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CARDIAC REHABILITATION

Winnipeg Region Annual Report

2017/18

PROGRAM OVERVIEW

The Cardiac Rehabilitation Program (CRP) operates out of two medical fitness facilities in Winnipeg, the Reh-Fit Centre and the Wellness Institute at Seven Oaks General Hospital. Both sites endeavor to provide programming that is accessible to all, and program subsidies are available to those who are in need.

The Cardiac Rehabilitation Program utilizes an inter-disciplinary team of health professionals to deliver an evidence-based program that helps individuals with cardiovascular disease acquire the skills and confidence to lead a healthier life.

The Cardiac Rehabilitation Program is a 16-week program that includes education and exercise classes offered at various times throughout the week. The education sessions address topics ranging from understanding the function of the cardiovascular system, cardiac medications, and the central importance of exercise, to other topics such as stress management, heart healthy nutrition, and action planning to achieve behaviour and lifestyle change.

The supervised exercise program aims to safely increase each person's cardiovascular conditioning, flexibility and strength under the careful guidance of the exercise professionals and the rest of the interdisciplinary cardiac rehabilitation team. Through this combination of education and exercise, participants learn how to safely manage their risk factors for heart disease and improve their quality of life. The overall approach emphasizes self-efficacy and is based on a model of self-management.

The program continues to offer a home-based option for people who are not able to attend the site-based program because they live too far away, do not have transportation to attend the sites, or prefer a more independent style of rehab and do not need to attend the program with a group. Home-based CR includes a pre- and post-assessment similar to the traditional program, phone calls with a fitness professional and Case Manager, and access to nutrition counselling and psychological services. The home-based CR is limited to those who are at lower risk, and the sites provide home-based programming on a limited basis.

All data for this program is collected in EMR to track all demographics, risk levels, reasons for being in the CR program, and time spent with each participant. The plan is to grow the home-based program and begin to expand to those at higher risk.

Cardiac Rehabilitation is strengthened by a productive partnership which includes the Reh-Fit Centre, Wellness Institute at Seven Oaks General Hospital, WRHA, WRHA Chronic Disease Collaborative, as well as the WRHA Clinical Psychology and Cardiac Sciences Programs, all working together with the medical and surgical hospital staff to augment care for cardiac patients. The program receives automatic referrals from cardiac surgery, medical wards at all Winnipeg hospitals, as well as referrals from the Heart Failure Clinic and the St. Boniface Heart Catheter Lab. The program also participates in research initiated by the University of Manitoba and Cardiac Sciences which aims to strengthen cardiac patient care.

Clinical consolidation and labour adjustments within the region are suspected to have impacted CRP referral patterns and pathways. While the CRP will continue to support sites and mitigate risk of missed referrals, there may be volatility in referral patterns through 2018-19.

QUALITY INDICATOR/BENEFITS TO PARTICIPANTS

Participants in Cardiac Rehabilitation programs across the world show improvement in their mortality and morbidity upon completion of cardiac rehabilitation, which means a lower risk for death, another cardiac event or additional surgery. More specifically participants gain improved quality of life and well-being, increased exercise tolerance and functional ability, improvement in their cardiac risk factors (e.g.. better lipid profiles, blood sugar levels and blood pressure, and reduced tobacco use) as well as improved psychological symptoms such as mood or depression.

This fiscal year the Cardiac Rehabilitation program selected the following six indicators to track program efficacy as well as demonstrate the significant and positive benefits of participation in this program:

- Brief Symptoms Inventory (BSI) to measure psychological well-being and risk for depression,
- Total blood cholesterol levels
- Waist girth,
- MET levels to measure exercise capacity,
- SF-36 Mental Health Summary Score and
- SF-36 Physical Health Summary Score, to measure quality of life.

In future Annual Reports, we intend to report quality metrics such as time of referral to time of CR program start date.

Changes in outcome variables were examined only for those participants with both pre- and post-data, so the number of individuals included in these analyses is lower than the total number of program starts. Each outcome variable was analyzed through a repeated-measures analysis, which examined each individual's change pre- and post- program rather than comparing changes in the average scores of the group as a whole.

Overall, the CRP participants showed significant improvement in all six of the indicators.

PSYCHOLOGICAL WELLBEING (Brief Symptoms Inventory)

BSI provides an overview of a participant's psychological symptoms and their intensity at a specific point in time. The BSI-Grand Severity Index gives psychologists and other healthcare professionals a single composite score that can be used to assess participant at intake for psychological problems, objectively support care management decisions, and measure participant progress during and after treatment to monitor change. The BSI-GSI ranges from 0 to 3, with higher scores indicating more intense symptoms of mental illness. A positive post-intervention outcome relates to the reduction in the BSI Grand Severity Index score.

Overall, there was a significant decrease in the overall BSI scores from the beginning of the CRP to the conclusion of the program, from GSI=0.42 to GSI=0.35 ($t=4.95$, $p<.001$). Both male and female participants, of all ages, experienced this significant decrease in BSI scores.

TOTAL BLOOD CHOLESTEROL

When blood cholesterol is too high, it builds up in the walls of the arteries and blood flow to the heart muscle is slowed down or blocked. Total blood cholesterol is a cardiac risk factor that should decrease following the cardiac rehabilitation intervention. A positive outcome for program participants would be a reduction in total blood cholesterol.

