



Vascular Access-Related Bloodstream Infections in Hemodialysis Patients in Québec

Surveillance results: 2014-2015

From April 1st, 2014, to March 31st, 2015, 45 hemodialysis units took part in the surveillance of vascular access-related bloodstream infections (VARBSIs) in hemodialysis (HD) patients, for a combined total of 55,640 patient-periods (Table 1). Participating units reported 156 VARBSIs in 142 patients. The proportion of patient-periods involving a fistula accounted for 43.4%. The VARBSI incidence rate was 0.09 cases per 100 patient-periods for patients with an arteriovenous (AV) fistula, 0.20 for patients with a synthetic fistula (graft), 0.37 for patients with a permanent catheter and 6.73 for patients with a temporary catheter. In 2014-2015, incidence rates per type of vascular access were stable compared to 2010-2014, except for patients with a permanent catheter, which has significantly decreased ($p < 0.01$). Since 2013-2014, four HD units joined the program and one HD unit stopped participating. Data was extracted on May 20, 2015.

Table 1 - Participation of Hemodialysis Units in the Surveillance of VARBSIs in Hemodialysis Patients, Québec, 2010-2011 to 2014-2015

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Units (N)	29	40	42	42	45
Patients monitored (average number per period)	3,311	3,855	3,977	3,984	4,280
Patient-periods* (N)	43,040	50,115	51,697	51,791	55,640
Patient-months (N)	40,276	47,041	48,340	48,469	52,001
Dialysis sessions (N)	517,835	604,817	621,516	623,172	668,590
Catheter-days (N)	655,588	750,919	798,816	824,834	883,423
VARBSIs (cat. 1a, 1b and 1c, N)	190	214	218	152	156
VARBSIs with AV fistulas or grafts (N)	29	38	46	25	24
VARBSIs with permanent or temporary catheters (N)	161	176	172	127	132
Infected patients (N)	182	206	210	150	142

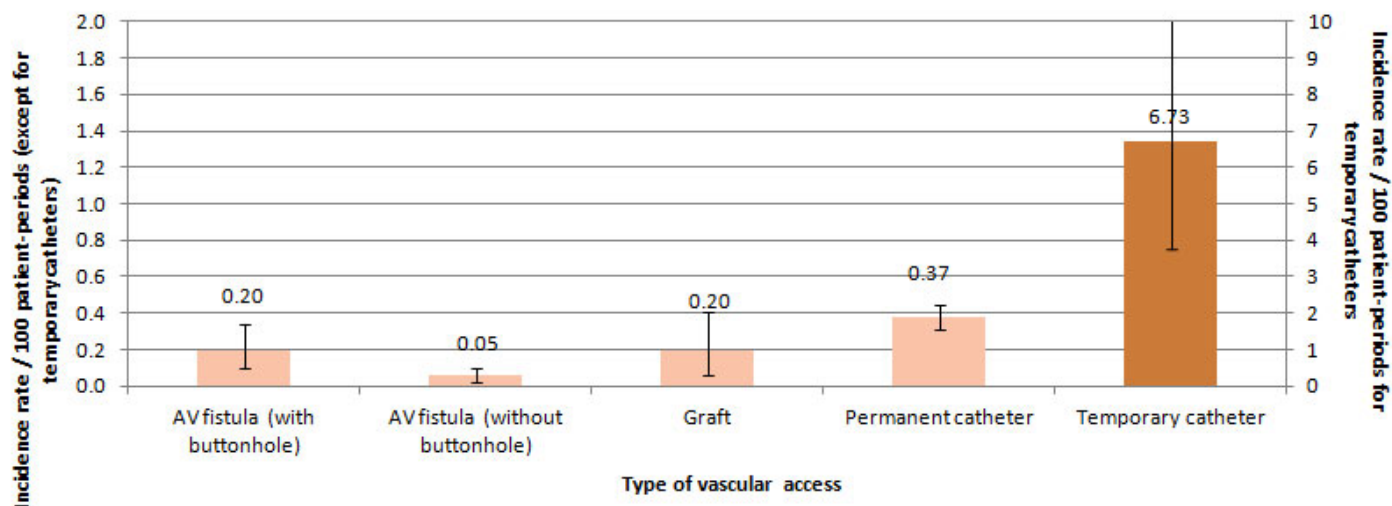
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Incidence rates

The 2014-2015 VARBSI incidence rate was 0.28 cases per 100 patient-periods. The incidence rate was 0.09 for patients with an AV fistula, 0.20 for patients with a graft, 0.37 for patients with a permanent catheter and 6.73 for patients with a temporary catheter (Figure 1). In patients with AV fistulas, the VARBSI incidence rate was higher when the buttonhole technique was used (0.20 per 100 patient-periods versus 0.05, $p < 0.01$). Incidence rates were not statistically different between patients with an AV fistula with buttonhole and those with a graft, nor they were such difference between patients with a graft and those with a permanent catheter; however, the incidence rate for patients with an AV fistula with buttonhole was lower than the incidence rate for those with a permanent catheter ($p < 0.03$).

Therefore, compared to AV fistulas without buttonhole, the incidence rate with a temporary catheter was 123.6 [54.1 ; 282.3] times greater, with a permanent catheter 6.9 [3.5 ; 13.5] times greater, with a graft 3.6 [1.2 ; 10.8] times greater and with an AV fistula with a buttonhole, the incidence rate was 3.6 [1.5 ; 9.0] times greater (all p values < 0.05). The incidence rate with a temporary catheter was 18.0 [10.5 ; 30.8] times higher than with a permanent catheter ($p < 0.05$).

