TWO-DAY PROTOCOL STRATEGY TO REDUCE WAIT TIMES FOR NUCLEAR MEDICINE MYOCARDIAL PERFUSION IMAGING AT FORT ST. JOHN HOSPITAL

Presented by:

Gene Blair I. Saldana, RTNM, CNMT

Sole Charge Nuclear Medicine Technologist

Radiation Safety Officer

IDC Brown Bag Lunch Session

28 May 2020 (12:15pm-1:00pm)

northern health

the northern way of caring

Disclosures

- Sole Proprietor: *Saldana* **Accreditation** Consultancy Services
  - Accreditation Coordinator for INITIO Medical Group Inc.; privately-owned PETCT Clinic in Burnaby, BC

Saldana ACCREDITATION
CONSULTANCY SERVICES

Professional Background

- 20 years as a Nuclear Medicine Technologist
- Medical Technologist and Nurse
- Distance Assisted Training Program sponsored by the Philippine Nuclear Research Institute in consortium with the University of Sydney, Australia
- U.S. (NMTCB) and Canadian Certified Nuclear Medicine Technologist (CAMRT); to finish CT program this year
- Work experiences in the Philippines, Saudi Arabia, Singapore
- Canada (2014): PETCT technologist – private clinic and BCCA-Vancouver
- Joined NH Sept 2018;
- Charles Jago Awardee 2019 for Innovation

Acknowledgements:

- Clinical:
  - **Dr. Shehab Elshazly**

    Head of Radiology, UHNBC

    Dual Certified Radiologist/Nuclear Medicine Specialist
- Administrative:
  - **Terry Mitchell, BA, RTR**

    Former North Peace Medical Imaging Manager

    Fort. St. John Hospital
- Technical:
  - **Roma Toor, RTNM, BAppSc**
    - Manager, Diagnostics UHNBC
  - **Shelly Todd, RTNM, CNMT**
    - Chief Technologist, Nuclear Medicine UHNBC
  - **Shelley Fisher, R.T.N.M., R.D.C.S.**
    - Chief Technologist, Nuclear Medicine, MMH

FSJH-MPI Multidisciplinary Team

Back From Left to Right: Booking Clerk – **Melissa McCoy**; Internist - **Dr. Nasinuku Saukila**, Former Medical Imaging Manager-**Terry Mitchell, RTR, BA**
Front from Left to Right: NM technologist – **Gene Saldana, RTNM, CNMT**;
Cardiology Nurse – **Brenda Baumeister LPN**; Charge Respiratory Therapist– **Joanne Rondeau, RT**
Not in Picture: **Dr. Karen Humphreys**

Topics/Learning Objectives

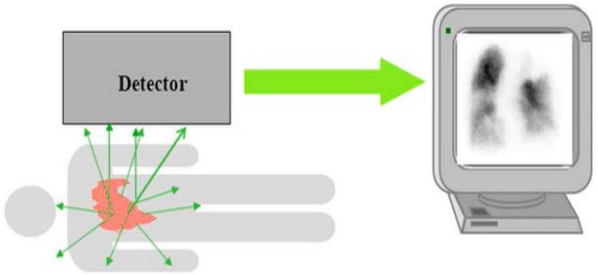
- Overview about Nuclear Medicine and Myocardial Perfusion Imaging (MPI)
- Coronary Artery Disease-Ischemic Heart Disease
- MPI protocols set by ASNC / GE Pharmaceuticals
- Workflow process: 1-Day vs. 2-Day Protocol
- Waitlist issue
- Advantages and its Positive outcomes
- Challenges and Solutions
- Results
- Current Status and COVID19 pandemic crisis
- Summary

What Is Nuclear Medicine[1]?

- A type of imaging that creates images of both physical and functional aspects of the living body
- evaluates molecular, metabolic, physiologic and pathologic conditions of the body; allows physicians measure its chemical and biological process
- Uses very small amounts of radioactive materials (called radiopharmaceuticals or radiotracers)

Nuclear Medicine methods : Emission Imaging

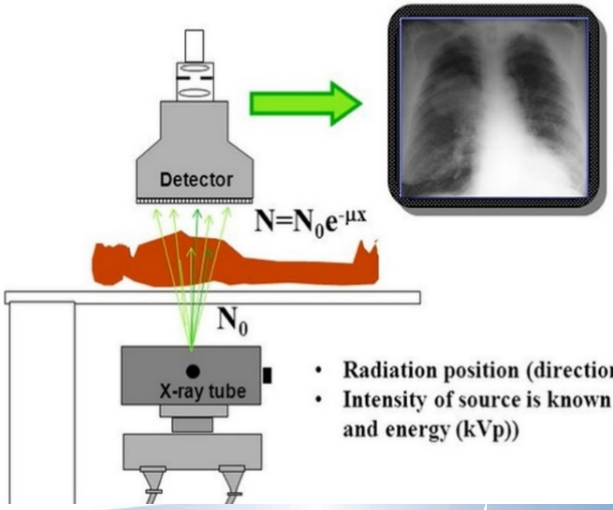
Measure concentration and distribution of radiopharmaceutical in the body ➔ PHYSIOLOGY (Organ Function, not structure)



- **Radiation position (direction) is NOT known**
- **Intensity of source is NOT known**
- **Energy is known**

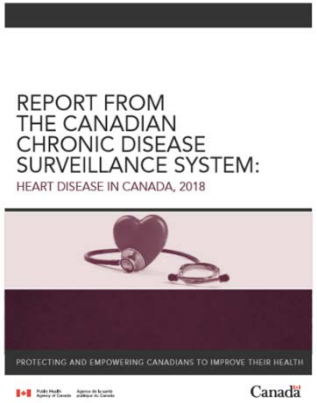
X-ray methods : Transmission Imaging

Measure attenuation coefficient ➔ ANATOMY



- **Radiation position (direction) is known**
- **Intensity of source is known (known flux (mAs) and energy (kVp))**

Heart Disease



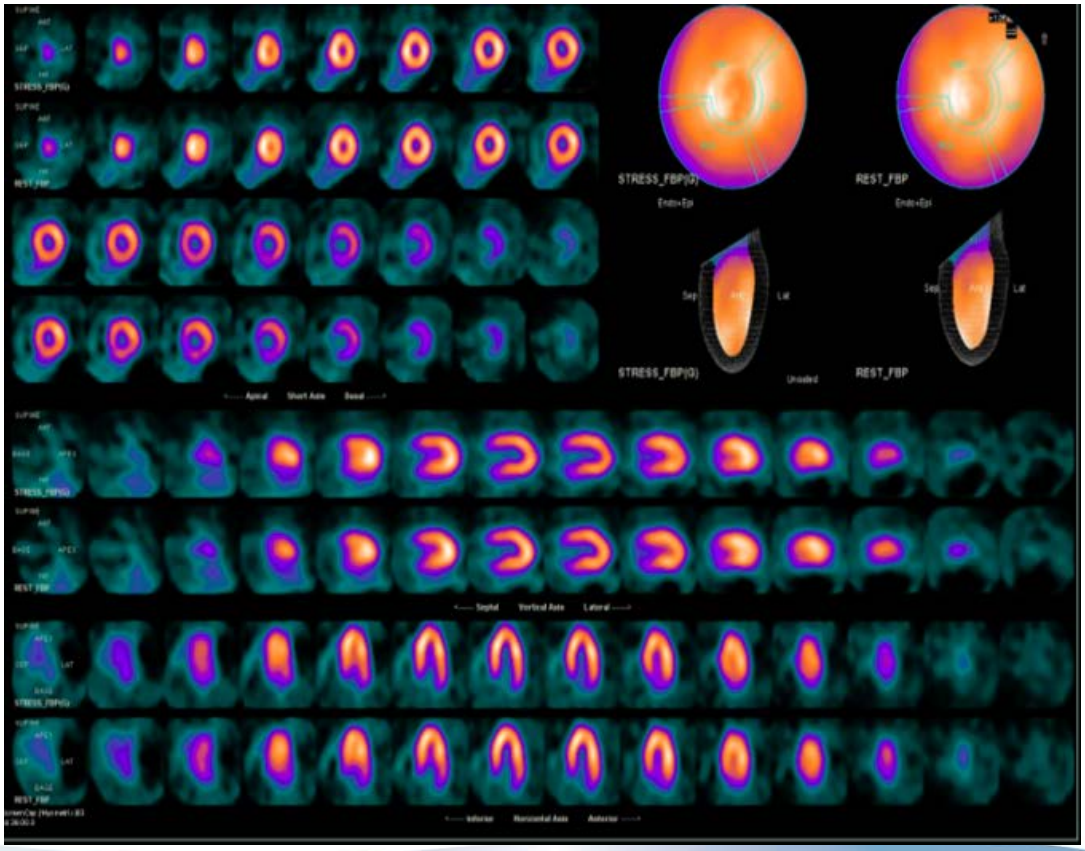
- **Public Health Agency of Canada (CCDSS) 2018)[3]**
  - 2nd leading cause of death among Canadians, after Cancer; and leading cause of hospitalization;
  - about 2.4 million (or 1 in 12) Canadian adults aged 20 years and older were living with ischemic heart disease
  - 8.9 million deaths globally attribute to heart disease
- **Cardiac Services BC[4]**
  - IHD: relatively stable in the last decade; rate of 6.9% in 2016
  - Mortality decreased from 20.6 to 14.7 per 1,000 people (2001 to 2016)

