

Improving MRI Department Efficiency: Enhancing Productivity and Reducing Wait Times

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Introduction [2]



An MRI technologist prepares a patient in the prep room at the QEII Health Sciences Centre in Halifax. (Nova Scotia Health)

- First **2-bay MRI suite** in Nova Scotia (1.5 T and 3 T magnets)
- This site layout requires more planning and administration from the techs
- The wait time for an MRI is almost **2 years**
- The MRI scanner sits idle **31%** of the time
- If we take the steps to decrease the idle time, we can solve the wait time issue for MRI scans in Halifax

QEII MRI Wait times [3]

90% served within: 717 days (2+ years)

Bones and Joints: **554 days**

Brain: **800 days**

Chest and Abdomen: **744 days**

Heart: **736 days**

50% served within: 73 days (2+ months)

Bones and Joints: **195 days**

Brain: **71 days**

Chest and Abdomen: **40 days**

Heart: **51 days**

Wait Times

Understanding the Numbers



NOVA SCOTIA

90%



- Maximum time 90% patients waited

- Shows how service is performing overall

- 45 days means 90% of patients had their appointment within 45 days of the procedure/service being requested

50%



- Maximum time 50% patients waited

- Generally includes the most clinically urgent cases

- 35 days means 50% of patients had their appointment within 35 days of the procedure/service being requested



- The **Shortest Wait Time** is highlighted and displays a green clock.

- Procedures offered throughout Nova Scotia display a **Provincial Wait Time**.

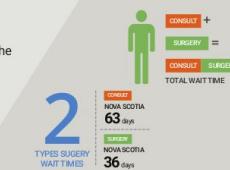
- Sometimes data is **unavailable** when it is not submitted to the Department of Health and Wellness, or there were a very small number of patients who recently received the procedure or service.

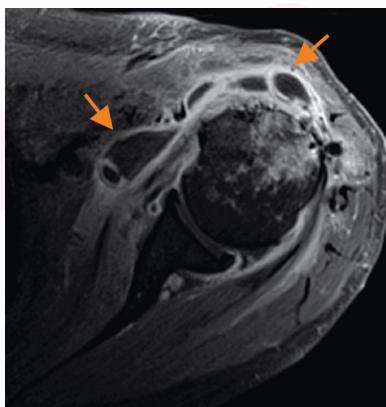
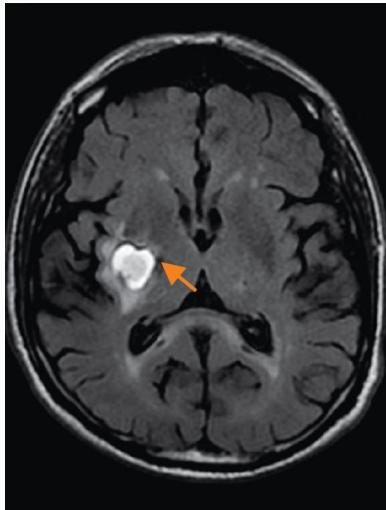
- Wait Times are for elective non-emergency cases only.

Surgery & Surgeon Consultations

- Surgeon Consult Wait Time is the # of days patients wait to see the surgeon for their first appointment (after a referral is made). This represents only patients who did need surgery.

- Surgery Wait Time is the # of days patient wait for surgery after the surgeon and the patient agree that surgery is needed. This excludes emergency patients.





National Maximum Wait Time Access Targets for MRI^[1,4]

The Canadian Association of Radiologists determines:

Priority 1 (P1) Emergent cases - Life or limb immediately threatened

- Same day- max **24 hours** (some less than an hour based on clinical team decisions)

Priority 2 (P2) Urgent- Life or limb not immediately threatened.

- Max of **7 days** or ASAP

Priority 3 (P3) Semi-urgent- Imaging necessary before P4 benchmark.