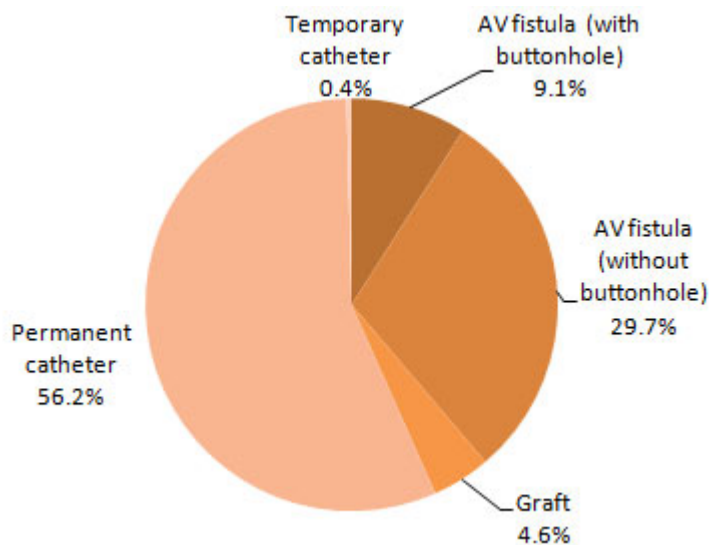
Figure 1 - VARBSI Incidence Rate by Type of Vascular Access, Québec, 2014-2015 (Incidence Rate per 100 Patient-periods [95% CI])



95% CI: 95% confidence interval.

Permanent catheters were the most commonly used type of vascular access, followed by AV fistulas without the use of the buttonhole technique (Figure 2).

Figure 2 - Breakdown of Patient-periods by Type of Vascular Access, Québec, 2014-2015 (%)



Incidence rate time trends

In 2014-2015, incidence rates per type of vascular access were stable compared to 2010-2014, except for patients with a permanent catheter, which has significantly decreased ($p < 0.01$) (Table 2 and Figures 3 and 4).

Figure 3 - VARBSI Incidence Rates by Type of Vascular Access, Québec, 2010-2014 and 2014-2015 (Incidence Rate per 100 Patient-periods [95% CI])

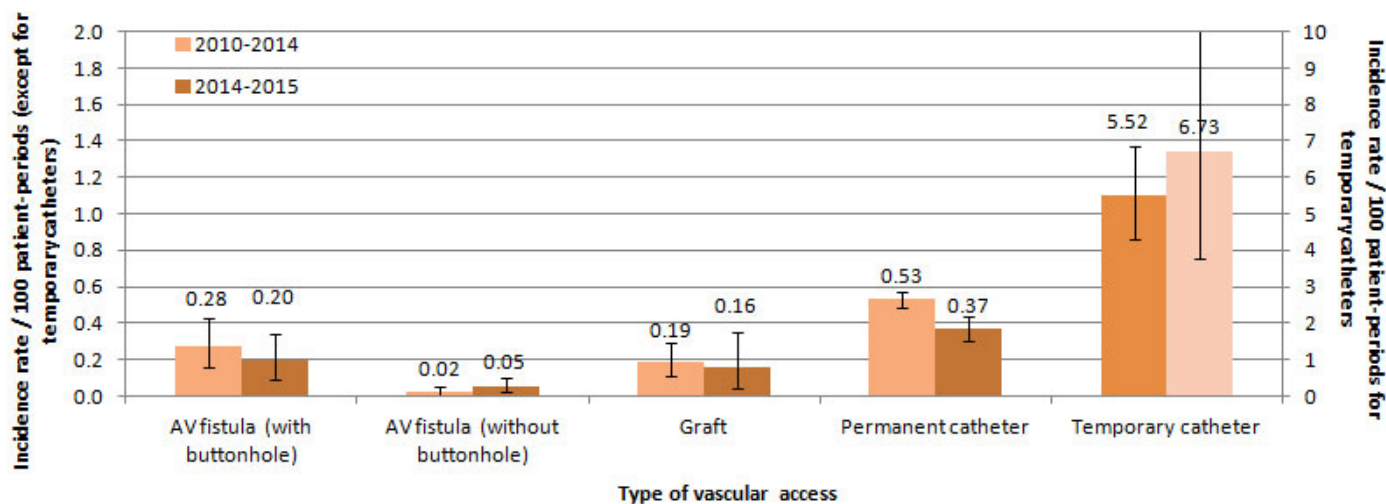
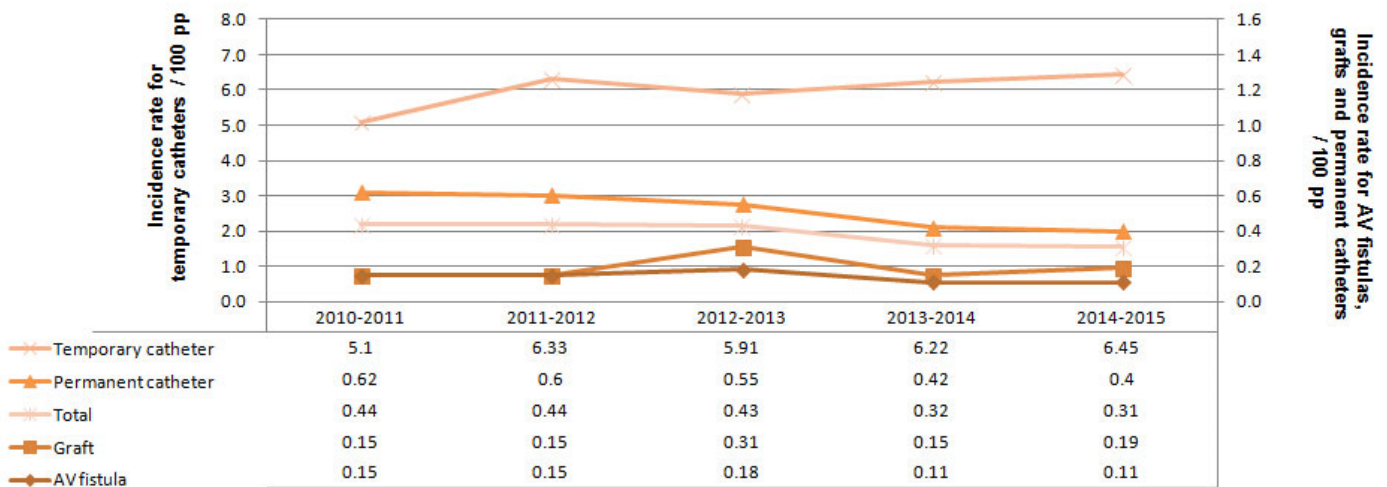