"The **EARLY DETECTION** and management of medical conditions such as high blood pressure, diabetes and high cholesterol can help you reduce your risk of heart disease." - PHAC

Myocardial Perfusion Imaging[5]

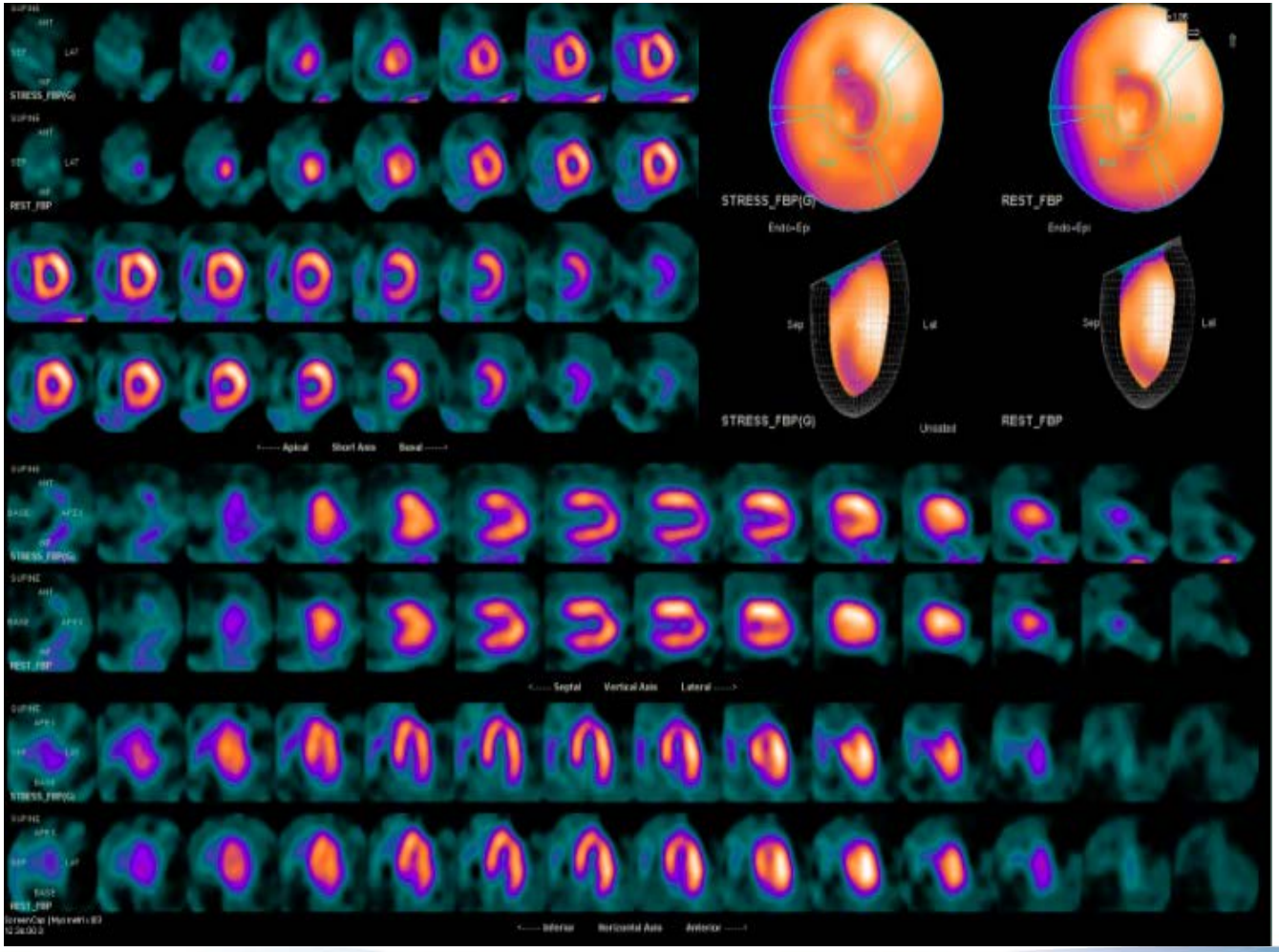
- Nuclear Stress Test, Radionuclide Cardiac Imaging, Stress MIBI, SPECT Nuclear Cardiology, Thallium Stress, Cardiac SPECT/CT
- radiotracer is administered intravenously for distribution of blood flow in the myocardium which can be assessed at rest and stress

NORMAL STUDY



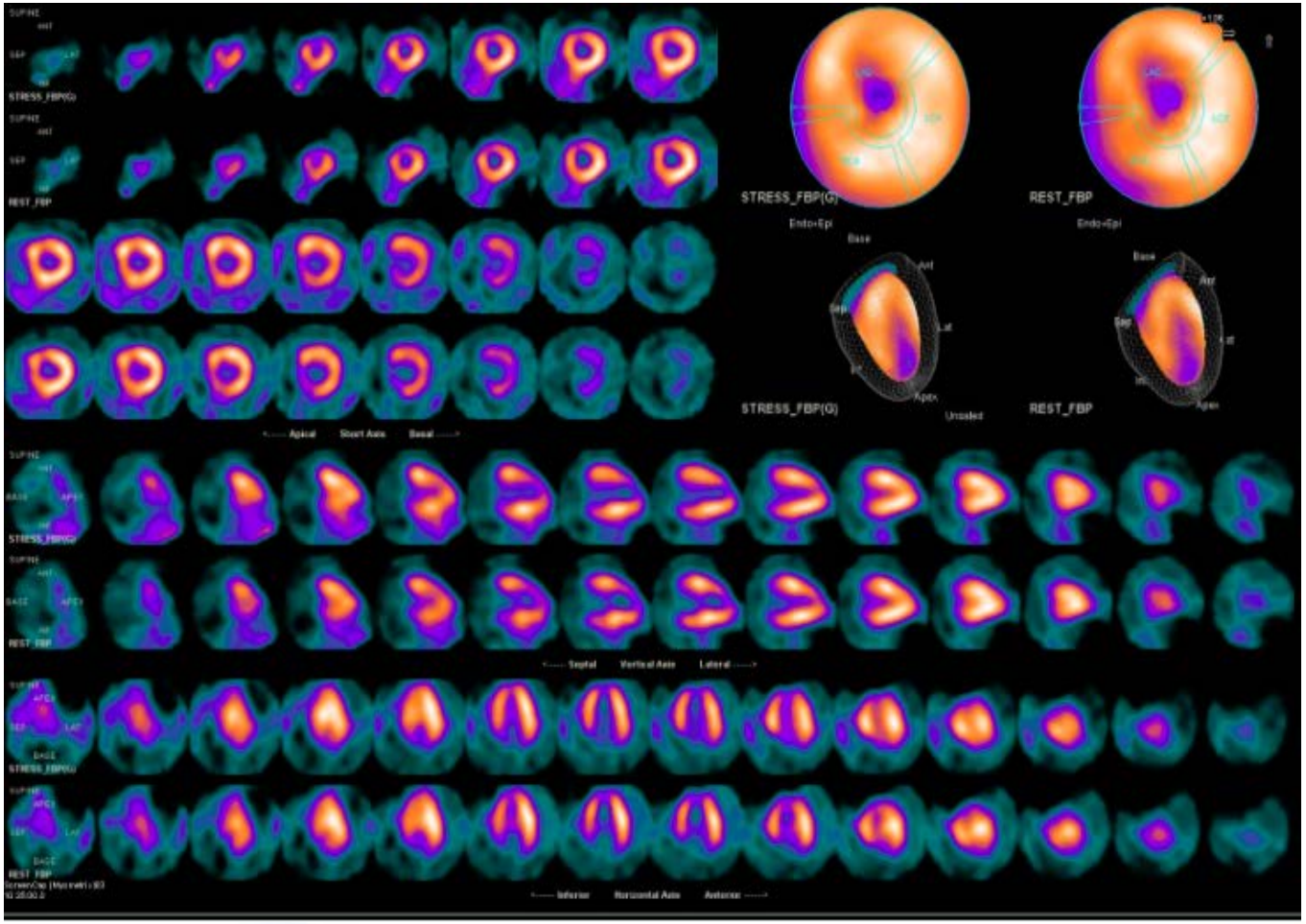
Myocardial Perfusion Imaging[5]

- the severity of decreased tracer concentration is worse when the tracer is administered during stress than at rest: ISCHEMIA