Participants experienced a significant decrease in their total blood cholesterol by the end of the program from an average of 3.87 mmol/L to 3.68 mmol/L ($t=4.79$, $p<.001$). Participants experienced an improvement in total blood cholesterol regardless of age or gender.

WAIST GIRTH

Waist girth has been shown to be a strong predictor of heart disease, stroke, high blood pressure, high blood cholesterol and type-2 diabetes. Even a modest reduction in waist girth can translate into reduced risk of disease and disability. Both exercise and heart healthy nutrition, which is emphasized in this program, can affect a reduction in waist girth.

The average waist girth of participants decreased significantly over the course of the CRP, from 102.8 cm at the beginning to 100.4 cm at the conclusion of the program ($t=8.74$, $p<.001$). The reduction in waist girth experienced by participants was similar regardless of gender or age.

EXERCISE CAPACITY (MET Levels)

MET levels are a way of measuring the amount of energy expended during physical activities. In CRP participants, MET levels were assessed during a graded exercise test. The higher the MET level upon program completion the better the functional capacity and cardiovascular conditioning. MET levels should ideally increase following the cardiac rehabilitation program. This positive outcome was established this year from the data collected.

Overall, there was a statistically significant increase in MET level following the CRP ($t=-23.59$, $p<.001$). The peak MET level increased from an average of 7.61 METS to 9.29 METS over the course of the CRP.

Recently, the Canadian Cardiovascular Society developed a set of quality indicators with which to assess cardiac rehabilitation programs. One of the quality indicators (CR-17) is the percentage of CRP participants who showed a half metabolic equivalent (MET) increase in their exercise capacity from pre- to post-program. Of the CRP participants from Reh-Fit Centre and the Wellness Institute in 2017-18, 70.9% had a .5 or greater MET improvement throughout the course of the program.

Regardless of how exercise capacity is assessed, gender and age impacted the extent of the improvement. For men, and for younger participants, the size of the difference in MET levels was significantly greater pre- to post- program than for women, and older participants. While 74.1% of male participants had at least a .5 MET improvement in exercise capacity, only 60.0% of female participants met that benchmark. The average age of participants who achieved a .5 MET improvement was 62.0 years, compared with an average age of 65.5 years for those whose exercise capacity improved less than .5 MET.

QUALITY OF LIFE (SF-36 Summary Measures)

The SF-36 is a widely used Health Survey that assesses quality of life. Two global scores are computed that assess psychological quality of life (Mental Health Summary Score), and physical health quality of life (Physical Health Summary Score). This year participants benefitted from improved Mental and Physical Health Summary Scores.

Higher scores on the Mental Health Summary Measure indicates the absence of psychological distress and limitation due to emotional problems, so ideally there should be an increase in this score over the course of the Cardiac Rehabilitation program.

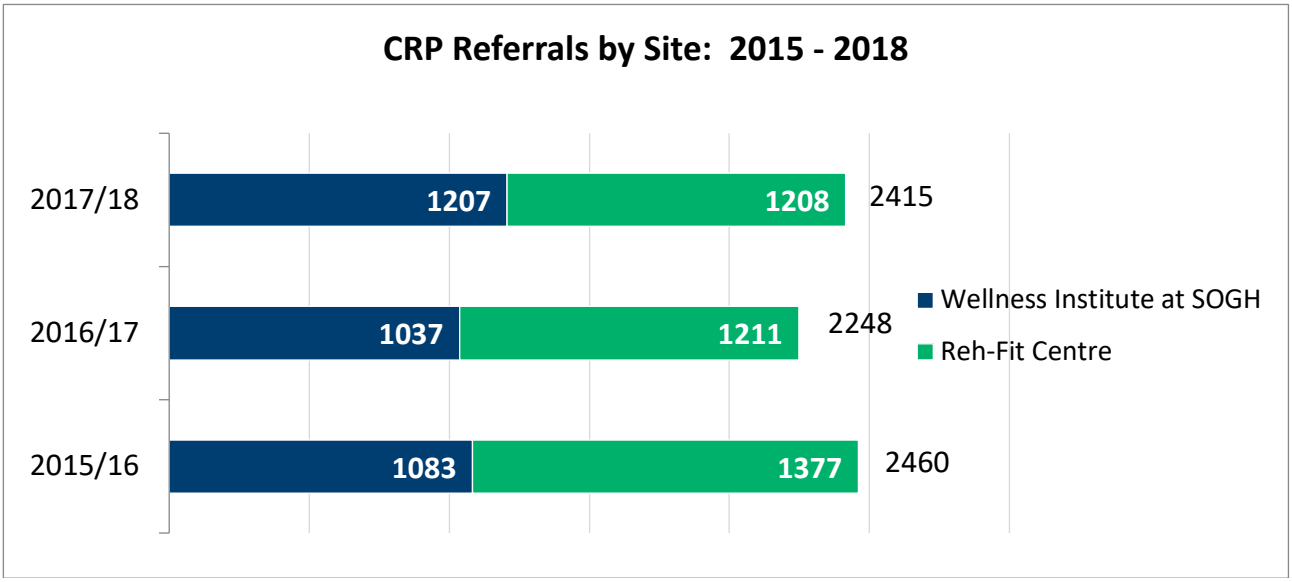
The average Mental Health Summary Score for CRP participants increased significantly over the course of the program, from 48.4 to 51.0 ($t=-4.77$, $p<.001$).