Table 2 - VARBSI Incidence Rates by Type of Vascular Access, Québec, 2010-2014 and 2014-2015 (Incidence Rate per 100 Patient-periods and per 1,000 Vascular-Access Days [95% CI])

Type of Vascular Access	Incidence Rate/100 Patient-periods [95% CI]		Incidence Rate/1,000 Vascular-Access Days [95% CI]	
	2010-2014	2014-2015	2010-2014	2014-2015
AV fistula or graft	0.16 [0.13 ; 0.18]	0.10 [0.06 ; 0.14]	---	---
AV fistula	0.15 [0.13 ; 0.18]	0.09 [0.05 ; 0.13]	---	---
With buttonhole*	0.28 [0.16 ; 0.42]	0.20 [0.09 ; 0.34]	---	---
Without buttonhole*	0.02 [0.00 ; 0.05]	0.05 [0.02 ; 0.10]	---	---
Graft	0.19 [0.11 ; 0.29]	0.16 [0.04 ; 0.35]	---	---
Permanent or temporary catheter	0.59 [0.55 ; 0.64]	0.42 [0.35 ; 0.49]	0.21 [0.19 ; 0.23]	0.15 [0.12 ; 0.18]
Permanent catheter	0.53 [0.49 ; 0.57]	0.37 [0.31 ; 0.44]	0.19 [0.17 ; 0.20]	0.13 [0.11 ; 0.16]
Temporary catheter	5.52 [4.32 ; 6.87]	6.73 [3.75 ; 10.56]	1.96 [1.54 ; 2.45]	2.39 [1.33 ; 3.76]
Total	0.39 [0.37 ; 0.42]	0.28 [0.24 ; 0.32]	0.21 [0.19 ; 0.23]	0.15 [0.12 ; 0.18]

* Incidence rates for AV fistulas, with and without buttonhole, are limited to data from 2013-2014 and 2014-2015, as information on the use of the buttonhole technique was not collected before 2013-2014.

Figure 4 - VARBSI Incidence Rates by Type of Vascular Access, for Units Participating Since 2010-2011 (N = 28), Québec, 2010-2011 to 2014-2015 (Incidence Rate per 100 Patient-periods)



Despite recommendations to increase the use of fistulas, the proportion of patients who were receiving hemodialysis through a catheter, either temporary or permanent, increased in 2014–2015 compared to 2010–2014. However, the proportion of patients with a temporary catheter, which is the form of vascular access most likely to lead to a VARBSI, decreased significantly ($p < 0.01$).

Figure 5 - Time Trends in Patient-periods by Type of Vascular Access, for Units Participating Since 2010-2011 (N = 28), Québec, 2010-2011 to 2014-2015

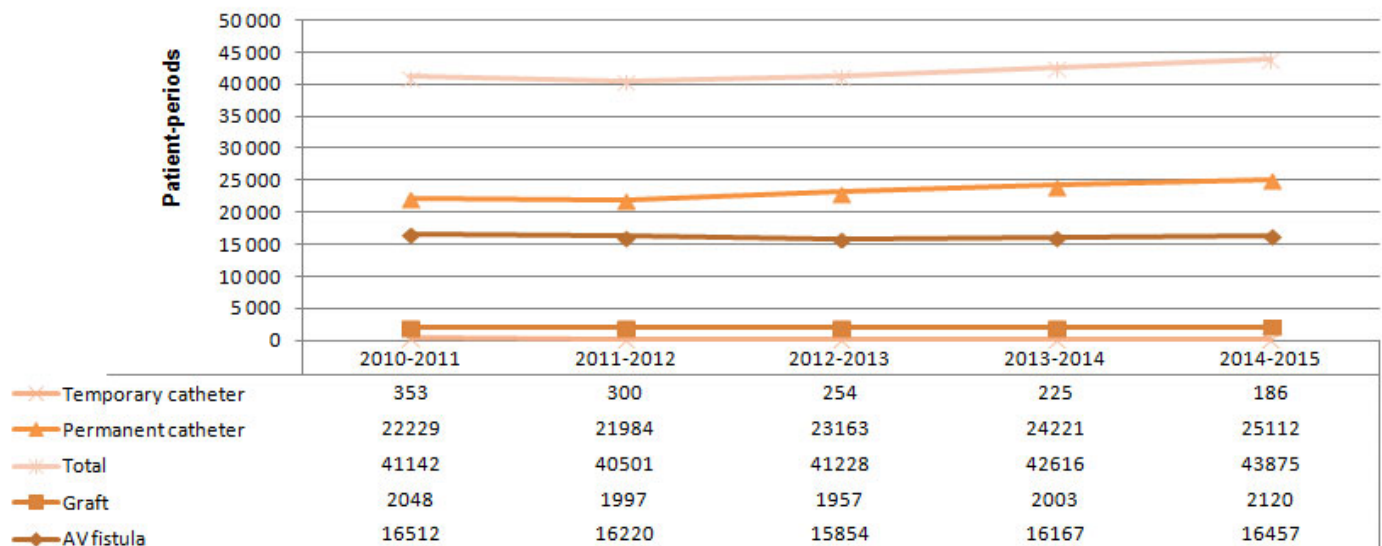


Table 3 - Breakdown of Patient-periods by Type of Vascular Access, 2010-2014 and 2014-2015 (%)

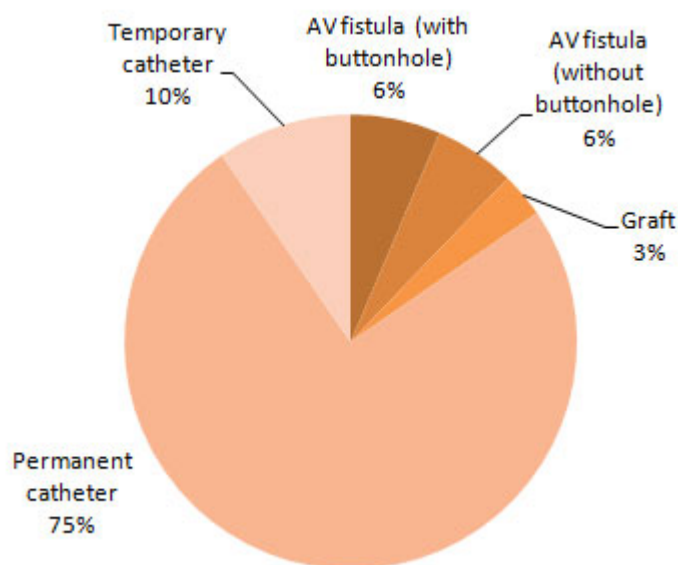
Type of Vascular Access	Québec (%)	
	2010-2014	2014-2015
AV fistula	40.6	38.8
With buttonhole	---	9.1
Without buttonhole	---	29.7