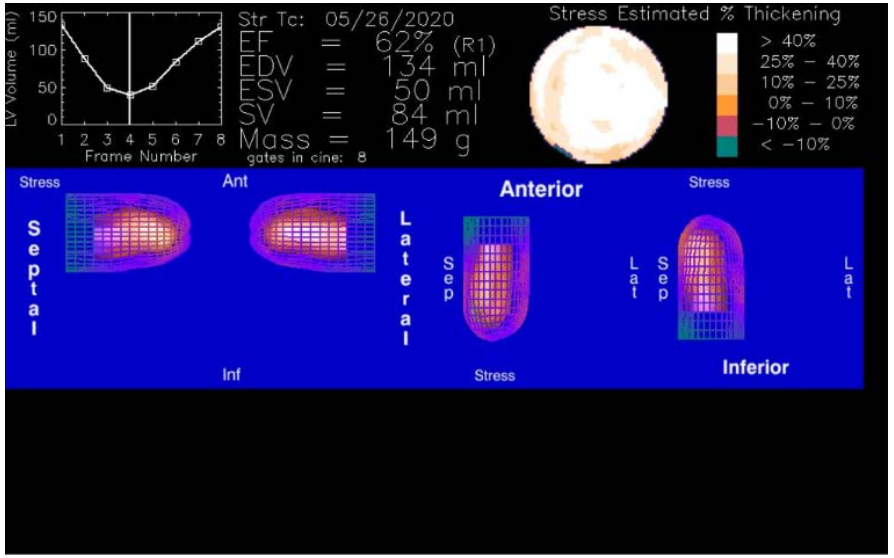
Myocardial Perfusion Imaging[5]

- diminished tracer concentration remains unchanged from rest to stress: INFARCT/SCAR



Myocardial Perfusion Imaging[5]

- calculates global and regional ventricular function
- Regional wall motion and thickening
- Left ventricular ejection fraction and volumes
- Ejection fraction[15]:
  - normal (> 55% to < 70%)
  - low normal (50% to 55%)
  - mildly (45% to < 50%)
  - moderately (35% to < 45%)
  - severely reduced (< 35%)



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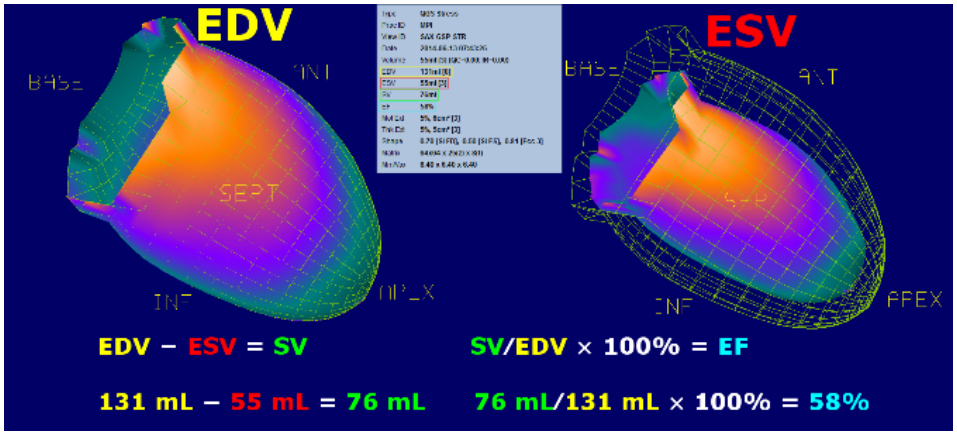

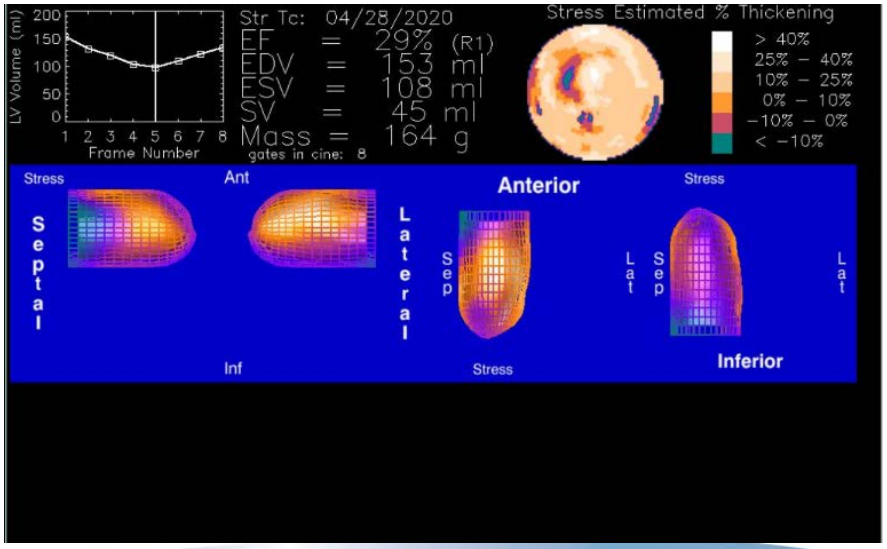

Refer Wisely: Management and Testing of IHD[12]

Symptomatic (Sudden worsening of symptoms could represent ACS and should be referred to the ED)

No known IHD

Classification of chest pain
- Characteristics
  - Substernal chest pain
  - Brought on by exertion
  - Relieved with rest
- 2 characteristics = atypical chest pain
- 3 characteristics = typical chest pain/angina

Assess symptoms

Assess exercise capacity

Age (years)	Sex	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain
≤39	Men	Intermediate	Intermidiate	Low
	Women	Intermediate	Very Low	Very Low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very Low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
>60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

	ETT	CTA	MPI
Low likelihood, can exercise	A	R	R
Low likelihood, cannot exercise	N/A	M	A
Intermediate likelihood, can exercise	A	M	A
Intermediate likelihood, cannot exercise	N/A	A	A
High likelihood, can exercise	M	M	A
High likelihood, cannot exercise	N/A	M	A

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Don't perform cardiac imaging for patients who are at low risk.

Known IHD (MI, stent, bypass)

Assess symptoms

Review medical management

Consider antianginals

IHD medical management
1. Aspirin
   - 81 mg daily is adequate
2. Statins
   - Rosuvastatin - 20-40 mg
   - Atorvastatin - 40-80 mg
3. Beta blockers
   - Not required for all patients
   - Needed if low LVEF (≤40% with heart failure) or recent MI
4. Blood pressure control
5. Glucose control
6. Tobacco cessation
7. Regular exercise

Antianginal drug management
1. Beta blockers
   - Carvedilol - 25 mg bid
   - Metoprolol - 50 mg bid
   - Nitrates - goal dose >60 mg
2. Calcium channel blockers
   - Amlodipine - 10 mg daily
   - Side effects: edema
3. Nitrates
   - Short acting for acute symptoms
   - Long acting, prescribe ONCE daily
     - Goal dose >60 mg
     - Headache common side effect
4. Ranolazine
   - For refractory angina
   - Monitor QT

	ETT	CTA	MPI
Known IHD, Symptomatic	M	M	A

Legend: A = appropriate, M = maybe appropriate, R = rarely appropriate, ETT = exercise treadmill test, CTA = computed tomography angiography, MPI = myocardial perfusion imaging

Refer Wisely: Management and Testing of IHD[12]

Asymptomatic

No known IHD → Testing generally not indicated → Assess CV risk → Risk factor modification → Medications (ASA, statin) if indicated

Known IHD (prior MI, stent, bypass) → Testing generally not indicated → Review medical management

Assess CV risk on the web or your smartphone with the ASCVD Risk Estimator

Risk factor modification: recommendations

- Physical activity
- Weight management
- Tobacco counseling
- Diet
  - Reduce intake of saturated fat (<7% of total calories); trans fatty acids (<1% of total calories); total cholesterol (<200 mg/dL)
  - Limit alcohol consumption
- Blood pressure control (<140/90 mm Hg)
- Patients with diabetes: HbA1C ≤7%

IHD medical management

- Aspirin
  - 81 mg daily is adequate
- Statins
  - Rosuvastatin - 20-40 mg daily
  - Atorvastatin - 40-80 mg daily
- Beta blockers
  - Not required for all patients
  - Needed if low LVEF (≤ 40% with heart failure) or recent MI
- Blood pressure control
- Glucose control
- Tobacco cessation
- Regular exercise

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Don't perform stress cardiac imaging or coronary angiography in patients without cardiac symptoms unless high-risk markers are present.

Don't perform radionuclide imaging as part of routine follow-up in asymptomatic patients.

