastructure

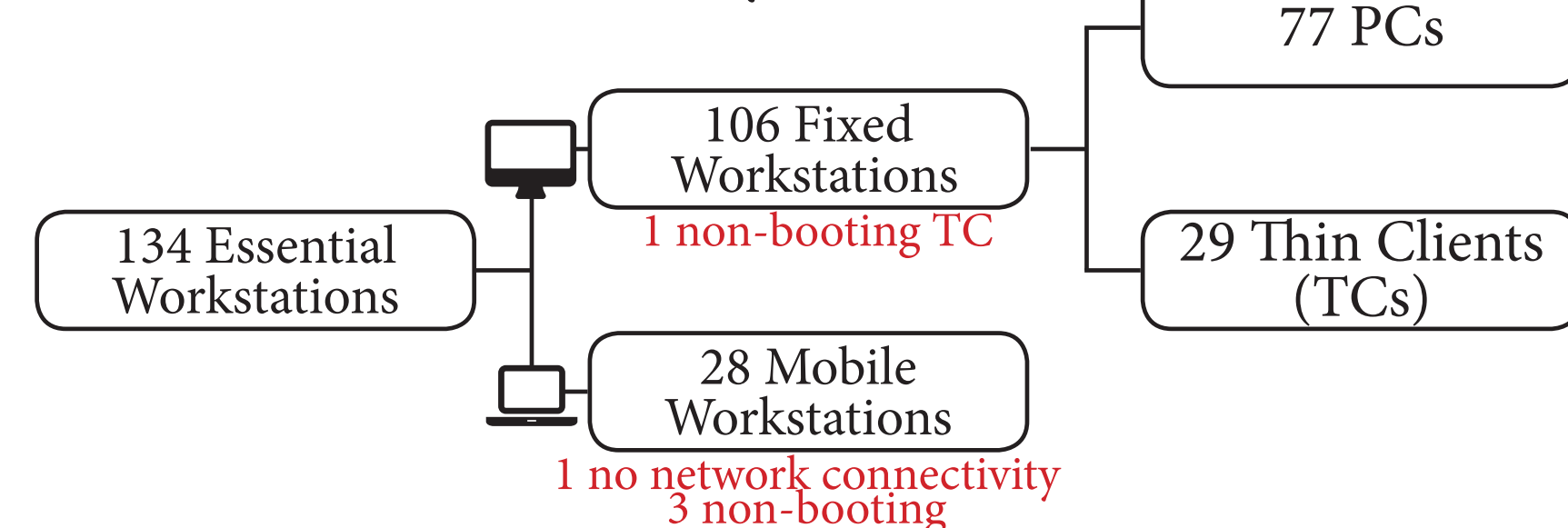
- General
  - > Registration (admit/discharge/transfer)
  - > Electronic health record (EHR) access (patient records, laboratory/imaging results, etc.)
  - > Order entry
  - > Network connectivity
- Printing
- Digital signature capture & tap-in/out user authentication
- Voice capture & speech recognition software

## Objectives & Methods

In collaboration with institutional Information Services (I.S.) teams, 5S\* work-group members conducted an **inventory, mapping, and function testing** of essential bedside CIS elements; data center (“cloud”-based) assets, network infrastructure, and devices for ancillary/support services or research were excluded. A companion web-survey was administered to end-users. \*5S is a Japanese organizational methodology: sort, set in order, shine, standardize, sustain.