Graft	4.5	4.6
Permanent catheter	54.2	56.2
Temporary catheter	0.7	0.4
AV fistula or graft	45.1	43.4
Permanent or temporary catheter	54.9	56.6
Catheterized for < 90 days	-	-
Catheterized for ≥ 90 days	-	-
Total (N)	196,307	55,158

Description of cases

Patients who developed a VARBSI were aged between 0 and 95 years, with a median age of 68 years. The vast majority (85%, or 132 cases) of VARBSIs occurred in patients who received their hemodialysis treatment via catheter, even though they represented only 57% of the patient-periods monitored (Figures 2 and 6). For most of the cases that arose in patients receiving their hemodialysis through an AV fistula, the buttonhole technique was used (53%) even though this technique is used among 23% of patients with AV fistula.

Figure 6 - Breakdown of VARBSIs by Type of Vascular Access, Québec, 2014-2015 (N = 156)



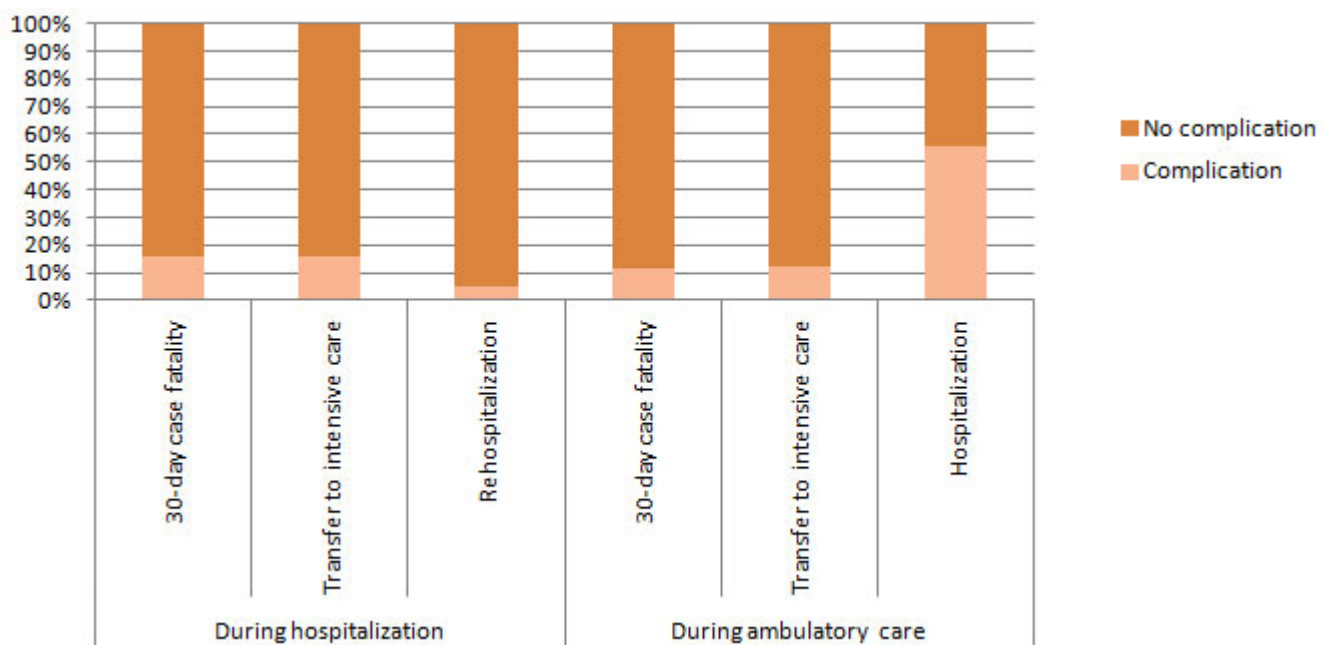
Overall, 12% of VARBSI cases resulted in death within 30 days following the onset of bacteriemia. Death occurred in 16% of cases of VARBSI among hospitalized patients (Table 4 and Figure 7), compared with 12% of cases among patients receiving ambulatory care ($p > 0.05$). A total of 55% of ambulatory patients who developed a VARBSI required hospitalization.

Table 4 - 30-Day Case Fatality, Percentage of Transfers to ICU and Percentage of

Hospitalizations and Rehospitalizations During a VARBSI Episode, by Origin of Acquisition, Québec, 2014-2015 (N, %)

Origin of Acquisition	Complication	Number of VARBSI Cases Monitored	Presence of Complication	
			N	%
During hospitalization	Death within 10 days	19	2	11
	Death within 30 days	19	3	16
	Transfer to ICU	19	3	16
	Rehospitalization	19	1	5
During ambulatory care	Death within 10 days	137	6	4
	Death within 30 days	137	16	12
	Transfer to ICU	136	17	13
	Hospitalization	137	76	55

Figure 7 - 30-Day Case Fatality, Percentage of Transfers to ICU and Percentage of Hospitalizations and Rehospitalizations During a VARBSI Episode, by Origin of Acquisition, Québec, 2014-2015 (%)