- Max **30 days**

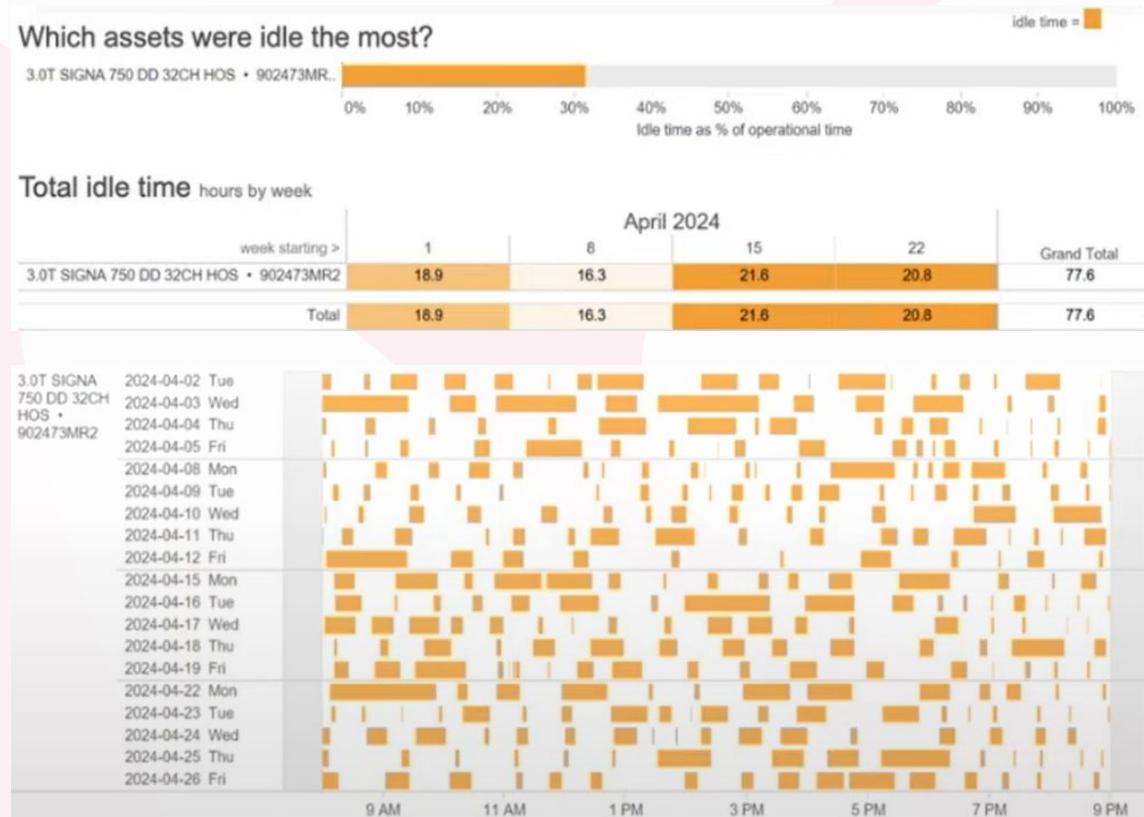
Priority 4 (P4) Non-urgent- no negative long-term medical outcome related to delay in treatment if