Preoperative Assessment

Assess exercise capacity → **Assess for surgical risk factors** → **Optimize medical therapy** → **Testing rarely indicated**

Example METs

- 3-6 METs
  - Brisk walking >4 mph
  - Bicycling <10 mph
  - Dancing
  - Climb stairs
  - Yard chores
- >6 METs
  - Push mower
  - Running
  - Heavy loads (>20 kg)
  - Aerobics

Surgical risk factors

1. Prior MI/CAD
2. Heart failure
3. Diabetes on insulin
4. CKD (Creat >2 mg/dL)
5. Stroke/TIA

Medical therapy

1. Control BP
2. Quit smoking
3. Control blood glucose

	ETT	CTA	MPI
4 METs or No risks factors	R	R	R
No symptoms <1 year after NL test	R	R	R
Unknown METs + RFs Low risk surgery	R	R	R
Unknown METs + RFs Intermediate risk surgery	M	R	M
Unknown METs + RFs High risk surgery	M	R	A

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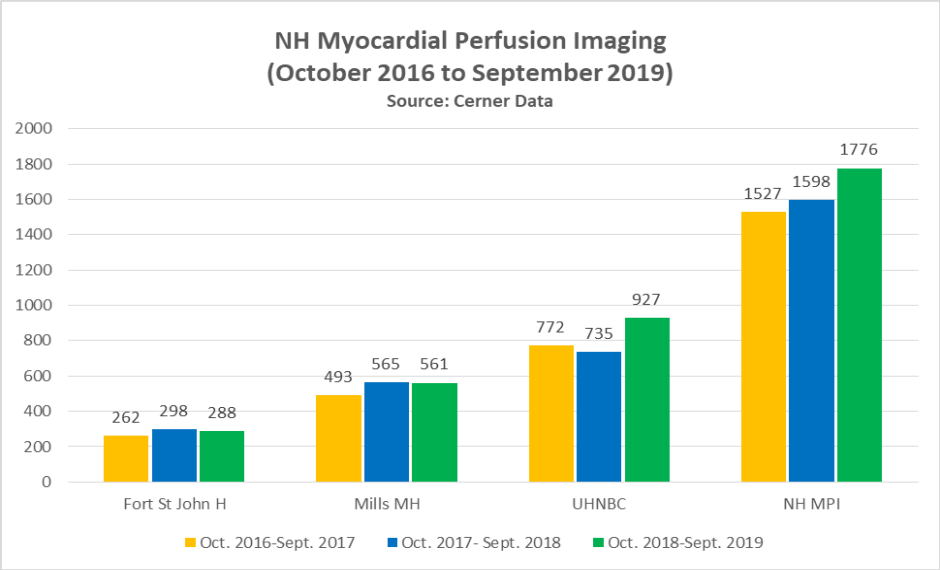
Don't perform cardiac imaging as a pre-operative assessment in patients scheduled to undergo low- or intermediate-risk non-cardiac surgery.

https://www.asnc.org/files/Appropriate%20Use%20Poster%2011x17_2final.pdf

NH-MPI STATISTICAL RECORDS: October 2016 to September 2019
Source: Cerner Data

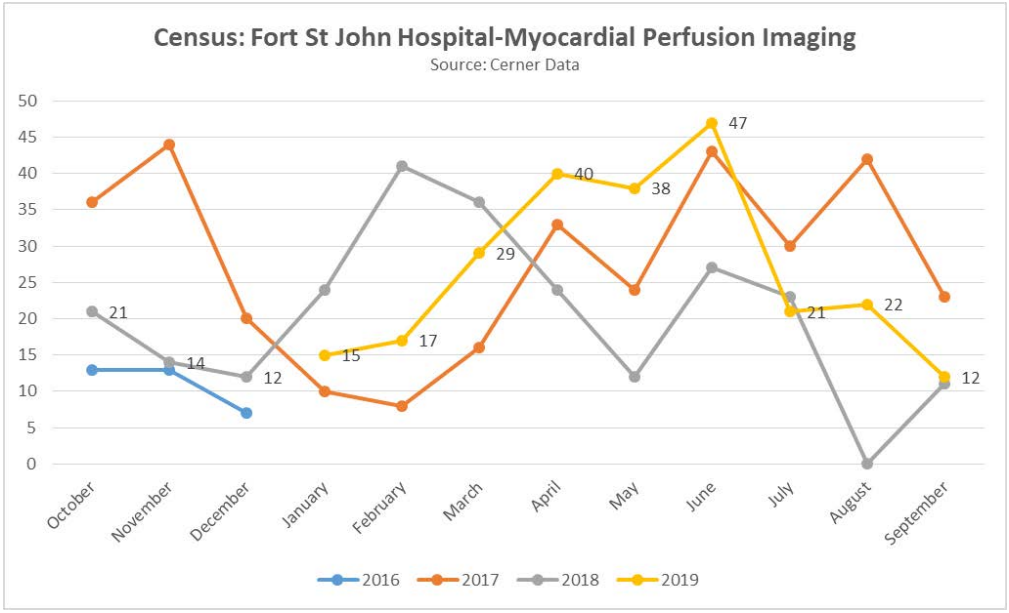


Facility	Average	Percentage
Fort St John H	283	17%
Mills MH	540	33%
UHNBC	811	50%
NH MPI	1634	

Winter and Summer Seasons: Low cases

Assumptions/Factors:

- **Patients and staffs on holiday breaks**
- **Difficult to travel**
- **Limited radioactive material production deliveries**



Spring runs from March 1 to May 31; Summer runs from June 1 to August 31; Fall (autumn) runs from September 1 to November 30; and Winter runs from December 1 to February 28

Waitlist Issue

- **Manpower**
  - Internist availability
  - Technologist and Nurse workloads
- **Equipment Use**
  - Scheduling In sequence
  - Performing Non-Cardiac Nuclear Cases

“There's no excuse for making excuses: When we stop making excuses, we can start doing.”

Strategic Assessment: Identify Opportunities for Improvement

MPI Protocols Set by ASNC/SNMMI and G.E. Healthcare Manufacturer Recommendations

Journal of Nuclear Cardiology®
May/June 2016

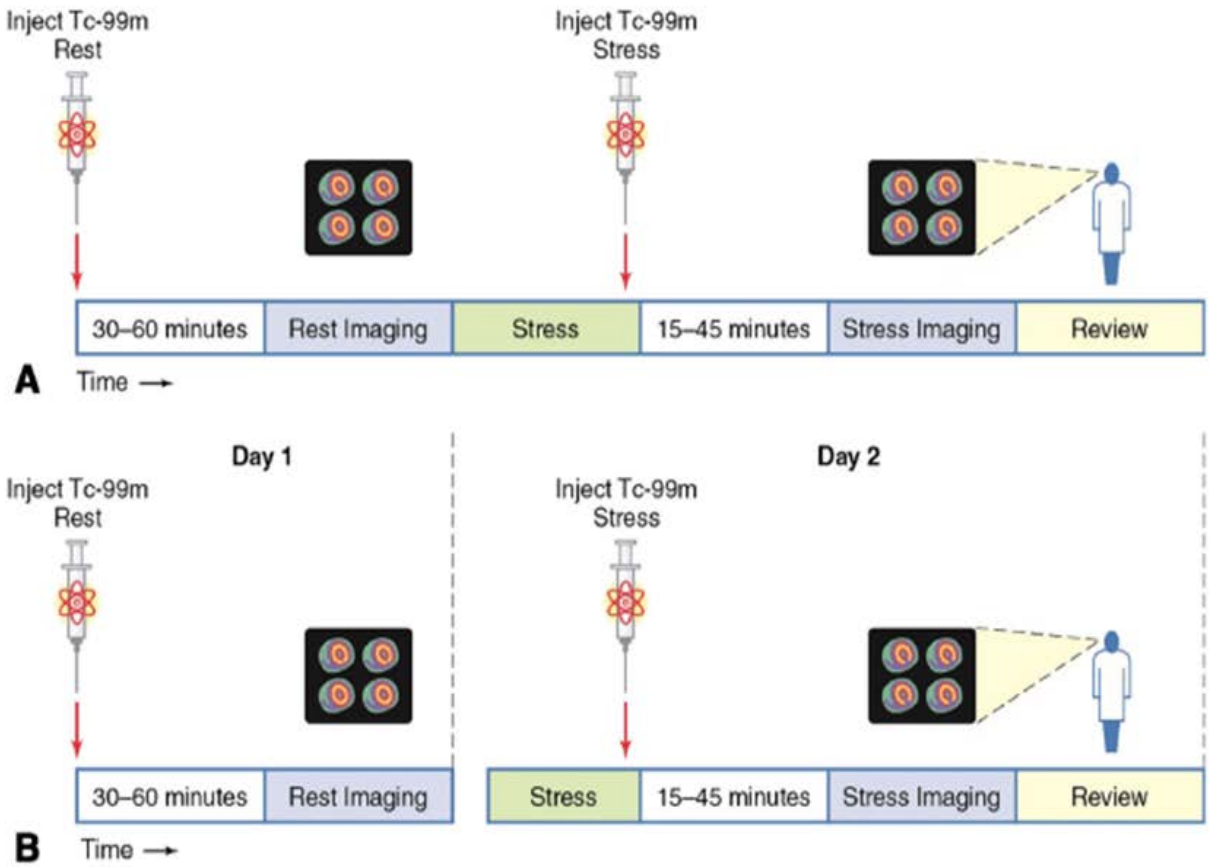


Figure 6. One (A) and two (B) day rest-stress Tc99m imaging protocols.