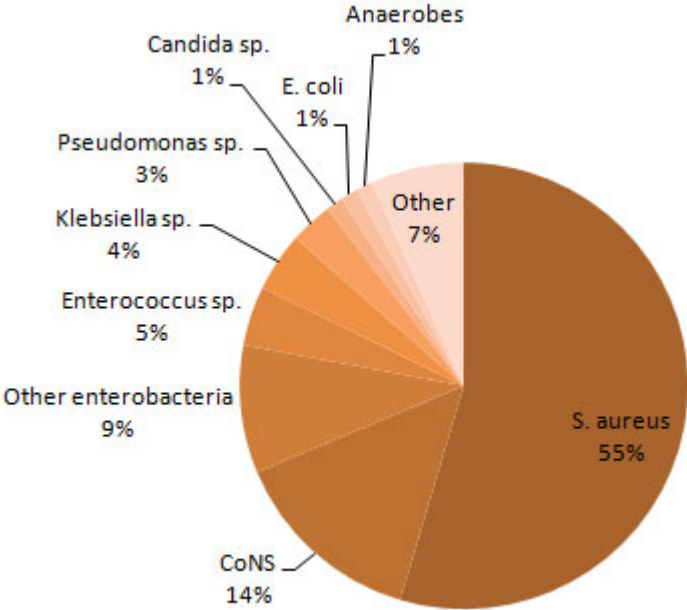


Microbiology

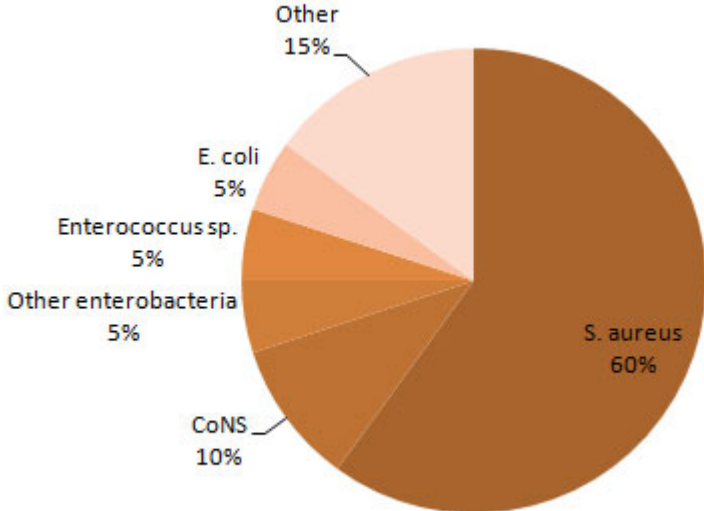
Figure 8 shows that *Staphylococcus aureus* was the most frequently isolated microorganism in all VARBSI cases (55%). It was followed by coagulase-negative *Staphylococcus* (CoNS, 14%) and other enterobacteria (other than *Escherichia coli* and *Klebsiella* sp., 9%). Six of the CoNS cases (n = 23) were *S. lugdunensis* and 8 were *S. epidermidis*. *S. aureus* was the most frequently isolated microorganism in cases resulting in death (60%).

Figure 8 - Categories of Isolated Microorganisms in All Reported Cases (N = 163) and Cases Resulting in Death Within 30 Days (N = 20), Québec, 2014-2015 (%)

Isolated Microorganisms—All Cases



Isolated Microorganisms—Death Within 30 Days



In 2014-2015, 15% of *S. aureus* strains were oxacillin-resistant, which is not significantly different compared with 2010-2014 percentage (Table 5 and Figure 8).

Table 5 - Percentage of Strains Tested and Percentage of Resistance to Antibiotics for Certain Isolated Microorganisms, Québec, 2014-2015 (N, %)

Microorganism	Antibiotic	Isolated	Tested	Resistant
		N	N %	N %

<i>Staphylococcus aureus</i>	Oxacillin	89	89	100.0	13	14.6
<i>Enterococcus faecium</i>	Vancomycin	2	2	100.0	1	50.0
<i>Enterococcus faecalis</i>	Vancomycin	5	5	100.0	0	0.0
<i>Klebsiella (pneumoniae/oxytoca)</i>	CSE 4	7	4	57.1	2	50.0
	Imipenem or meropenem	7	2	28.6	0	0.0
	Multiresistant 1	7	5	71.4	2	40.0
	CSE 4	2	2	100.0	0	0.0
<i>Escherichia coli</i>	Fluoroquinolones 3	2	2	100.0	1	50.0
	Imipenem or meropenem	2	2	100.0	0	0.0
	Multiresistant 1	2	2	100.0	0	0.0
	CSE 4	7	6	85.7	0	0.0
<i>Enterobacter sp.</i>	Imipenem or meropenem	7	3	42.9	0	0.0
	Multiresistant 1	7	7	100.0	0	0.0
	Amikacin, gentamicin or tobramycin	5	4	80.0	0	0.0
	CSE 2	5	5	100.0	0	0.0
<i>Pseudomonas sp.</i>	Fluoroquinolones 2	5	5	100.0	0	0.0
	Imipenem or meropenem	5	3	60.0	0	0.0
	Piperacillin/tazobactam	5	2	40.0	0	0.0
	Multiresistant 2	5	5	100.0	0	0.0
<i>Acinetobacter sp.</i>	Imipenem or meropenem	0	0	-	0	-
	Multiresistant 3	0	0	-	0	-

CSE 2: cefepime or ceftazidime.

CSE 4: cefepime, cefotaxime, ceftazidime or ceftriaxone.

Fluoroquinolones 2: ciprofloxacin or levofloxacin.