Higher scores on the Physical Health Summary Measure indicate the absence of physical limitations or decrements in well-being, high energy levels, and excellent self-rated health, making an increase in score a positive outcome.

CRP participants saw a significant increase in their Physical Health Summary Score, from an average score of 37.3 at the beginning of the program to 46.0 at the program's conclusion ($t=-19.00$, $p<.001$).

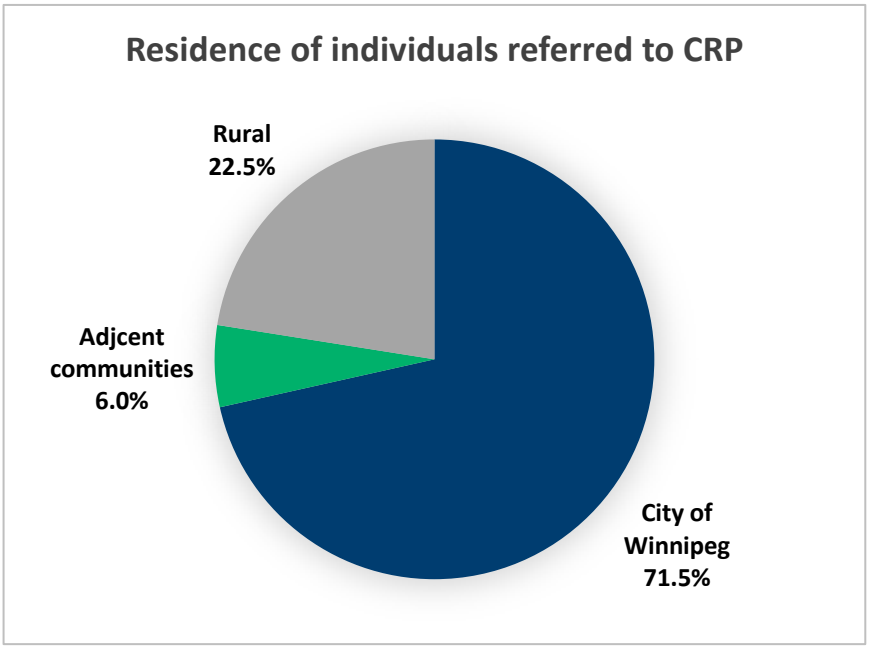
CRP REFERRALS

The total number of referrals received by the Cardiac Rehabilitation Program consisted of all referrals that were received between April 1, 2017 and March 31, 2018. Overall, there were 2415 referrals in 2017/18 to the CRP at the Wellness Institute at SOGH or Reh-Fit Centre. The chart below shows the number of referrals received by each site, and comparative data from the previous two years. For a complete summary of the number of referrals received monthly and quarterly, see Appendix B.



CRP referrals were made for individuals who ranged in age from 18 to 100 years old, with an average age of 64.8 years. Males made up 72.6% of the referrals.

About three-quarters of the referrals (71.5%) were given to individuals who lived within the city of Winnipeg; 6.0% of referrals were to individuals living in communities adjacent to Winnipeg (within a 10-minute drive to the perimeter), and 22.5% lived in other communities as far away as Churchill.



Diagnosis:

All program referrals received were classified according to the potential participant's primary diagnosis. The diagnosis was categorized as either 'Acute Coronary Syndrome' (which includes myocardial infarction, unstable angina, and ACS NOS), 'Non-ACS', or 'inadequate data'. These classifications are described in further detail in Appendix A ("Definitions").

The table below shows the total number of referrals received in 2017/18, according to the potential participant's primary diagnosis and referring hospital. The most common non-ACS diagnosis was vascular disease (300 individuals) followed by heart failure (229 individuals). For a summary of the potential participant's primary diagnosis prior to classification, see Appendix C.

Referring site:	ACS Referrals	Non-ACS referrals	Inadequate data	TOTAL
St. Boniface General Hospital	837	716	77	1630
Health Sciences Centre	77	7	70	154
Seven Oaks General Hospital	59	8	55	122
Grace Hospital	73	3	19	95
Victoria Hospital	58	6	3	67
Concordia Hospital	32	1	16	49
Other/outpatient*	92	156	26	274
Non-WRHA hospital	9	9	0	18
TOTAL	**1237**	**906**	**266**	**2409****

**'Other/outpatient' referrals include patient-initiated referrals or those made by community physicians*
***For 6 referrals, data on diagnosis was missing*

61.2% of the ACS cases within the WRHA received a referral to the CRP

Intervention:

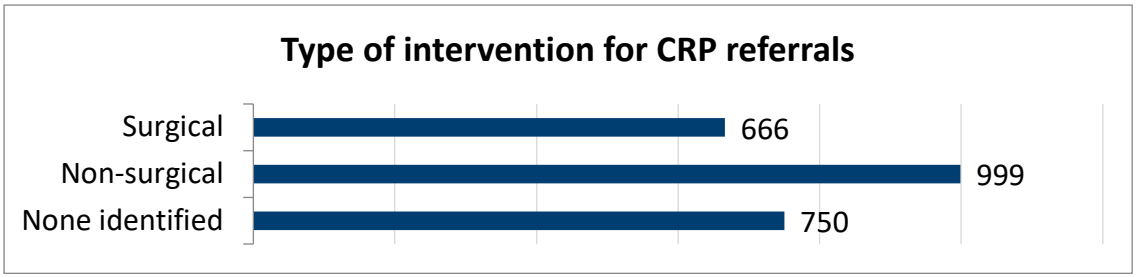
All referrals were also classified according to the type of intervention that the potential participant received. All referrals were classified as having a surgical intervention, a non-surgical intervention, or no intervention identified (including missing data). These classifications are described in further detail in Appendix A ("Definitions").