- Max **60 days**

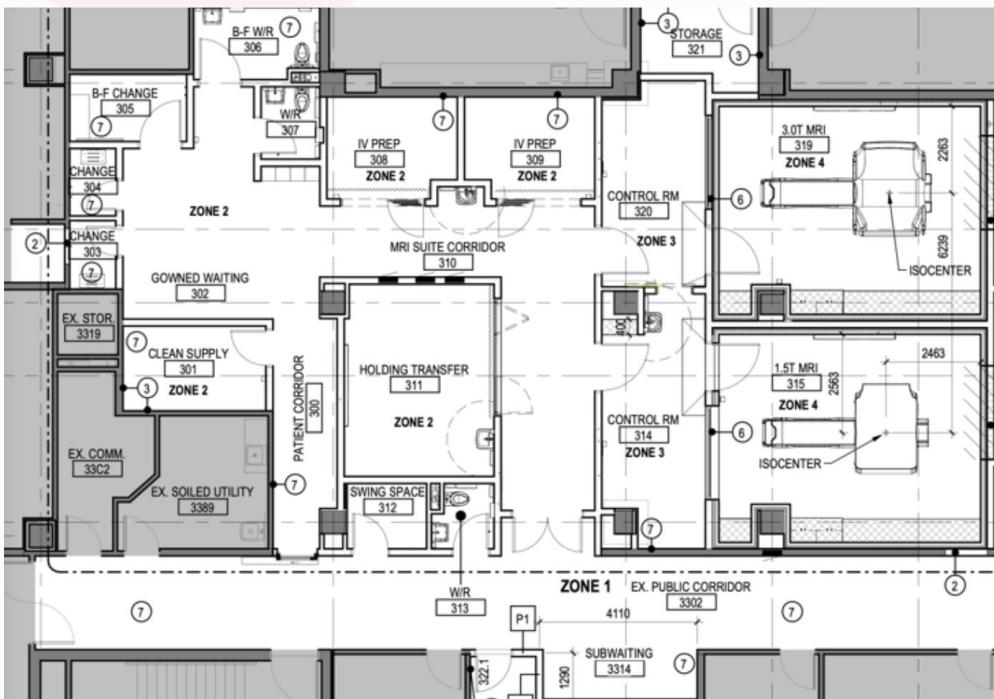
3T Magnet Idle Time

During the hours of operation the 3T magnet sat idle for 78/247 hours creating an idle percentage of **31%**

- this percentage excludes a 5 minute idle gap between cases!
- **42%** idle with no allotted gap (103/247 hours)



Background [2,5]



- **4** safety zones monitored by staff due to safety concerns
 - **Zone 1:** freely accessible to the public
 - **Zone 2:** Patient supervised preparation
 - **Zone 3:** The tech control zone where unscreened personnel or ferromagnetic items become dangerous
 - **Zone 4:** The MRI scan room which is clearly marked and strictly supervised
 - **6** staff model
 - **4** technologists
 - **1** TA
 - **1** dedicated porter
 - 2 Magnets = double the patient & staff
 - Organization and distinct roles are required for efficiency

Project Overview

1. MRI 2-bay Workflow Project (Current Project):
 - Simulate staff/patient tasks through the Siemens 2-bay MRI suite.
 - Collect data to improve efficiency and workflow/ for future endeavours

Future Projects

2. MRI Staff Scheduling Optimization
 3. MRI Protocol Duration Analytics
 4. MRI Patient Scheduling Optimization

Protocol	Number Exams	Mean Duration	Std Duration	Mean Prep D	Booking Time	Bed Flip Time
Pelvis Prostate Prostate	75	22.0	5.0	1.4	30	8.0
Pelvis Prostate Prostate+Gd	2	38.3	14.9	6.0	45	6.8
Pelvis Rectal/Anal Ca	7	47.4	8.2	5.9	60	12.6
Pelvis Routine Pelvis	3	28.2	9.0	6.7	45	16.8
Pelvis Perianal Fistula	2	49.1	10.7	0.6	45	-4.1
Pelvis Endometrial/Cervical Ca	2	58.2	5.2	0.5	60	1.8
Abdomen Liver	2	50.5	23.5	0.6	45	-5.5
Pelvis Penile	1	39.4	#DIV/0!	1.0	60	20.7
Abdomen Pancreas	3	37.8	12.2	9.4	45	7.2
Abdomen Renals	1	38.3	#DIV/0!	0.6	45	6.7