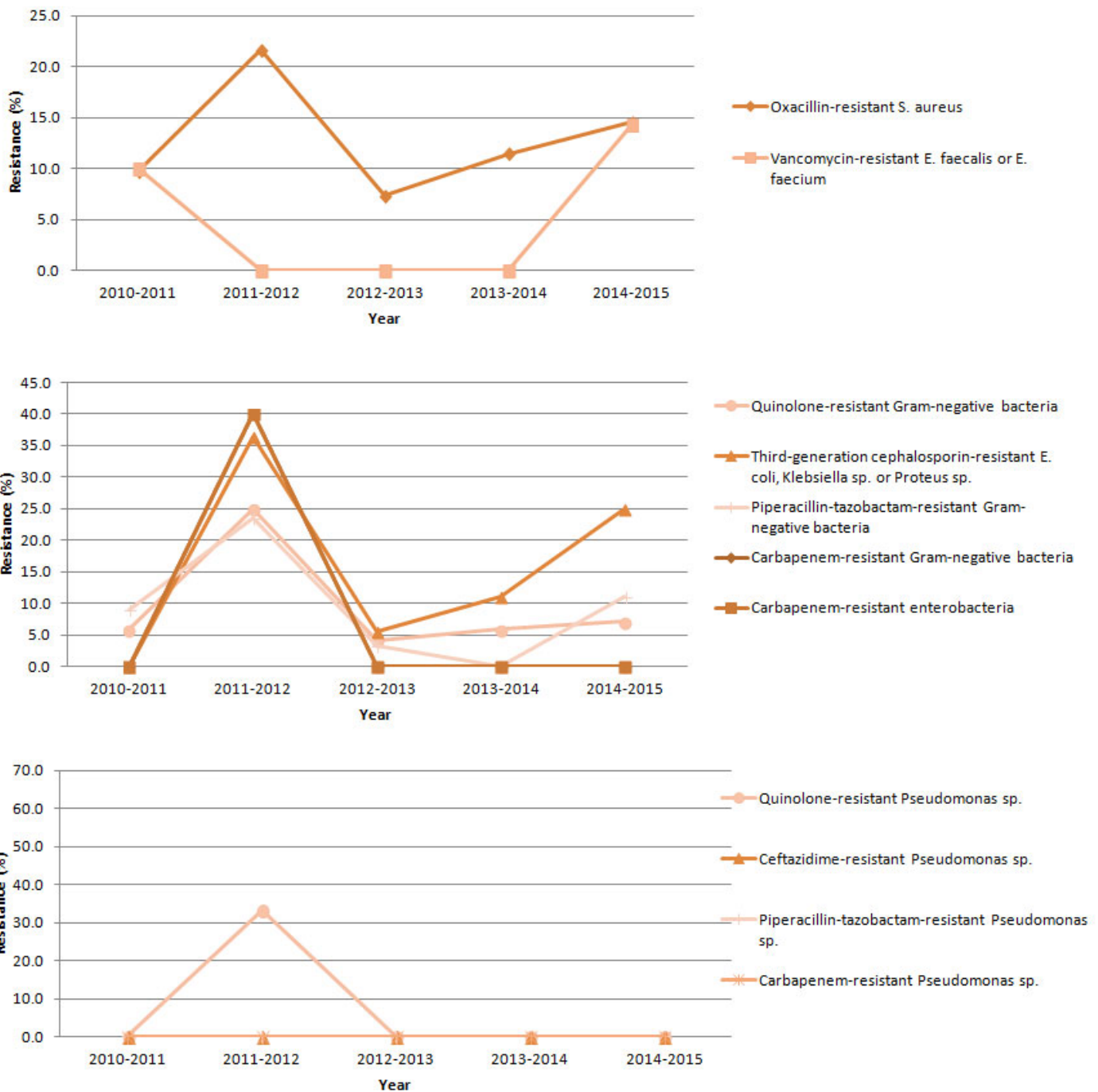
Fluoroquinolones 3: ciprofloxacin, levofloxacin or moxifloxacin.

Multiresistant 1: intermediate or resistant to an agent in three of the following five categories: cephalosporins 4, fluoroquinolones 3, aminoglycosides, carbapenems, piperacillin or piperacillin/tazobactam.

Multiresistant 2: intermediate or resistant to an agent in three of the following five categories: cephalosporins 2, fluoroquinolones 2, aminoglycosides, carbapenems, piperacillin or piperacillin/tazobactam.

Multiresistant 3: intermediate or resistant to an agent in three of the following six categories: cephalosporins 2, fluoroquinolones 2, aminoglycosides, carbapenems, piperacillin or piperacillin/tazobactam, ampicillin/sulbactam.

Figure 9 - Percentage of Antibiotic Resistance in Certain Gram-Positive Bacteria, Certain Gram-Negative Bacteria and *Pseudomonas sp.*, Québec, 2010-2011 to 2014-2015 (%)



Results per healthcare facility

Figures 10 and 11 show the breakdown of patient-periods monitored in 2014–2015, by type of vascular access and by healthcare facility. In 2014–2015, the percentage of fistulas decreased in 14 healthcare facilities and increased in 9 (Table 6). Seventeen facilities reported a rate of 0 VARBSI per 100 patient-periods, and 4 reported a rate higher than the 90th-percentile mark for 2010–2014 (Figure 12 and Table 7). Facilities with an incidence rate of 0 had small dialysis units of 4 to 12 chairs, except for two bigger units.

Figure 10 - Patient-periods Followed, by Healthcare Facility, Québec, 2014-2015 (%)

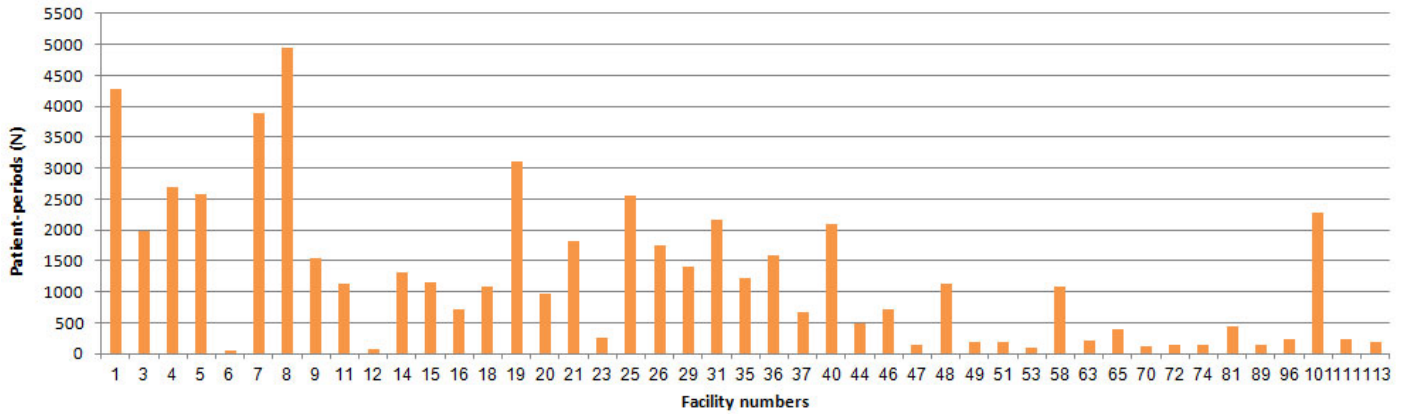


Figure 11 - Breakdown of Patient-periods Monitored by Type of Vascular Access and by Healthcare Facility, Québec, 2014-2015 (N)