Interventions in the surgical category included:

- Coronary Artery Bypass Graft (CABG)
- Ventricular Assisted Device (VAD)
- Valve repair/replacement
- Transcatheter Aortic Valve Implantation (TAVI)
- Thoracic Endovascular Aortic Repair (TEVAR)

84.3% of the cardiac surgical cases within the WRHA received a referral to the CRP

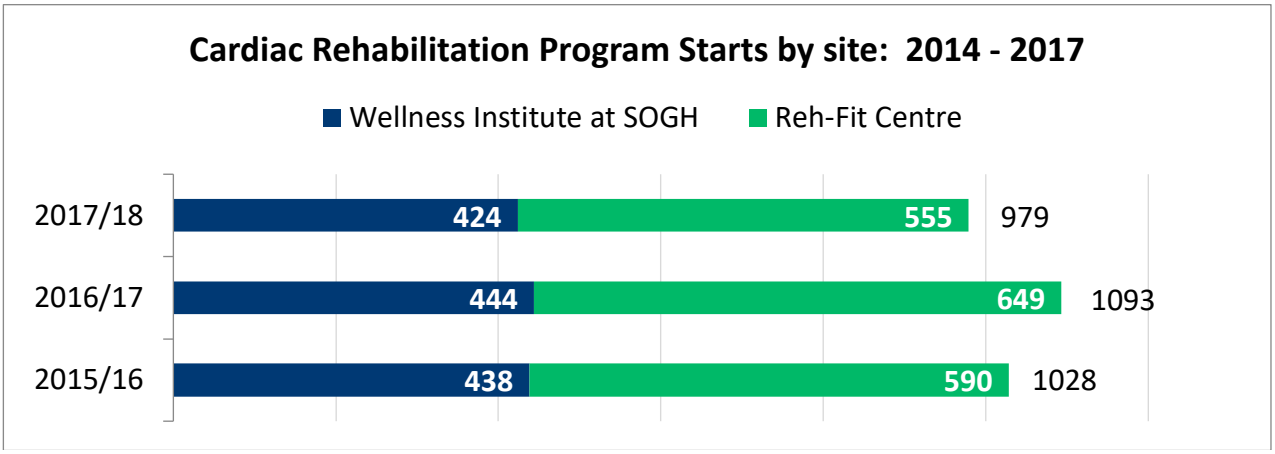
In 2017/18, 666 of the individuals who had been referred to the CRP had surgical interventions.



The most common surgical intervention was CABG (389 individuals) followed by valve repair (241 individuals. 755 of the individuals who received non-surgical interventions had had a PTCA +/- stent. For a further breakdown of intervention type prior to classification, see Appendix C.

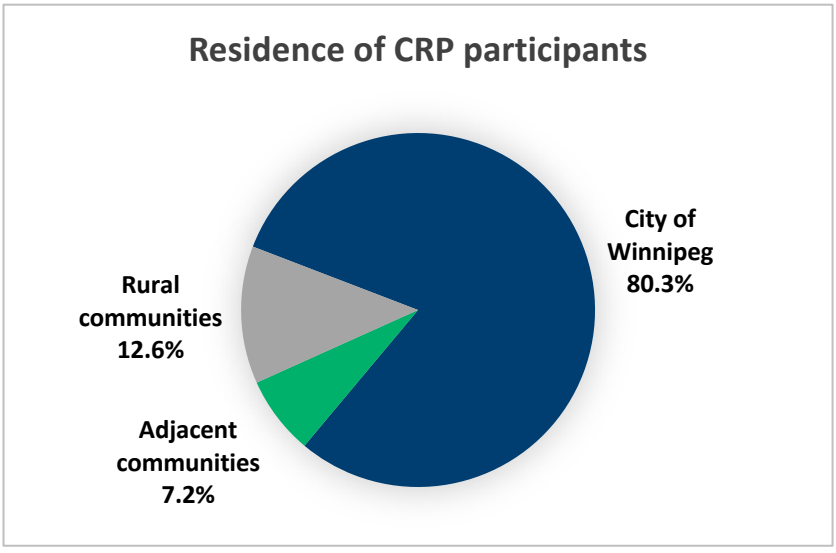
PROGRAM STARTS

Program starts are the participants who actually start the CRP between April 1, 2017 and March 31, 2018. The participant may have been referred during the previous fiscal year, but started the program during the current fiscal year. In 2017/18, 979 people started the CRP in Winnipeg. Ten of these people participated in the home-based program.



Who attended the CRP at the Wellness Institute at SOGH or the Reh-Fit Centre in 2017/18?

- 75.9% were male, 24.1% were female
- Average age was 63.2 years (range 29 – 94)
- 80.3% of participants lived within the Winnipeg perimeter and another 7.2% lived in adjacent communities
- 81.5% of the participants were married
- 45.9% were employed, and 45.3% were retired or semi-retired. 5.5% of CRP participants were on disability benefits.