## Results

### Workstation Inventory

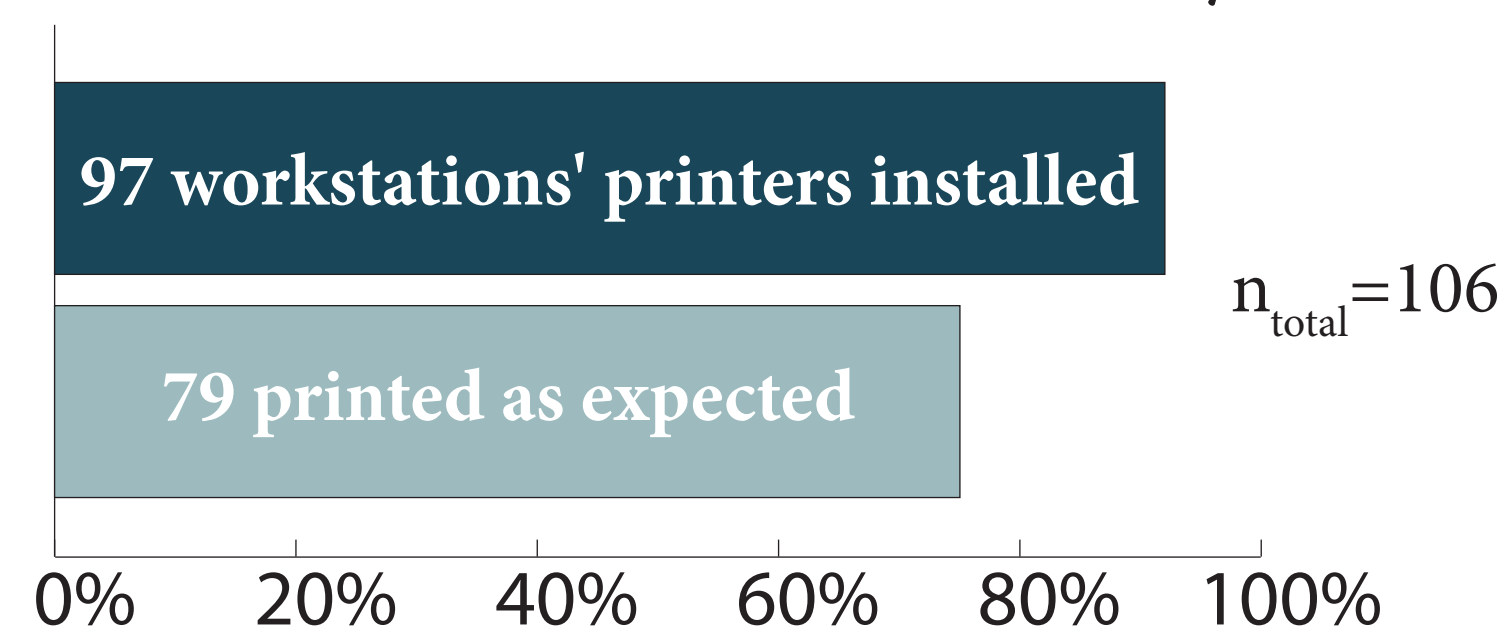


Critical issues identified at:

▲ 1% of fixed workstations ▲ 15% of mobile workstations

### Mapping & Print Path Testing

Workstations and print paths mapped (bottom figure). Mobile workstations were excluded from analysis.



Of the total 106 fixed workstations analyzed, 97 had at least one designated print path installed (92%), and of those, 79 printed as expected (81% of installed). Overall, **79 of 106** fixed workstations printed as expected (75%).

## Device Inventory & Function Testing

|                                                                                            |  Tap-in/-out User Authentication |  Digital Signature Capture |  Voice Capture & Speech Recognition Software |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|  Fixed  | 84% present<br>81% functional*                                                                                      | 58% present                                                                                                   | 73% present                                                                                                                     |
|  Mobile | 81% present<br>50% functional*                                                                                      | 74% present                                                                                                   | n/a                                                                                                                             |
| <i>n</i> =                                                                                 | 90 fixed<br>26 mobile                                                                                               | 31 fixed<br>27 mobile                                                                                         | 44 dictation stations                                                                                                           |

\*of those present

An inventory of accessory devices was conducted and functions tested where capable. *n* represents number of workstations that should have relevant accessory devices installed (every workstation does not require every device). Mobile workstations do not have dictation capability.

## Staff Survey

An electronic survey to ED staff elicited 108 responses (22%) out of 495 advanced practice providers, nurses, physicians, scribes, and technicians. Most respondents were nurses (39%) or physicians (40%).

## Staff Survey (cont.)

| Reported to work Well/Very Well                                                                          | Reported to work Poor/Very Poor                                                               |
|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|  Registration         |  Dictation |
|  EHR Access           |  Printing  |
|  Network Connectivity |                                                                                               |
|  Order Entry          |                                                                                               |

General CIS functions including registration (admit, discharge, transfer), EHR access (patient records, laboratory/imaging results), order entry, and inter-/intra-net were reported to work well/very well. Dictation and printing performed the worst according to survey respondents.

End-users indicated that **24.6%** of shifts in the past month had been hindered by an ED CIS infrastructure issue.

Respondents cited:

- an absence of routine maintenance processes
- the lack of nimble methods to initiate repairs

## Conclusions

This baseline assessment study is the first segment of an overall multidisciplinary strategy for ED CIS improvement spearheaded by ED providers and institutional I.S. teams. The study identified barriers to patient care workflow and will guide scheduled interventions including hardware upgrades, device reallocation with a concomitant locative schema, facilitation of an improved I.S. work-order entry system, and weekly “tech rounds” by assigned ED personnel. Since the completion of this assessment, several new printers have been installed, dedicated primary print paths have been re-designated by I.S. throughout the department, and a self-service web-based CIS work ticket creation system has been implemented. A follow-up assessment will be completed following the implementation of remaining interventions.

## References

<sup>1</sup>“Lifespan Annual Report 2015” Internet: [www.lifespan.org/uploadedFiles/Lifespan/Content/About/Lifespan-Annual-Report-2015.pdf](http://www.lifespan.org/uploadedFiles/Lifespan/Content/About/Lifespan-Annual-Report-2015.pdf), [Oct. 1, 2016].

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