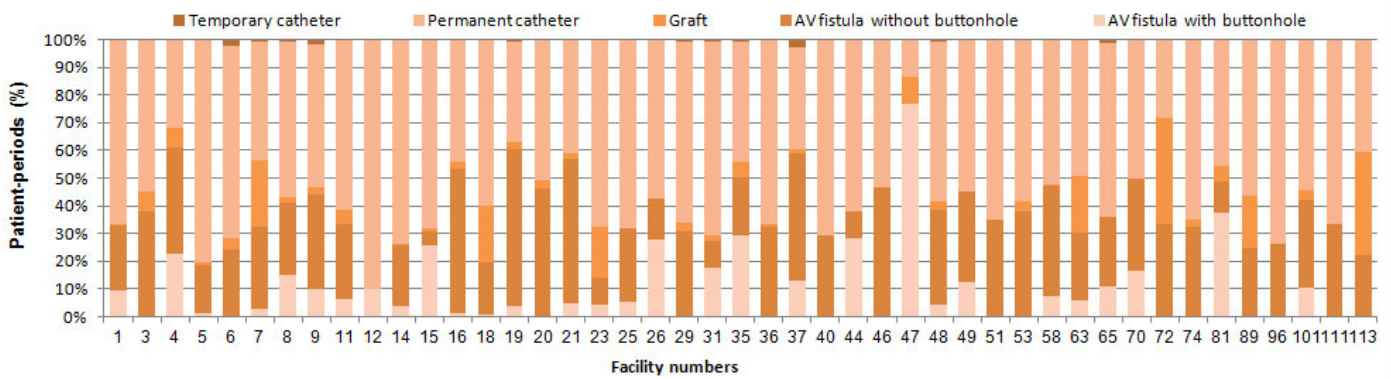


Figure 12 - VARBSI Incidence Rate per Healthcare Facility (2014-2015) and Incidence Rate Percentile (2010-2011 to 2013-2014), Québec, 2014-2015 (Incidence Rate per 100 Patient-periods)

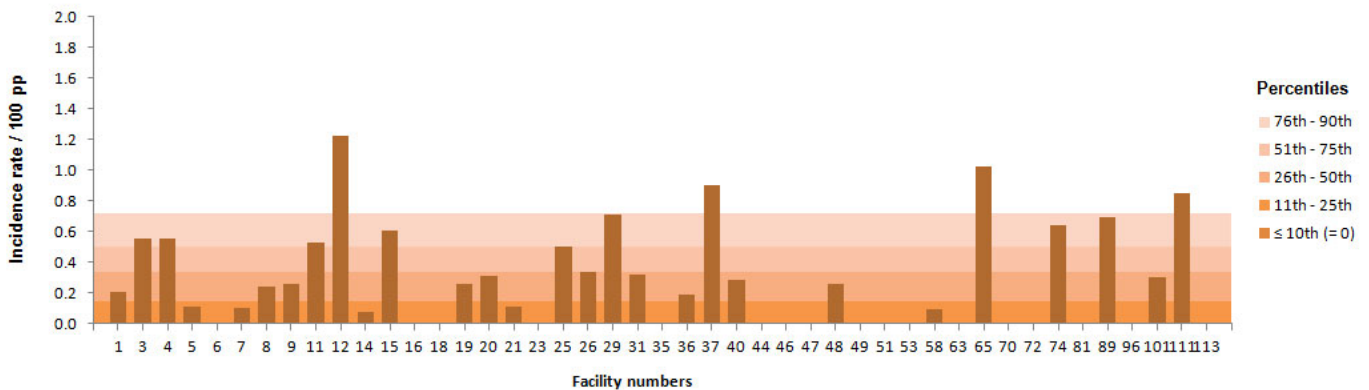


Table 6 - Number of Patient-periods Monitored and Percentage of Fistulas, by Healthcare Facility, Québec, 2010-2014 and 2014-2015 (N, % [95% CI])

Facility	2010-2014		2014-2015		Variations (p < 0,05)
	Patient-periods (n)	% with fistula	Patient-periods (n)	% with fistula	
1					
3					
4					
5					
6					
7					
8					
9					
11					
12					
14					
15					
16					
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113					