Research Collaboration

Facility: Halifax Infirmary MRI department

Dr. Chris Bowen: Lead MRI Researcher

Dr. Jennifer Payne: Lead Researcher/Dalhousie Professor

Dylan LeBlanc: MRI Technologist/Department Team Lead

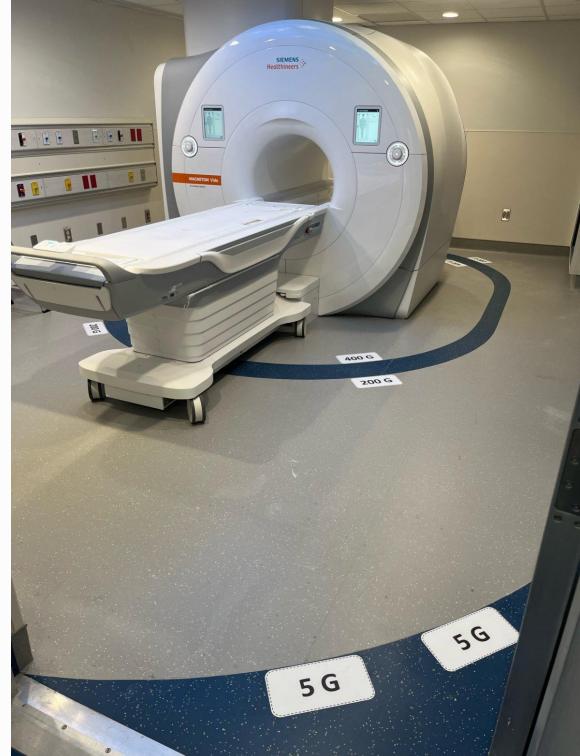
SMU health research team: Research/IT

Kara Doucet: MRI Technologist

Grayson Porter: NSH Research Coordinator

HI MRI staff: Support

Jamie Eliasson: Dalhousie Professor/Radiological Technologist



Methodology

1. Defining staff roles: 2 scan techs, 2 backup techs, an administration TA, and the dedicated MRI porter.
2. Lay out all steps that each staff member and patients perform that tie up resources and delay patient movement/create idle time. Also adding in a backup staff member to cover breaks and low-probability events.
3. Create an effective workflow for efficient use of MRI zones and patient movement.
4. Test out the workflow model and make adjustments based on staff comments, patient comments, and data collection of the time it takes for staff and patients to perform each step.

Results: Staff Roles [2]

- **4 technologist**

- 2 in each bay switching between scan tech and backup tech
- Scan tech: follows patient through care to scanning
- Back-up tech: assists with patient set up, finishes paperwork, available for admin questions, priority is to prep next patient

- **1 dedicated porter**

- Communicate with the admin TA to transport patients to and from the MRI department
- Stocking, cleaning, and initial patient instructions