Some individuals who received referrals to CRP did not start the program. For 310 individuals, information was recorded about the reason for declining the referrals.

- About 2 in 5 (42.6%) of the 310 individuals who were able to be contacted indicated that they were not interested in participating in the program.

- Some of the individuals did not want to participate in the program because they lived outside of Winnipeg (15.8%) or had problems with transportation (5.2%).

- For about one-third (35.2%) here were other reasons for declining the referral. Some of these had already participated in the program in the past, or, did not qualify for the program. A few individuals had medical issues or language barriers that prevented their participation. A small number of individuals had registered for intake, but did not show up for the program.

- Based on data for reasons for declining, financial issues were seldom mentioned as a reason for not attending the program (1.3%)

Program Starts by Diagnosis:

All program starts were classified according to the participant's primary diagnosis at the time of referral. The diagnosis was categorized as either 'Acute Coronary Syndrome' (which includes myocardial infarction, unstable angina, and ACS NOS), 'Non-ACS', or 'inadequate data'. These classifications are described in further detail in Appendix A ("Definitions").

The table below shows the total number of program starts in 2017/18, according to the participant's primary referral diagnosis and referring hospital. The most frequently-mentioned non-ACS diagnosis among those who had started the CRP was vascular disease (120 individuals) followed by stable coronary artery disease (84 individuals). For a summary of the participant's primary diagnosis prior to classification, see Appendix C.

Referring site:	ACS Referrals	Non-ACS referrals	Inadequate data	TOTAL
St. Boniface General Hospital	339	233	9	581
Health Sciences Centre	51	3	0	54
Seven Oaks General Hospital	40	2	3	45
Grace Hospital	37	3	1	41
Victoria Hospital	26	1	2	29
Concordia Hospital	19	2	0	21
Other/outpatient*	77	100	5	182
Non-WRHA hospital	11	5	2	18
TOTAL	**600**	**349**	**22**	**971****

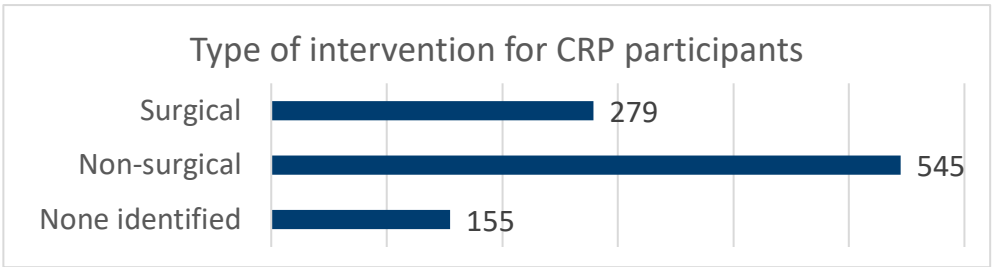
**'Other/outpatient' referrals include patient-initiated referrals or those made by community physicians*
***For 8 program starts, data on diagnosis was missing*

29.7% of the ACS cases within the WRHA started the CRP

Program starts by intervention:

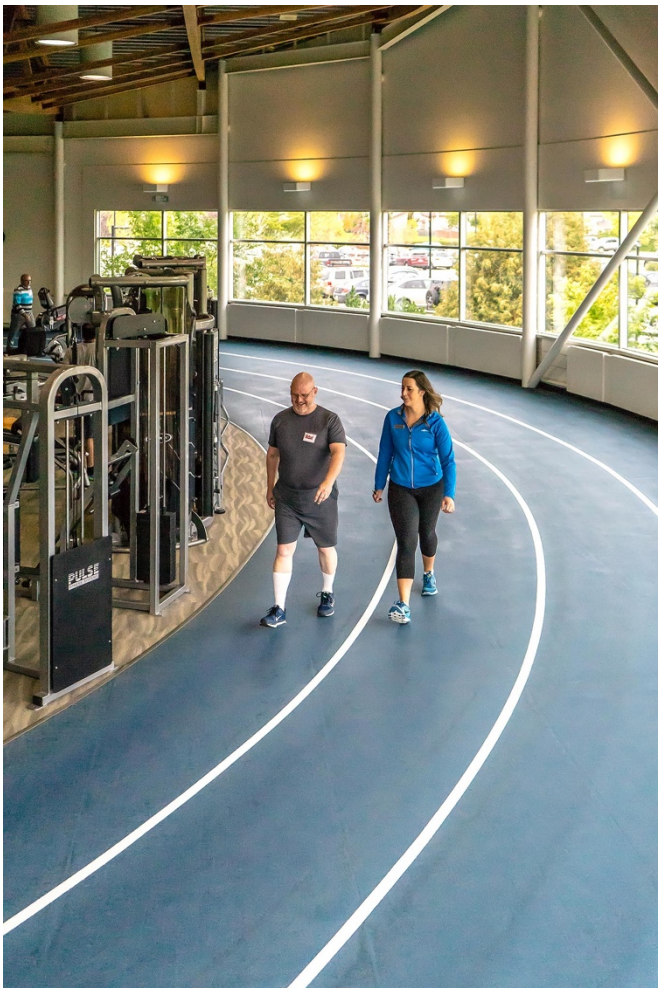
All program participants were also classified according to the type of intervention that the participant received prior to referral. All program starts were classified as having a surgical intervention, a non-surgical intervention, or no intervention identified (including missing information). These classifications are described in further detail in Appendix A ("Definitions").