Workflow process: One-Day Protocol

ONE-DAY PROTOCOL MYOCARDIAL PERFUSION IMAGING REST/STRESS AT FORT ST JOHN HOSPITAL			
0700-0745	Machine QC and dose prep		
0745-0815	1st patient-interview, consent signing, set-up IV		
0815-0845	2nd patient- interview, consent signing, set-up IV		
0845-0915	3rd patient- interview, consent signing, set-up IV	0845-0915	**Rest Scan 1st patient**
0915-0945	4th patient- interview, consent signing, set-up IV	0915-0945	**Rest Scan 2nd patient**
		0945-1015	**Rest Scan 3rd patient**
1000-1030	Doctor's arrival and perform 1st patient Stress	1015-1045	**Rest Scan 4th patient**
1030	First patient injection	1115-1145	**Stress Scan 1st patient**
1030-1100	2nd patient Stress		
1100	2nd patient injection	1145-1215	**Stress scan 2nd patient**
1100-1130	3rd patient stress		
1130	3rd patient injection	1215-1245	**Stress scan 3rd patient**
1130-1200	4th patient stress		
1200	4th patient injection	1245-1315	**Stress scan 4th patient**
1315-1345	Lunch Break		
1345-1400	1st patient image processing		
1400-1415	2nd patient image processing		
1415-1430	3rd patient image processing		
1430-1445	4th patient image processing		
1445-1500	Cleaning and print daily reports		

WORKFLOW PROCESS: TWO-DAY PROTOCOL

Rest Scans - Mondays

(if holiday, Wednesdays or Fridays)

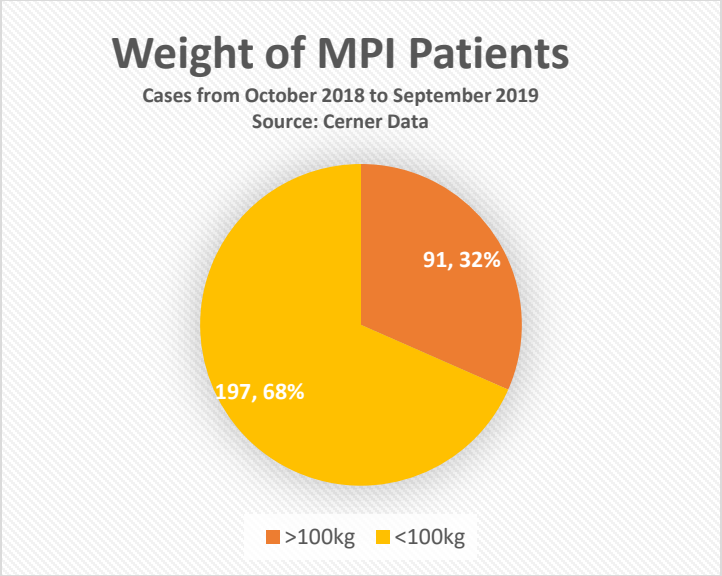
Stress Scans -Tuesdays

TWO-DAY PROTOCOL MYOCARDIAL PERFUSION IMAGING REST/STRESS AT FORT ST JOHN HOSPITAL			
	DAY 1:Rest		
0700-0745	Machine QC and dose prep		
0800-0830	1st patient-interview, consent signing, set-up IV		
0845-0915	2nd patient- interview, consent signing, set-up IV		
		0915-0945	Rest Scan 1st patient
0920-0950	3rd patient- interview, consent signing, set-up IV		
		1000-1030	Rest Scan 2nd patient
1000-1030	4th patient- interview, consent signing, set-up IV		
		1030-1100	Rest Scan 3rd patient
1045-1115	5th patient- interview, consent signing, set-up IV		
		1115-1145	Rest Scan 4th patient
1120-1150	6th patient- interview, consent signing, set-up IV		
		1200-1230	Rest Scan 5th patient
1200-1230	7th patient- interview, consent signing, set-up IV		
		1230-1300	Rest Scan 6th patient
		1315-1345	Rest Scan 7th patient
1345-1415	Lunch break		
1415-1500	More time to do documentation		
	I can do non-cardiac eg bone scan		
	I can add 1 more Cardiac if needed		
	I have more allowance if delayed/repeat scan		

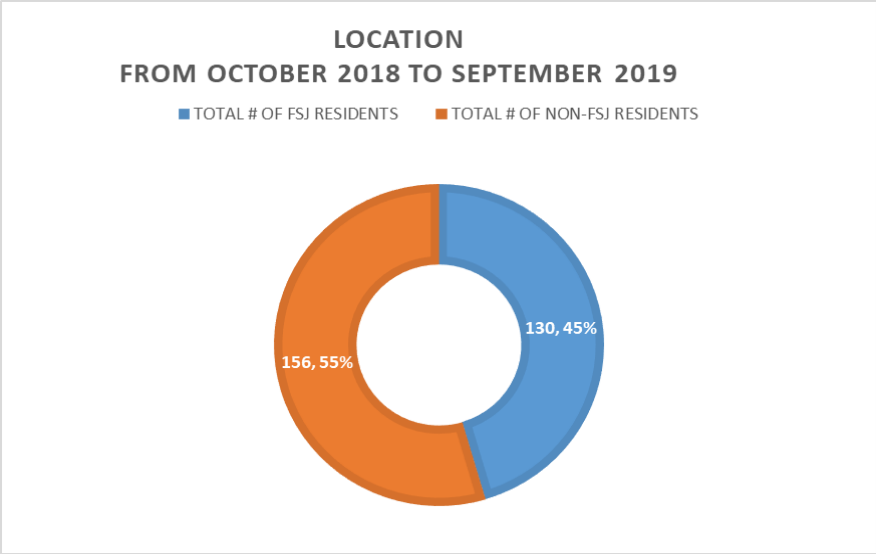
TWO-DAY PROTOCOL MYOCARDIAL PERFUSION IMAGING REST/STRESS AT FORT ST JOHN HOSPITAL			
	DAY 2: Stress		
0700-0745	Machine QC and dose prep		
0800-0815	1st patient-set-up IV		
0830-0845	2nd patient-set-up IV		
0900-0915	3rd patient-set-up IV		
0900-0930	Doctor arrival and 1st patient perform Stress		
0930	1st Stress Injection		
0930-0945	4th patient-set-up IV		
		1015-1045	Stress Scan 1st patient
0930-1000	2nd patient Stress		
1000	2nd patient injection		
1000-1015	5th patient-set-up IV		
		1045-1115	Stress Scan 2nd patient
1000-1030	3rd patient Stress		
1030	3rd patient injection		
1030-1045	6th patient-set-up IV		
		1115-1145	Stress Scan 3rd patient
1030-1100	4th patient Stress		
1100	4th patient injection		
1100-1115	7th patient-set-up IV		
		1145-1215	Stress Scan 4th patient
1100-1130	5th patient Stress		
1130	5th patient injection		
1130-1145	1st patient image processing		
		1215-1245	Stress Scan 5th patient
1130-1200	6th patient Stress		
1200	6th patient injection		
1200-1215	2nd patient image processing		
		1245-1315	Stress Scan 6th patient
1200-1230	7th patient Stress		
1230	7th patient injection		
1230-1245	3rd patient image processing		
1245-1300	4th patient image processing		
1300-1315	5th patient image processing		
1315-1345	6th patient image processing		
		1315-1345	Stress Scan 7th patient
1345-1415	Lunch Break		
1415-1430	7th patient image processing		
1430-1500	-more time to reprocess images		
	-cleaning up and prepare for next day		
	-more time to verify documentation		
	-more allowance if delayed/repeat scan		

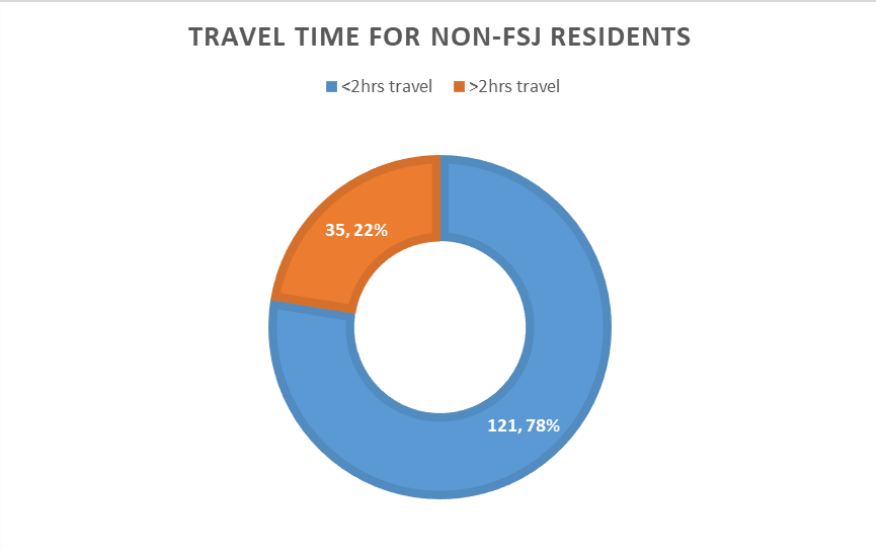
Advantages and its Positive outcomes

- Reduced wait times
- Maximize Internist availability
- Patient -focused quality care and Work-Balance for Technologist and Nurse
- Technical [8] :
  - Avoid having residual activity (“shine-through” or “crosstalk”) from the first injection interfere with interpretation of images reflecting the second injection
  - Attenuation artifacts in larger patients (e.g., >100kg or BMI >35) and in female patients with excessive breast tissues
  - Can repeat scans if needed for high gut activity



Challenge 1: Inconvenience for non-FSJ residents





Solutions:

- **Travel Allowances for members of First Nations Community**
- **Patient schedule:**

  Day 1: Travel early morning, Perform Rest Scan around 12noon or early afternoon, Hotel Check-In: 3pm

  Day 2: Stress Scan as first patient: 8am, Hotel Check-Out: 12noon
- **Can be arranged for 1-Day Protocol (<100kg patient)**

