The Impact of eOrdering for Cardiac Catheterization on Rates by RHA and on Diagnosis of Critical Coronary Artery Disease

Objective

To determine whether the objectives of eOrdering Cardiac Catheterization (CC) were achieved: similar rates of CC across Regional Health Authorities (RHAs) and improvement in percentage diagnosed with critical coronary artery disease (CAD).

Practice Points

1. Electronic ordering of CC with embedded decision supports was undertaken using MyCCath (a Mobia developed tool) in the CC Unit of the Health Sciences Centre, the provincial centre for CC.

2. The decision tool included the Thrombolysis in Myocardial Infarction (TIMI) score which predicts risk for adverse outcomes in patients with acute coronary syndrome (ACS).

3. Prior to introduction of MyCCath, Western Health had the lowest rate of CC/1,000 population but the highest rate of diagnosis of critical CAD.

4. Initial evaluation revealed that users of MyCCath felt it improved the referral process and that they supported its introduction.

5. Audit, feedback, and academic detailing was undertaken in 2019 for 46 referring physicians to improve selection of patients with stable angina for CC who had high risk features.

Methods

1. MyCCath was introduced in Dec 2017 and in Feb 2019 referrals could only be made electronically.

2. Data was obtained on patients who had CC for CAD from 2014-2017 (pre-MyCCath) and for 2019 (post-MyCCAth) from the APPROACH database to determine rates of CC by indication and the percent diagnosed with critical CAD. Rates were standardized for age and sex/1,000 adults/year to facilitate accurate comparison of RHAs.

Results

Table 1. Age Standardized Rates/1,000 Adults/Year of CC for Stable Angina and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern (EH)	Central (CH)	Western (WH)	Labrador-Grenfell (LGH)
Age Standardized Rate/1,000 Adults 2014–17 (per year)	2.35	2.89	1.52	1.76
Age Standardized Rate/1,000 Adults 2019	1.74	2.69	1.13	0.93
% Critical CAD 2014–17	50.2	50.0	58.8	57.3
% Critical CAD 2019	58.7	57.2	59.5	72.4

- In all four regions, rate of referral for CC for stable angina in 2019 fell. The provincial age standardized rate was 1.77 (95% CI: 1.64% – 1.89) in 2019.
- Rate of referral was significantly higher than the provincial rate in CH and significantly lower in WH and LGH.
- Rate of diagnosis of critical CAD improved from 51% to 59%.
- In 2019, 11% of those who had CC for stable angina had more atypical symptoms or angina on strenuous activity (CCSI), 58% had angina with slight exercise limitation and 31% had angina with severe exercise limitation.

Table 2. Age Standardized Rates/1,000 Adults/Year of CC for STEMI and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern	Central	Western	Labrador-Grenfell
Age Standardized Rate/1,000 Adults 2014–17 (per year)	0.86	0.84	0.69	0.77
Age Standardized Rate/1,000 Adults 2019	0.91	0.98	1.08	1.03
% Critical CAD 2014–17	78.0	71.0	77.0	70.3
% Critical CAD 2019	75.6	85.0	78.0	71.0

- Rate of CC for ST Elevated Myocardial Infarction (STEMI) increased in all four regions, particularly in WH.
- The provincial age standardized rate in 2019 was 0.96 (95% CI: 0.86 – 1.05).

- Despite increase in utilization the provincial rate of diagnosis was good at 77%, similar to that in 2014–2017 (76%).

TABLE 3. Age Standardized Rates/1,000 Adults/Year of CC for NSTEMI and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern	Central	Western	Labrador-Grenfell
Age Standardized Rate/1,000 Adults 2014–17 (per year)	2.11	2.33	1.34	2.05
Age Standardized Rate/1,000 Adults 2019	2.37	2.37	2.05	2.44
% Critical CAD 2014–17	68.9	67.8	73.5	62.9
% Critical CAD 2019	71.0	70.0	65.0	76.0

- The standardized rates of CC for Non ST Elevated Myocardial Infarction (NSTEMI) increased, particularly in WH. This was accompanied by a fall in percent diagnosed with critical CAD from 73.5 to 65.
- The age standardized rate for the province in 2019 was 2.32 (95% CI: 2.18 – 2.47).
- Percent diagnosed with critical CAD was 69%, similar to 2014–2017 (69%).

TABLE 4. Age Standardized Rates/1,000 Adults/Year of CC for Unstable Angina and Percent Diagnosed With Critical CAD Analyzed by RHA Before and After Introduction of Electronic Ordering

	Eastern	Central	Western	Labrador-Grenfell
Age Standardized Rate/1,000 Adults 2014–17 (per year)	0.87	1.01	0.69	0.94
Age Standardized Rate/1,000 Adults 2019	0.85	0.92	0.92	1.10
% Critical CAD 2014–17	55.7	58.7	64.7	36.6
% Critical CAD 2019	60.0	63.6	54.0	48.5

- The age standardized rate for the province was 0.89 (95% CI: 0.80 – 0.98).
- The rate increased in WH with percent diagnosed with critical CAD falling from 65 to 54.
- The percent diagnosed in the province with critical CAD who had unstable angina was 56% in 2014–2017 and in 2019 it was 59%.

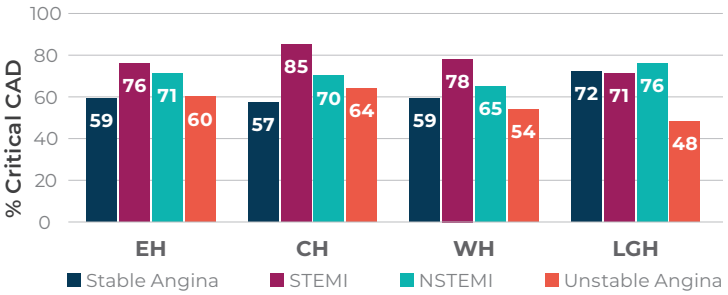

Figure 1. Percent Diagnosed With Critical CAD by Indication and by RHA in 2019

- In 2019, the provincial rate of diagnosis of critical CAD was 59% for stable angina, 77% for STEMI, 70% for NSTEMI, and 59% for unstable angina.

Conclusions

1. Rates of CC use for stable angina decreased in 2019 and percent diagnosed with critical CAD increased associated with introduction of eOrdering and of audit, feedback, and academic detailing. This was a good outcome.
2. Potential exists to reduce CC in stable angina in patients with CCS scores 1 and 2.
3. Rates of CC use for STEMI increased and percent diagnosed with critical CAD was 77%, close to optimal target, another good outcome.
4. Rates of CC for NSTEMI increased and percent diagnosed with critical CAD was 70%, a good result in the era of high sensitivity Troponin use.
5. Rates of CC use for unstable angina increased in WH but percent diagnosed with critical CAD decreased, an outcome of concern.
6. The provincial rate of diagnosis of critical CAD in unstable angina was 59% in 2019, whereas during COVID-19, the rate of diagnosis fell to 48% instead of increasing at a time of forced rationing. These facts support an educational intervention for referring physicians.
7. eOrdering facilitated appropriate decrease in the use of CC for stable angina and appropriate increase in the use for STEMI and Acute Coronary Syndrome (ACS). However, the educational intervention likely had additional benefit in stable angina where percent with critical CAD improved.
8. Audit, feedback, and academic detailing on the work up and referral strategy for CC in ACS should be undertaken with referring physicians.