In 2017/18, 279 of the participants of the Cardiac Rehabilitation Program had a surgical intervention, and 545 had another type of intervention. The most frequently-mentioned surgical intervention among program participants was CABG (163 participants) followed by valve repair (110 participants). PTCA +/- stent was the most common non-surgical intervention (462 partiicpants). For 155 of the participants, no intervention was identified or the information was missing. For a summary of the types of interventions of program participants prior to classification, see Appendix C.



35.3% of the cardiac surgical cases within the WRHA started the CRP

CRP PROGRAM ATTENDANCE

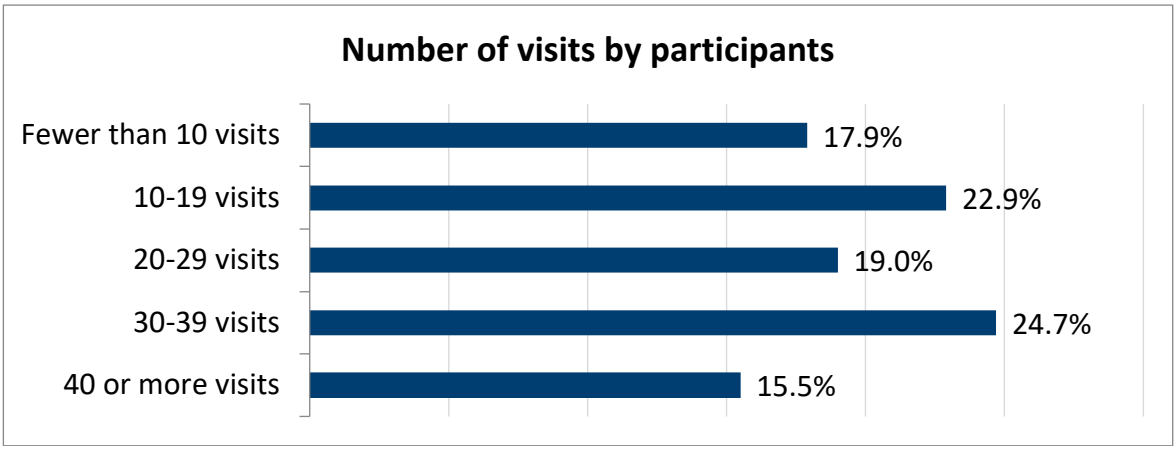


The majority of participants who started the CRP (88.3%) had a post-program assessment completed.

For participants who attended the program at the Wellness Institute, the number of visits they made to the facility was recorded. About 3 in 5 participants (59.2%) attended the program at the Wellness Institute at least 20 times. A participant attending 20 or more sessions would have attended an average of at least once a week for the full 16-week program. Program attendance represents a significant commitment of time and energy on the part of the participant, their family and supports.

Many barriers, such as transportation, family support or return to work, can interfere with participants attending the CRP regularly. Consequently the program encourages clients to incorporate physical activity into their lives outside of the structured program. It is not known how frequently CRP participants engage in physical activity outside of the program sites.

Participants who lived within Winnipeg or adjacent communities were significantly more likely to make 20 or more visits to the CRP (61.3%) than participants who lived outside of Winnipeg (46.9%). Males participants had a greater likelihood of visiting the program at least 20 times (62.9%) than did female participants (49.5%).



REGIONAL PROGRAMS WITH WRHA REFERRALS

Throughout Manitoba and Northern Ontario, there are a number of rehabilitation and wellness programs that receive cardiac rehabilitation referrals from WRHA sources. This data was not included in the CRP program data because it was not specific in terms of type, source or attendance, and was only provided at year end. These referrals are however important to note because they increase overall referral rates from by WRHA by over 10%.

The Rehabilitation and Healthy Lifestyles Program in the Thunder Bay Regional Health Sciences Centre received 26 referrals from the Winnipeg region. Of these referrals, 11 completed the rehab program. One individual received education and intake but was unable to participate in a structured class. Of the 14 individuals who did not participate in the program, 12 declined or did not respond, and two were deemed inappropriate for the program due to ongoing medical conditions.

For the cardiac rehabilitation that operates out of The Pas Wellness Centre, 20 referrals were received from St. Boniface General Hospital between April 2017 and March 2018, as well as three referrals from the Heart Failure Clinic in Winnipeg. Four of the referrals were forwarded to the Public Health Nurse in Flin Flon. Individual education and community support were provided, although an exercise program and group education was not available for clients living in Flin Flon. In The Pas, 60% of the clients received individual counselling. Eight individuals attended the initial assessment for the STEP walking program, and two these attended 6 weekly sessions and a post-assessment by the physiotherapist. Three attended monthly group education sessions at a variety of locations. In addition to these individuals, four clients that returned to The Pas followed up at The Pas Wellness Centre as a self-referral; three of these had CABG performed and one had PTCA with stent insertion.

Between April 2017 and March 2018, 235 people were referred from the WRHA hospitals to the cardiac rehabilitation program in Brandon; 119 of these were post-surgical referrals. Of these, 36 individuals started the cardiac rehabilitation program in Brandon.