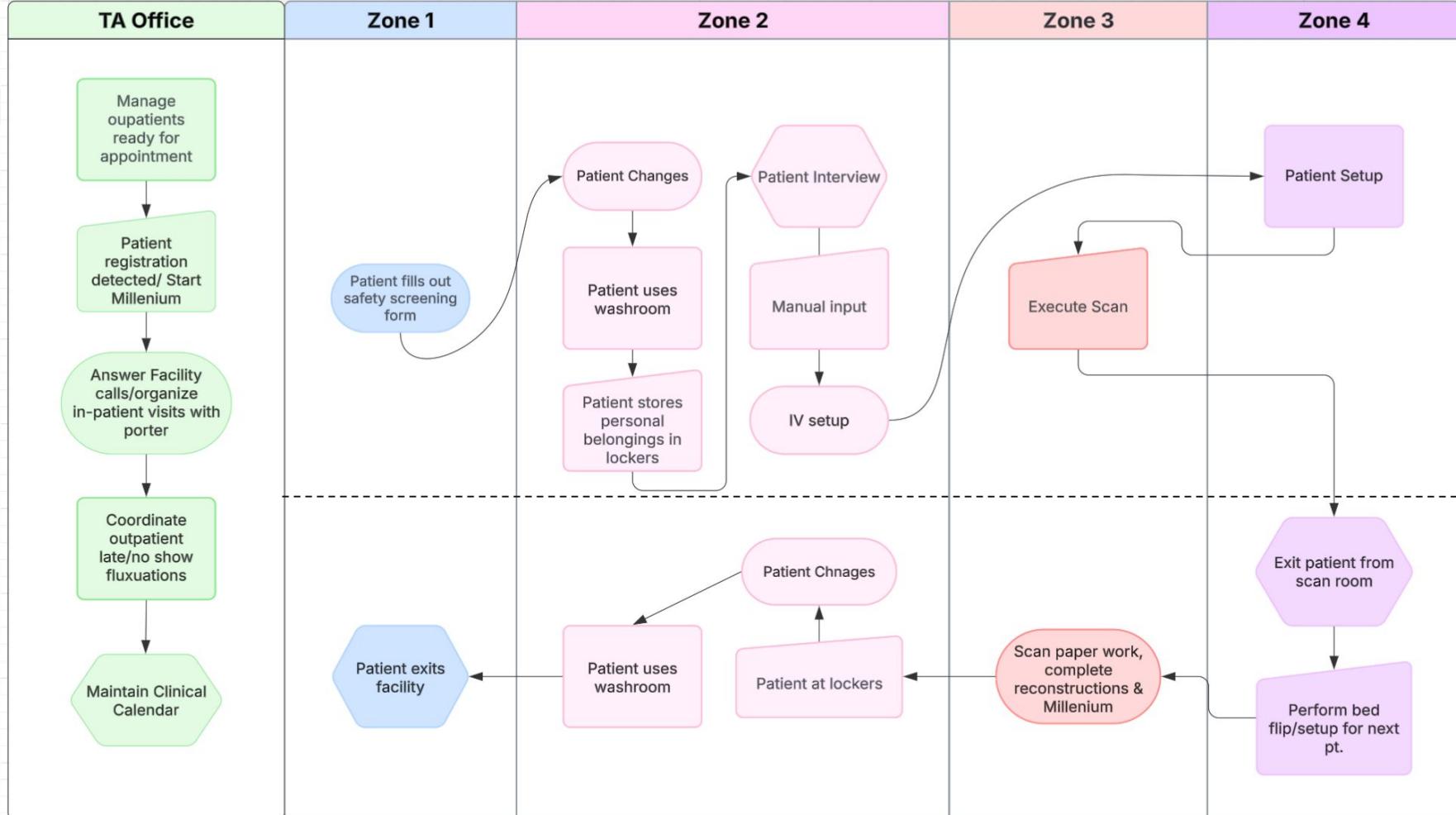
- **1 administrative TA**

- Manages clinical calendar, inpatient appointments, outpatient fluctuations, and facility calls