  Travel the night before or early dawn, Rest Scan: 8am; Stress Scan: 11am

  Go Home by 3pm

Challenge 2: Patient Dose exposure

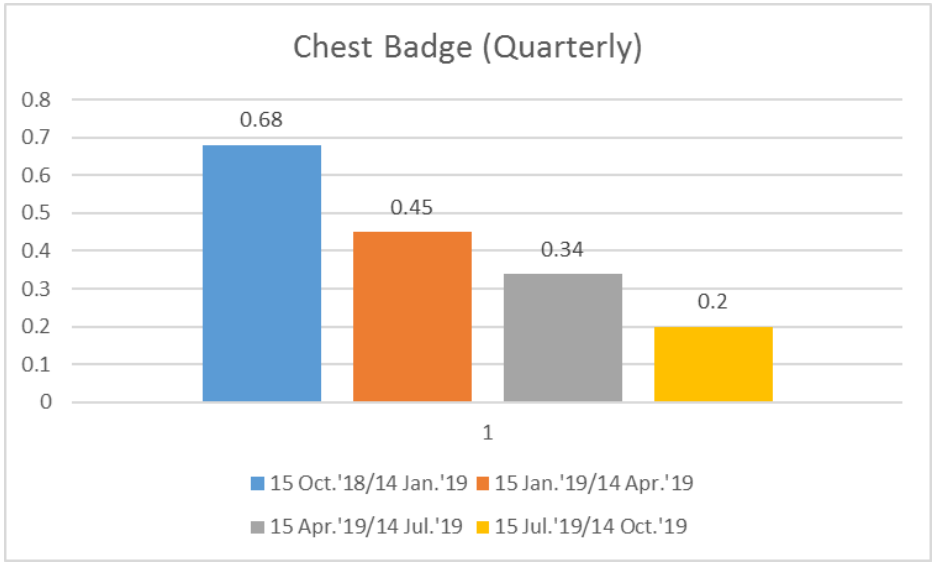
Table 5. Current SPECT myocardial perfusion imaging protocols: recommended radiopharmaceutical activities and their corresponding radiation effective doses

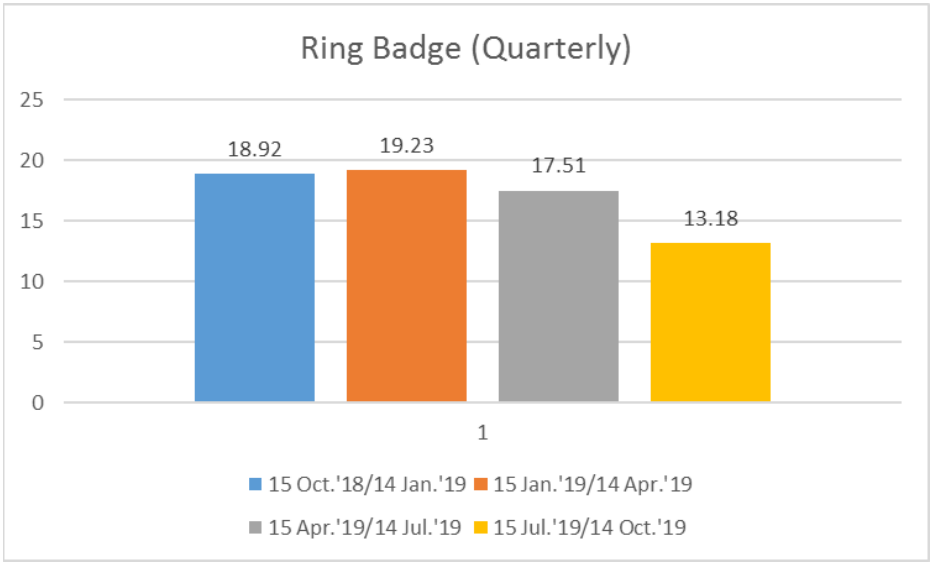
	First injection				Second injection				Total Dose (mSv)	Total dose if Stress only (mSv)
	Given at	Activity (mCi)	Activity (MBq)	Dose (mSv)	Given at	Activity (mCi)	Activity (MBq)	Dose (mSv)		
Tc-99m protocols										
Tc-99m one-day stress-first/ stress-only	Stress	8-12	296-444	2.0-3.0	(Rest)	24-36	888-1332	7.0-10.5	9.0-13.5	2.0-3.0
Tc-99m one-day rest/stress	Rest	8-12	296-444	2.3-3.5	Stress	24-36	888-1332	6.1-9.1	8.4-12.6	n/a
Tc-99m two-day stress/rest	Stress	8-12	296-444	2.0-3.0	(Rest)	8-12	888-1332	2.3-3.5	4.3-6.5	2.0-3.0
Tc-99m two-day stress/rest–large patient	Stress	18-30	666-1110	4.5-7.6	(Rest)	18-30	666-1110	5.2-8.7	9.8-16.3	4.5-7.6
Tc-99m two-day rest/stress	Rest	8-12	296-444	2.3-3.5	Stress	8-12	296-444	2.0-3.0	4.3-6.5	n/a
Tc-99m two-day rest/stress large patient	Rest	18-30	666-1110	5.2-8.7	Stress	18-30	666-1110	4.5-7.6	9.8-16.3	n/a

Solutions:

- **American Society of Nuclear Cardiology:**
  Recommended Dose Exposure: <9mSv[7]
- **Weight-Based Dosing**
  - thin patients without excessive breast tissue should receive activities at the low end of the recommended range
  - >100kg patients: increased count statistics of a 2-day protocol
- **Stress First/Stress Only Protocols (Criteria Based)**
  - Consider newer/more advanced scanners
  - Reporting doctor availability

Challenge 3: Technologist Dose exposure





Effective Dose Limits		
	Period	Effective Dose (mSv)
Nuclear energy worker	(a) One-year dosimetry period	50
	(b) Five-year dosimetry period	100
Lens of the eye	One-year dosimetry period	150
Skin	One-year dosimetry period	500
Hands and feet	One-year dosimetry period	500
A person who is not a nuclear energy worker	One calendar year	1

Annual Effective Dose	mSv
Chest Badge:	1.67
Ring Badge:	68.84

Challenge 3: Technologist Dose exposure

- **REPORT ON OCCUPATIONAL RADIATION EXPOSURES IN CANADA 2018[13]**
  - National Dose Registry, Radiation Protection Bureau, Environmental and Radiation Health Sciences Directorate, and Health Environments and Consumer Safety Branch
  - Eleven–year trend of mean annual effective doses and mean annual non–zero doses for Nuclear Medicine Technologists

Job Category*	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Nuclear Medicine Technologist	1907	1928	1844	1880	1956	2025	1914	1842	1683	1811	1783
Mean Dose (mSv)	1.51	1.54	1.37	1.31	1.39	1.28	1.25	1.23	1.23	1.32	1.24
Mean Non-Zero Dose (mSv)	1.99	2.02	1.81	1.72	1.82	1.74	1.69	1.73	1.67	1.70	1.69

Solutions:

- ALARA principle: Time, Distance and Shielding
- Diligently Use of lead apron, lead syringe and lead gloves

Challenge 4: Complex Booking Process

- Instructions can be confusing since tests perform for 2 days; other patients have been booked previously for 1-day protocol
- Cannot come on the scheduled day for Rest Scan
- Additional workload for booking staff