APPENDIX A: DEFINITIONS

This report includes information on relevant referral and outcome data for the 2017/18 fiscal year. Data collected to track Cardiac Rehabilitation Program (CRP) activity include referrals and program starts. This data is stored within the Electronic Medical Records (EMR) system. Selected CRP data is compared with data obtained from Winnipeg Regional Health Authority (WRHA) to assess the proportion of relevant cases that receive referrals and start the program (see Diagnosis and Intervention, below).

REFERRALS:

Most of the referrals to the Cardiac Rehabilitation Program at The Wellness Institute at Seven Oaks General Hospital and Reh-Fit Centre originate from either WRHA hospitals or outpatient/other sources. Hospital referrals are made by the hospital system using the "Cardiac Rehabilitation Referral Form". This form is faxed to the CR site. Referrals may also come to the sites in the form of a discharge summary. Hospital referrals are received from one of the following Winnipeg hospitals: St. Boniface General Hospital (SBGH), Health Sciences Centre (HSC), Concordia Hospital (CH), Grace General Hospital (GGH), Seven Oaks General Hospital (SOGH), and Victoria General Hospital (VGH). A small number of referrals are received from hospitals outside the WRHA region.

If a participant self-refers, or is referred by a physician, this referral is classified as 'outpatient/other'. In the case of a self-referral, a physician must sign a "Cardiac Rehabilitation General Referral Form" to confirm a cardiac diagnosis and the participant's suitability for the program. Referral forms may be faxed to the physician's office for signature.

For reporting, the total number of referrals is the sum of hospital-generated and outpatient/other referrals received by the program sites between April 1, 2017 and March 31, 2018.

Within the EMR system, when a referral is received at either the Wellness Institute or Reh-Fit Centre, the referral is entered as a program 'prospect'. If the sites are unable to contact the potential participant or if the individual does not choose to enter the program, the status of the referral is then changed to 'declined'. When possible, reasons for declining the referral are recorded.

PROGRAM STARTS:

Program starts are the participants who, after receiving a referral or self-referring, actually start CRP. For those who wish to attend the program, the status of the referral is changed to 'accepted' when registration and payment is received, and 'active' on the first day of the program. The data in this report are presented based on an active start date between April 1, 2017 and March 31, 2018. The participant may have been referred to the program prior to April 1, 2017, but started the program during the current fiscal year.

DIAGNOSIS:

During the 2016/17 fiscal year, changes were made to the way referrals and program starts were classified and reported, relative to previous reports, and this processed continued through 2017/18. Classification is based on the presence of a diagnosis of Acute Coronary Syndrome (ACS). Acute Coronary Syndrome describes a spectrum of conditions, and describes a constellation of signs and symptoms compatible with acute myocardial ischemia. Information about the patient's diagnosis is confirmed from information on the discharge report from the referring hospital.

All referrals and program starts were assigned one of three classifications based on diagnosis: ACS, non-ACS, or 'inadequate data'. The criteria for each of the classifications are:

Acute Coronary Syndrome (ACS)	Non-ACS	Inadequate data
• Acute MI (I21.0 to I21.9) • Subsequent MI (I22.0 to I22.9) • Unstable Angina (I20.0) • ACS, NOS (I24.9)	• Arrhythmia • Stable Coronary Artery Disease • Heart Failure • Congenital Heart Disease • Valvular Disease • Disease of the Aorta • Peripheral Artery Disease • Other	• The Discharge report/CRP referral form received by the program sites does not contain sufficient information to classify based on diagnosis

The number of referrals and program starts with a diagnosis of Acute Coronary Syndrome is compared against data obtained from the Winnipeg Regional Health Authority. WRHA data includes the total number of cases with relevant ACS diagnoses as either the Most Responsible diagnosis (MRDx), a condition that existed prior to admission, or a condition that arose post-admission. Only patients who were discharged home, to a homelike setting with support, or left against medical advice were included in the WRHA total, as these individuals would be eligible to attend the CRP in the community. Those transferred to another acute or long-term care facility were excluded.

INTERVENTION:

Another change in reporting that began during the 2016/17 fiscal year was to classify referrals and program starts based on the type of intervention that the patient received. All referrals and program starts were assigned one of three classifications based on intervention:

Surgical intervention	Non-surgical intervention	No intervention
• Coronary Artery Bypass Graft (CABG) • Ventricular Assisted Device (VAD) • Valve repair/replacement • Transcatheter Aortic Valve Implantation (TAVI) • Thoracic Endovascular Aortic Repair (TEVAR)	• Ablation • PTCA +/- Stent • Heart transplant (not done at SBGH) • ICD insertion • Pacemaker insertion • AAA repair (vascular not cardiac) • PAD revascularization	• Condition was medically managed, or no intervention was indicated • This includes empty intervention fields (missing data)

In cases where multiple interventions were indicated, the surgical intervention was entered.

The number of referrals and program starts with a surgical intervention is compared against data obtained from the Winnipeg Regional Health Authority. The WRHA data includes data on inpatients, discharged home or to another acute facility, whose interventions meet the criteria to be classified as surgical.