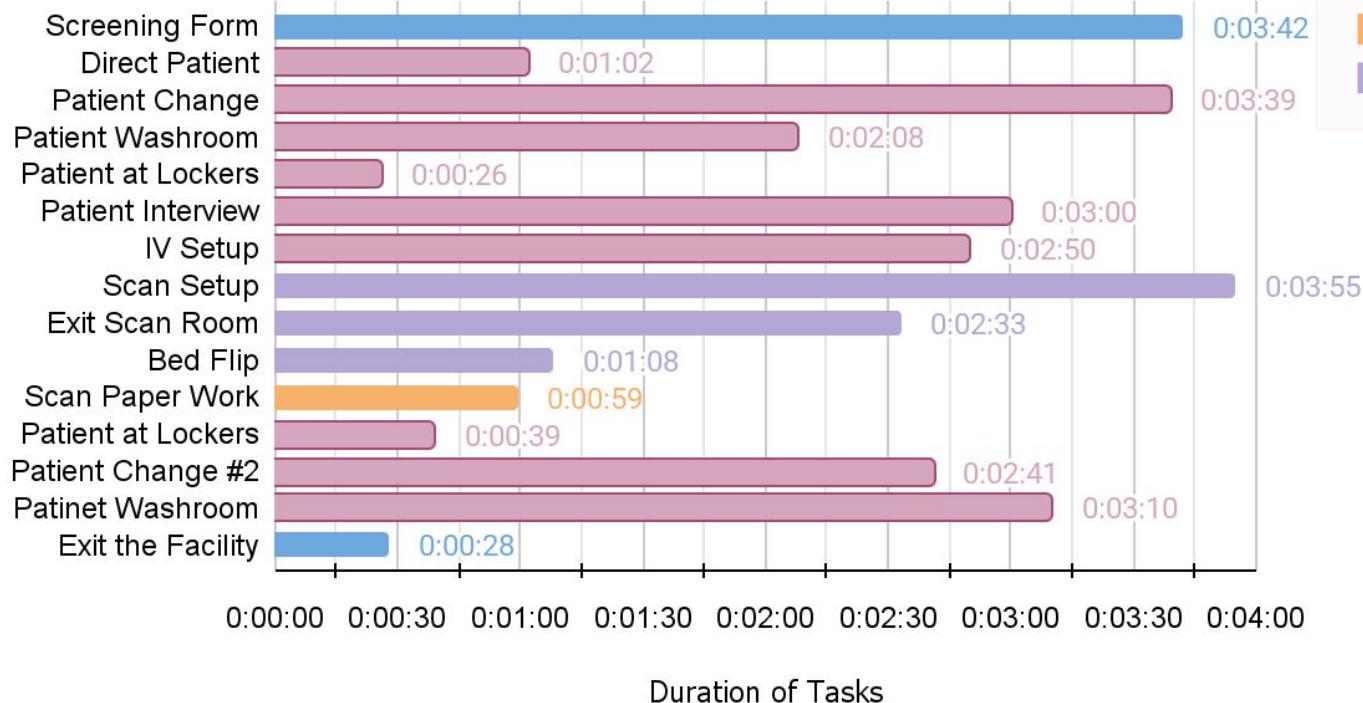
Control room of the new MRI suite at the QEII Health Sciences Centre (Nova Scotia Health)

Halifax Infirmary MRI Department Workflow Chart



Results

Duration of Tasks to be Completed in the MRI Department



Zone 1
Zone 2
Zone 3
Zone 4

Time for patient to be prepared for their scan with IV:
14m 27s

(Top 5 cases require contrast= 86% of operation time)

Time for patient to be prepared for theirs scan without IV:
11m 37s

Discussion: What I learned

Things I learned about MRI workflow:

- **3 patients max in Zone 2**
 - 2 patients being prepped and 1 exiting the magnet
 - With 2 change rooms, 2 bathrooms, many lockers, and 2 prep rooms the patients are not waiting for these resources and are able to be prepped for the scan before it is ready for them.
- **Use Zone 1 to your advantage!**
 - Patients do not need to be supervised and they can take their time filling out the screening form instead of taking up resources in the department
- **The prep room is the ideal place for patients to wait**
 - The patient is screened and has their IV inserted to ensure they are fully prepared for their scan or ready to switch magnets if needed.

Conclusion [2]

- Consistency in data
- Type of exam changes workflow
- Communication
- Late/no-show effects



MRI suite at the QEII Health Sciences Centre in Halifax. (Nova Scotia Health)

Thank You!

Questions?

References

- [1] Canadian Association of Radiologists. (2013). National Maximum Wait Time Access Targets for Medical Imaging (MRI and CT). <https://car.ca/patient-care/guides/>
- [2] Government of Nova Scotia. (2024, September 16). New MRI suite enhances patient care at Halifax Infirmary. Nova Scotia News.
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- [4] Weber, M. A., & Biederer, J. (2013). Indications for 24 hours/7 days emergency MRI. Magnetom Flash, 2, 2013.
- [5] Westbrook, C., Kaut Roth, C., & Talbot, J. (2019). MRI in Practice, 5th Edition. Oxford: Blackwell Publishing Ltd