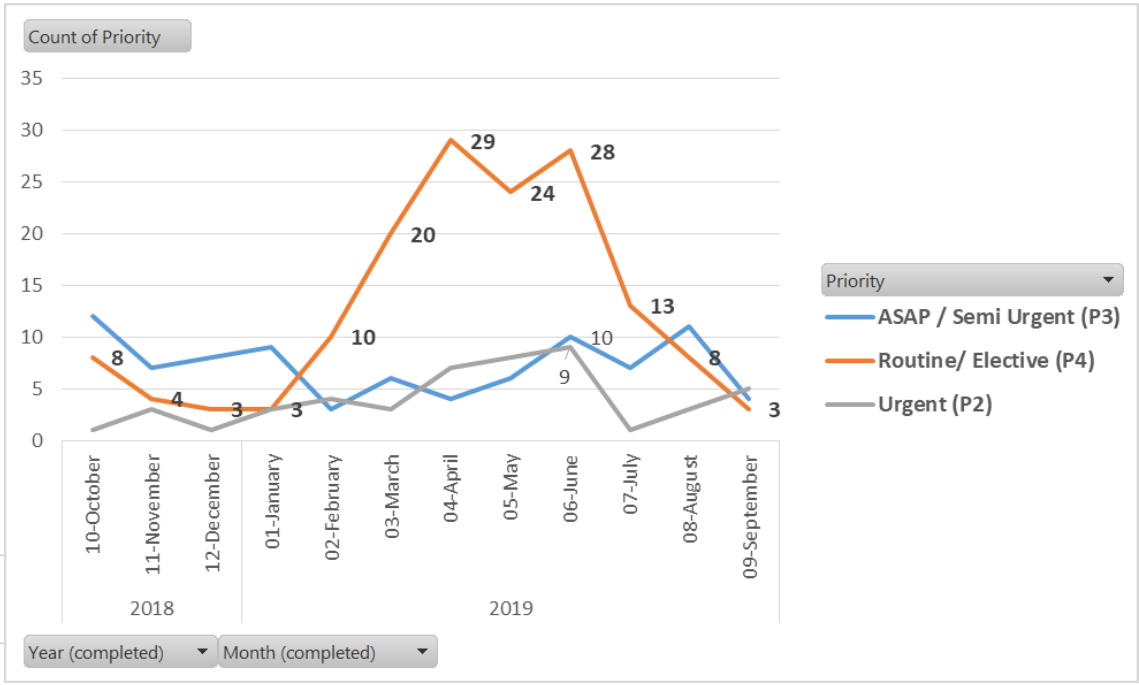
Solutions: Complex Booking Process

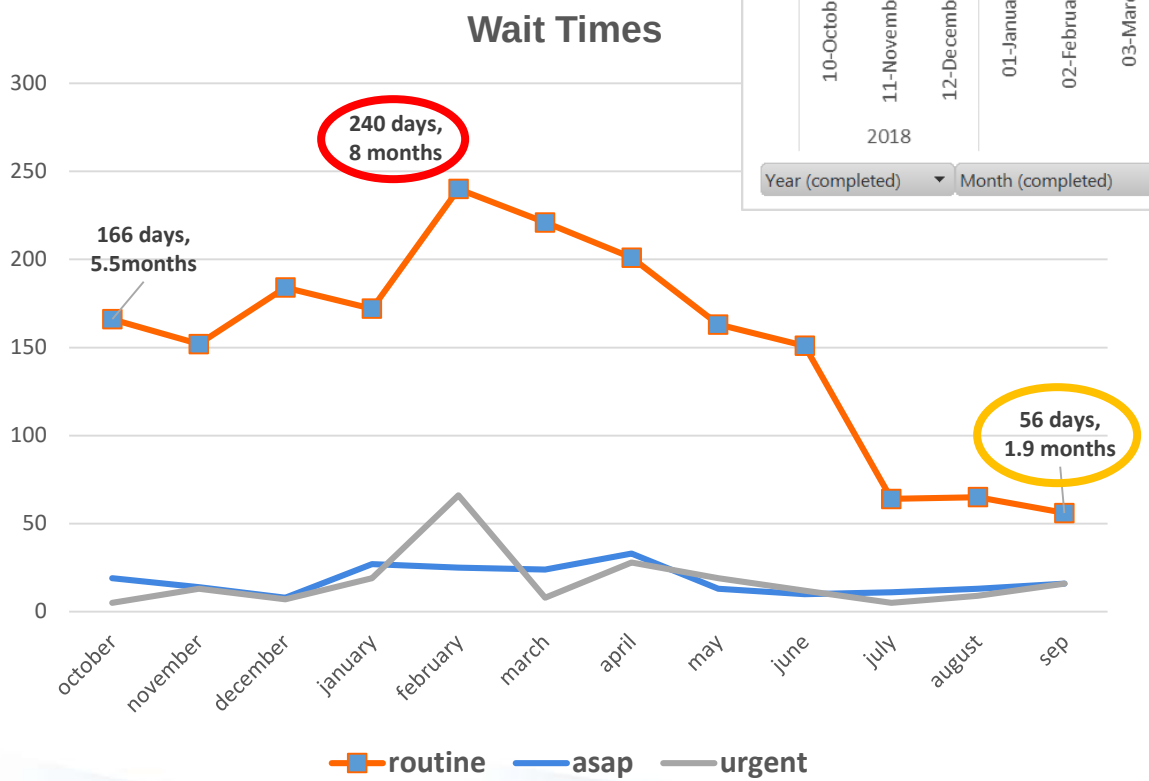
- Sole-Charge Booking clerk to be more consistent and thorough explanation of preparation and the need to do 2-day protocol
- Flexibility of Rest Scan appointment but maximum to be completed within 1 week
- Collaboration with NM Technologist

Minor Challenges

- Extra expenses to supplies (2 IV set-up)
- Inconvenience to setting up another IV
- Report not ready until both Stress/Rest Scans done
- Dictation issue

Results



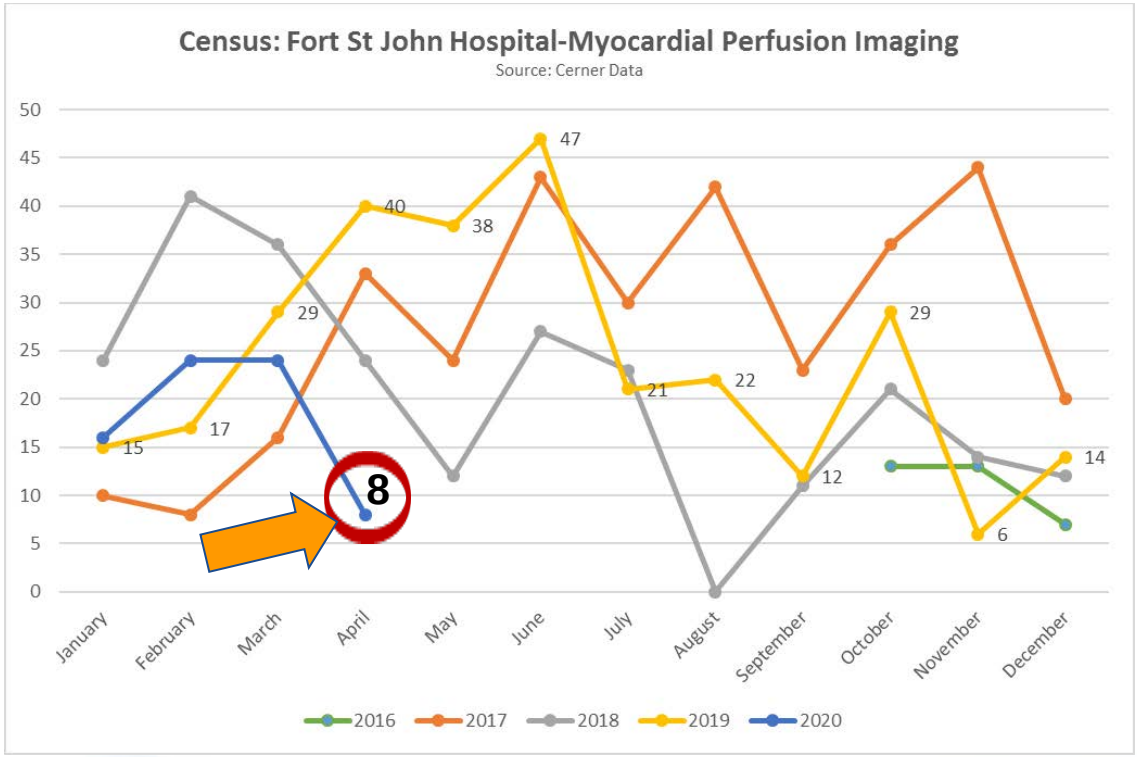


Priority	Timing
Routine	Within 6 weeks
ASAP/ Semi-Urgent	Within 14 days
Urgent	Within 48 hrs

Current Status and Response to COVID19 Pandemic Crisis

March 24, 2020 NH Memo on COVID-19 Outbreak Response: Cardiac Services [9]

- Phase 2 – Postponement of All Elective Patients, Prioritize Urgent and Emergent Patients
- Screen patients for COVID-19 symptoms and cancel tests for patients with suspected COVID-19 symptoms and inform requesting physician.



Current Status and Response to COVID19 Pandemic Crisis

- **Guidelines from ANSC and SNMMI (Approved 27 March 2020)** [10]

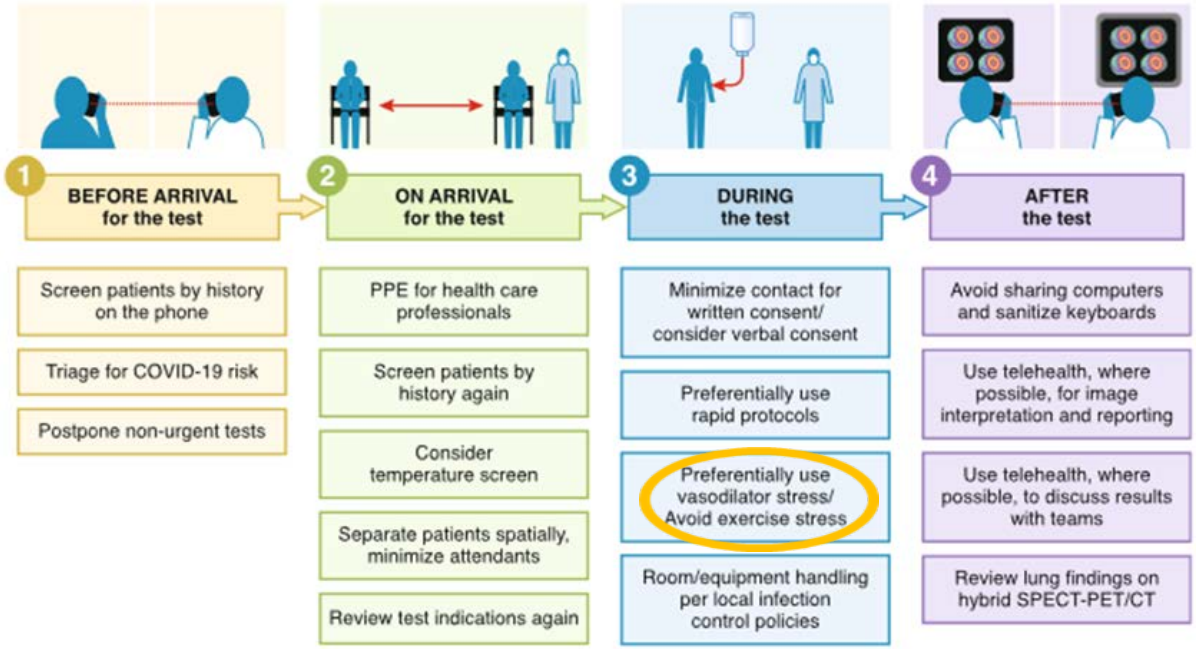


Figure 1. Key steps to minimizing COVID-19 exposure during the patient's journey through the nuclear cardiology laboratory.