APPENDIX B: Referrals and Program Starts

Referrals and Program Starts, Monthly, Quarterly and Year-end, Total and by Site

Referrals and Program Starts	April	May	June	1st Qtr	July	Aug.	Sept.	2nd Qtr
TOTAL # of referrals	202	248	194	644	215	187	197	599
Wellness Institute at SOGH	87	107	86	280	106	102	96	304
Reh-Fit Centre	115	141	108	364	109	85	101	295
TOTAL # of program starts	125	88	70	283	76	87	83	246
Wellness Institute at SOGH	73	34	30	137	30	40	39	109
Reh-Fit Centre	52	54	40	146	46	47	44	137

Referrals and Program Starts	Oct.	Nov.	Dec.	3rd Qtr.	Jan.	Feb.	March	4th Qtr	Year-end
TOTAL # of referrals	204	226	170	600	198	189	185	572	2415
Wellness Institute at SOGH	96	101	89	286	107	118	112	337	1207
Reh-Fit Centre	108	125	81	314	91	71	73	235	1208
TOTAL # of program starts	93	74	42	209	109	71	61	241	979
Wellness Institute at SOGH	36	31	3	70	52	33	23	108	424
Reh-Fit Centre	57	43	39	139	57	38	38	133	555

Referrals based on referral dates (receipt of referral from hospital or self-referral) between April 1, 2017 and March 31, 2018
Program starts based on active start dates (first date of CRP class) between April 1, 2017 and March 31, 2018

Referrals and Program Starts, Quarterly, by Referring Hospital and Primary Diagnosis

REFERRALS

Diagnosis	Referring Hospital	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
ACS	Concordia General Hospital	12	5	9	6
	Grace Hospital	17	13	23	20
	Health Sciences Centre	15	16	28	18
	St. Boniface General Hospital	252	198	195	192
	Seven Oaks General Hospital	16	14	9	20
	Victoria General Hospital	27	29	2	0
	Other/outpatient	16	18	31	27
	Non-WRHA Hospital	3	0	1	5

Diagnosis	Referring Hospital	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Non-ACS	Concordia General Hospital	1	0	0	0
	Grace Hospital	2	0	1	0
	Health Sciences Centre	0	1	4	2
	St. Boniface General Hospital	185	202	179	150
	Seven Oaks General Hospital	2	0	3	3
	Victoria General Hospital	1	4	1	0
	Other/outpatient	28	28	42	58
	Non-WRHA Hospital	1	1	5	2
Inadequate Data	Concordia General Hospital	3	6	1	6
	Grace Hospital	5	6	4	4
	Health Sciences Centre	15	18	19	18
	St. Boniface General Hospital	19	20	22	16
	Seven Oaks General Hospital	13	15	13	14
	Victoria General Hospital	1	1	0	1
	Other/outpatient	9	3	4	10
	Non-WRHA Hospital	0	0	0	0

PROGRAM STARTS

Diagnosis	Referring Hospital	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
ACS	Concordia General Hospital	5	4	4	6
	Grace Hospital	9	6	8	14
	Health Sciences Centre	16	4	17	14
	St. Boniface General Hospital	94	90	73	82
	Seven Oaks General Hospital	13	10	7	10
	Victoria General Hospital	10	7	9	0
	Other/outpatient	20	19	17	21
	Non-WRHA Hospital	3	0	1	7
Non-ACS	Concordia General Hospital	1	0	0	1
	Grace Hospital	2	0	1	0
	Health Sciences Centre	0	0	2	1
	St. Boniface General Hospital	70	66	34	63
	Seven Oaks General Hospital	2	0	0	0
	Victoria General Hospital	0	1	0	0
	Other/outpatient	30	28	21	21
	Non-WRHA Hospital	1	1	3	0
Inadequate Data	Concordia General Hospital	0	0	0	0
	Grace Hospital	1	0	0	0
	Health Sciences Centre	0	0	0	0
	St. Boniface General Hospital	1	5	3	0
	Seven Oaks General Hospital	1	0	2	0
	Victoria General Hospital	1	0	1	0
	Other/outpatient	3	1	1	0
	Non-WRHA Hospital	0	1	0	1

APPENDIX C: Referral Diagnosis and Intervention, prior to categorization

Diagnosis	Referrals		Program starts	
	#	%	#	%
Acute Coronary Syndrome	1237	51.2	601	61.7
Arrhythmia	74	3.1	47	4.8
Cardiomyopathy	73	3.0	20	2.0
Congenital Heart Disease	5	0.2	5	2.0
Coronary Artery Disease	1	0.0	2	0.2
Disease of the Aorta	14	0.6	3	0.3
Heart Failure	229	9.5	48	4.9
Other	41	1.7	21	2.1
Peripheral Artery Disease	2	0.1	1	0.1
Stable Coronary Artery Disease	167	6.9	84	8.6
Vascular Disease	300	12.4	120	12.3
Inadequate data	266	11.0	22	2.2
Missing data	6	0.2	5	0.5

Intervention	Referrals		Program starts	
	#	%	#	%
AAA repair	3	0.1	1	0.1
Ablation	3	0.1	0	0.0
CABG	389	16.1	163	16.6
Heart Transplant	6	0.2	3	0.3
ICD Insertion	15	0.6	7	0.7
Pacemaker Insertion	20	0.8	8	0.8
PAD Revascularization	1	0.0	0	0.0
PTCA +/- Stent	755	31.3	462	47.2
TAVI	27	1.1	3	0.3
TEVAR	6	0.2	1	0.1
VAD	3	0.1	2	0.2
Valve Repair	241	10.0	110	11.2
Other	196	8.1	64	6.5
None Identified	728	30.1	150	15.3
Missing/blank	22	0.9	5	0.5