Current Status and Response to COVID19 Pandemic Crisis

- **BC Careful Restart Plan:**
  - **NH Memo on Prioritization in Medical Imaging (as of 22 May 2020)**[9]

Table 1. BCRS Prioritization Levels and Time Interval Benchmark

Priority Level	Description	Time Interval Benchmark
P1	**Emergent:** An examination immediately necessary to diagnose and/or treat life-threatening disease or injury.	Immediately to Maximum 24 hours
P2	**Urgent:** An examination necessary to diagnose and/or treat disease or injury and/or alter treatment plan that is not immediately threatening to life or limb.	Maximum 7 calendar days
P3	**Semi-urgent:** An examination necessary to diagnose and/or treat disease or injury and/or alter treatment plan, where provided clinical information requires that the examination be performed sooner than the P4 benchmark period.	Maximum 30 calendar days
P4	**Non-urgent:** An examination necessary to diagnose and/or treat disease or injury, for long-range management or for prevention.	Maximum 60 calendar days
P5	**Follow-up:** The exam appointment date requested by the referring practitioner for the purpose of disease surveillance.	No time interval as they have a specified procedure date

  - **NH Memo on Taking Precautions in Medical Imaging (as of 21 May 2020)**[9]
    - Practice Physical Distancing
    - Personal Protective Equipment (PPE) and Equipment Hygiene
    - Screening COVID-19 Presumptive or Confirmed Case

Current Status and Response to COVID19 Pandemic Crisis

- **ANSC, SNMMI, and IAEA guidelines; Published May 14, 2020:**[11]
  - Ideally to be done on a Stress first/Stress only protocol
  - Two-Day protocol is considered:
    - To give greater control of workflow
    - Minimize time within the department
  - *One-Day protocol for Non-FSJ residents that need travel time >2hrs
  - Preferably to be done using Pharmacologic Stress
  - For Exercise Treadmill Patients:
    - considered to be an *aerosol generating procedure.*
    - Follow the Enhanced Respiratory Isolation for cleaning.
    - Allow 30 minutes after patient discharge to enter the room.
    - Wear gown, gloves, and Level-3 mask

Summary

- MPI is considered to be the most common cardiac non-invasive diagnostic tool that is useful in the evaluation and risk stratification of patients with known or suspected cardiovascular disease.
- Find ways to reduce patient dose exposure to <9mSv
- Continue to improve our MPI services with stable wait times of less than 60 patients; threshold of 100 patients;
- Aim for maximum 2 months wait time for routine cases
- Readily available to serve the Peace Region

Summary

- **ASNC** says:
  - "The protocol selected for a particular study should be tailored to the patient and to the clinical scenario."
  - "No single protocol is optimal for every patient, and nuclear cardiology laboratories should strive to implement patient-centered imaging rather than performing the same protocol for each patient."

Rob Beanlands, MD
2019 ASNC President
Chair and Division Head of Cardiology
Director of the National Cardiac PET Centre
University of Ottawa Heart Institute

Summary

- In September 2019: 40 requisition forms
  - **37 Routine,** 0 urgent, 0 semi-urgent, 3 specific date
  - Booking for 7 patients/week Two-Day protocol
  - 1.9 months wait time for routine cases

- As of May 15, 2020: 95 requisition forms
  - **83 Routine,** 0 urgent, **2 semi-urgent,** 10 specific date
  - Booking for 3-4 patients/week One-day protocol (Covid19 pandemic crisis)
  - 6.5 months wait time for routine cases

- COVID19 Pandemic Crisis BC Restart Plan:
  - Resume Two-Day Protocol as recommended by ANSC, SNMMI, IAEA
  - Stringent Infection Control Measures
  - Follow PPE guidelines
  - Maintain physical distancing
  - Preferably to be done using vasolator stress over exercise treadmill

References

1 About Nuclear Medicine and Molecular Imaging. *Society of Nuclear Medicine and Molecular Imaging*. Retrieved from

http://www.snmmi.org/AboutSNMMI/Content.aspx?ItemNumber=6433&&navItemNumber=756

2 Ivanovic, M. *Nuclear Medicine Systems: Basics and Isotopes SPECT Instrumentation. (photos from powerpoint slides).* Retrieved from

http://slideplayer.com/slide/7466703/

3 Report from the Canadian Chronic Disease Surveillance System: Heart Disease in Canada (2018). *Public Health Agency of Canada.* Retrieved from

https://www.canada.ca/en/public-health/services/publications/diseases-conditions/report-heart-disease-Canada-2018.html

4 Heart Disease in BC. *Cardiac Services BC*. Retrieved from

http://www.cardiacbc.ca/health-info/heart-disease-in-bc

5 Strauss, H. et.al. (2008). *Procedure Guideline for Myocardial Perfusion Imaging 3.3*. Retrieved from

http://snmmi.files.cms-plus.com/docs/Myocardial%20Perfusion%20Imaging%203.3.pdf

References

6 Henzlova, M. et.al. (2016). *ASNC imaging guidelines for SPECT nuclear cardiology procedures: Stress, protocols, and tracers*. American Society of Nuclear Cardiology Imaging Guidelines. p.15. Retrieved from

https://www.asnc.org/files/Guidelines%20and%20Quality/ASNC%20SPECT%20ProtocolsTracers%20Guidelines2016.pdf

7 Cerqueira, M. et.al. (2010). *Recommendations for reducing radiation exposure in myocardial perfusion imaging*. American Society of Nuclear Cardiology Information Statement. Retrieved from

https://www.asnc.org/files/Rec%20for%20Reducing%20Radiation%20Expo%20in%20MPI.pdf

8 DePuey, G. et.al. (2012). *Patient-Centered Imaging.* American Society of Nuclear Cardiology Preferred Practice Statement. p.2. Retrieved from

https://www.asnc.org/files/PCI%202012.pdf

9 Northern Health Operational Leadership and Physicians. *NH Medical Imaging Covid-19 Resources Page.* Retrieved from Northern Health Staff Internal Resources links

10 Skali, H. et.al. (2020). *Guidance and best practices for nuclear cardiology laboratories during the coronavirus disease 2019 (COVID-19) pandemic.* American Society of Nuclear Cardiology and Society of Nuclear Medicine and Molecular Imaging Information Statement. p.3. Retrieved from

https://link.springer.com/article/10.1007%2Fs12350-020-02123-2

References

11 Skali, H. et.al. (2020). *Guidance and Best Practices for Reestablishment of Non-Emergent Care in Nuclear Cardiology Laboratories during the Coronavirus Disease 2019 (COVID-19) Pandemic.* Information Statement from American Society of Nuclear Cardiology, International Atomic Energy Agency, and Society of Nuclear Medicine and Molecular Imaging; Endorsed by the Infectious Diseases Society of America. p.6-7. Retrieved from

https://zenodo.org/record/3827461#.Xsexnll7xyj

12 Winchester, D. et.al. (2019). *Refer Wisely: Management and Testing of Ischemic Heart Disease.* American Society of Nuclear Cardiology Appropriate Use Poster. Retrieved from

https://www.asnc.org/files/Appropriate%20Use%20Poster%2011x17_2final.pdf

13 Health Canada (2018). *Report on Occupational Radiation Exposures in Canada 2018.* National Dose Registry, Radiation Protection Bureau, Environmental and Radiation Health Sciences Directorate, and Healthy Environments and Consumer Safety Branch. p.19. Retrieved from

http://publications.gc.ca/collections/collection_2019/sc-hc/H126-1-2018-eng.pdf

14 Canadian Nuclear Safety Commission (2000). *Nuclear Safety and Control Act.* Justice Laws Website, Radiation Protection Regulations, Equivalent Dose Limits, 13-14. Retrieved from

https://laws-lois.justice.gc.ca/eng/regulations/SOR-2000-203/FullText.html

15 Dorbala, S. et.al. (2018). *Single Photon Emission Computed Tomography (SPECT) Myocardial Perfusion Imaging Guidelines: Instrumentation, Acquisition, Processing, and Interpretation.* ASNC SPECT Imaging Guidelines. Retrieved from

https://link.springer.com/article/10.1007/s12350-018-1283-y

References

16 Bouchard, A. (2018). *Heart function including ejection fraction.* myheart.net. Retrieved from *https://myheart.net/articles/heart-function-including-ejection-fraction-ef/*

Your feedback and ideas are important.
Email me:
gene.saldana@northernhealth.ca

- **NH QI team: Diana Tecson**
- **Kamaljeet Singh-CIS Clinical Application Support Analyst –Imaging Solutions for NH**