1	HÔPITAL CHARLES LEMOYNE	15,800	47 [46 ; 48]	4,268	34 [32 ; 35]	decrease
3	HÔPITAL ROYAL VICTORIA	7,375	42 [41 ; 43]	1,970	45 [43 ; 48]	increase
4	HÔPITAL NOTRE-DAME DU CHUM	8,868	63 [62 ; 64]	2,689	68 [66 ; 70]	increase
5	HÔPITAL GÉNÉRAL JUIF	7,422	25 [24 ; 26]	2,572	20 [18 ; 21]	decrease
6	L'HÔPITAL DE MONTRÉAL POUR ENFANTS	178	24 [17 ; 30]	49	29 [16 ; 41]	
7	PAVILLON L'HÔTEL-DIEU DE QUÉBEC	14,458	52 [51 ; 53]	3,877	57 [55 ; 58]	increase
8	PAVILLON MAISONNEUVE/PAVILLON MARCEL-LAMOUREUX	19,080	49 [48 ; 49]	4,935	43 [42 ; 44]	decrease
9	HÔPITAL DU HAUT-RICHELIEU	5,517	44 [42 ; 45]	1,543	47 [44 ; 49]	increase
11	HÔPITAL PIERRE-LE GARDEUR	4,167	44 [43 ; 46]	1,136	39 [36 ; 41]	decrease
12	CENTRE HOSPITALIER UNIVERSITAIRE SAINTE-JUSTINE	240	21 [16 ; 26]	82	10 [3 ; 16]	decrease
14	CENTRE HOSPITALIER RÉGIONAL DE LANAUDIÈRE	4,727	26 [25 ; 27]	1,308	26 [24 ; 29]	
15	HÔPITAL FLEURIMONT	5,878	32 [31 ; 33]	1,150	32 [29 ; 35]	
16	HÔPITAL RÉGIONAL DE RIMOUSKI	2,472	59 [57 ; 61]	709	56 [52 ; 60]	
18	HÔTEL-DIEU DE LÉVIS	4,008	48 [46 ; 49]	1,097	40 [37 ; 43]	decrease
19	HÔPITAL CITÉ DE LA SANTÉ	8,516	68 [67 ; 69]	3,102	63 [61 ; 65]	decrease
20	HÔPITAL DE CHICOUTIMI	3,978	61 [59 ; 62]	967	49 [46 ; 52]	decrease
21	HÔPITAL SAINT-LUC DU CHUM	5,465	62 [60 ; 63]	1,823	59 [57 ; 61]	
23	HÔTEL-DIEU D'ARTHABASKA	1,338	38 [35 ; 40]	267	33 [27 ; 38]	
25	HÔPITAL DU SACRÉ-COEUR DE MONTRÉAL	8,475	28 [27 ; 28]	2,563	32 [30 ; 34]	increase
26	HÔPITAL DE VERDUN	6,409	49 [48 ; 51]	1,754	43 [40 ; 45]	decrease
29	HÔPITAL GÉNÉRAL DE MONTRÉAL	6,084	32 [30 ; 33]	1,407	34 [32 ; 37]	
31	PAVILLON SAINT-JOSEPH	8,192	28 [27 ; 29]	2,157	29 [28 ; 31]	

35	HÔPITAL HONORÉ-MERCIER	3,014	51 [50 ; 53]	1,229	56 [53 ; 59]	increase
36	HÔPITAL GÉNÉRAL DU LAKESHORE	4,742	39 [37 ; 40]	1,587	33 [31 ; 36]	decrease
37	HÔTEL-DIEU DE SOREL	2,422	54 [52 ; 56]	662	60 [57 ; 64]	increase
40	HÔPITAL DE HULL	9,319	31 [30 ; 31]	2,105	29 [27 ; 31]	
44	HÔPITAL SAINTE-CROIX	2,014	43 [40 ; 45]	494	38 [34 ; 42]	
46	HÔPITAL DE GRANBY	1,795	56 [54 ; 58]	714	47 [43 ; 51]	decrease
47	HÔPITAL DE ROUYN-NORANDA	795	65 [62 ; 69]	134	87 [81 ; 92]	increase
48	CENTRE HOSPITALIER DE ST. MARY	4,086	44 [43 ; 46]	1,137	42 [39 ; 45]	
49	CENTRE DE SANTÉ ET DE SERVICES SOCIAUX MEMPHRÉMAGOG	566	48 [44 ; 52]	195	45 [38 ; 52]	
51	HÔPITAL DE MANIWAKI	624	36 [32 ; 40]	199	35 [29 ; 42]	
53	HÔPITAL DE CHANDLER	-	-	103	42 [32 ; 51]	-
58	HÔPITAL DU SUROÏT	4,085	57 [56 ; 59]	1,095	48 [45 ; 51]	decrease
63	HÔPITAL DE SAINT-GEORGES	363	49 [44 ; 54]	213	51 [44 ; 57]	
65	HÔPITAL ET CLSC DE VAL-D'OR	1,204	51 [49 ; 54]	392	36 [31 ; 41]	decrease
70	CENTRE DE SOINS DE COURTE DURÉE LA SARRE	334	61 [56 ; 66]	110	50 [41 ; 59]	
72	HÔPITAL ET CENTRE D'HÉBERGEMENT DE SEPT-ÎLES	281	51 [45 ; 56]	153	72 [65 ; 79]	increase
74	HÔPITAL DE DOLBEAU-MISTASSINI	96	42 [32 ; 52]	155	35 [27 ; 42]	
81	HÔPITAL DE MONT-LAURIER	1,511	49 [47 ; 52]	453	55 [50 ; 59]	
89	HÔPITAL DE MONTMAGNY	-	-	144	44 [36 ; 52]	-
96	CENTRE DE SANTÉ DE CHIBOUGAMAU	729	37 [34 ; 41]	238	26 [20 ; 32]	decrease
101	HÔPITAL RÉGIONAL DE SAINT-JÉRÔME	9,269	44 [43 ; 45]	2,280	46 [43 ; 48]	
111	HÔPITAL DE PAPINEAU	-	-	235	34 [28 ; 40]	-
113	HÔPITAL DE THETFORD MINES	411	59 [54 ; 64]	188	60 [53 ; 67]	

Table 7 - Number of VARBSI Cases and Incidence Rate by Healthcare Facility, and Percentile Ranking, Québec, 2010-2014 and 2014-2015 (Incidence Rate per 100 Patient-periods [95% CI])

Facility	2010-2014*			2014-2015	
	Number of cases	Mean number of cases per year	Rate/100 pp	Number of cases	Rate/100 pp
1 HÔPITAL CHARLES LEMOYNE	42	10.5	0.27 [0.19 ; 0.35]	9	0.21 [0.10 ; 0.37]
3 HÔPITAL ROYAL VICTORIA	43	10.8	0.58 [0.42 ; 0.77]	11	0.56 [0.28 ; 0.94]
4 HÔPITAL NOTRE-DAME DU CHUM	39	9.8	0.44 [0.31 ; 0.59]	15	0.56 [0.31 ; 0.88]
5 HÔPITAL GÉNÉRAL JUIF	14	4.7	0.19 [0.10 ; 0.30]	3	0.12 [0.02 ; 0.29]
6 L'HÔPITAL DE MONTRÉAL POUR ENFANTS	1	0.3	0.56 [0.00 ; 2.20]	0	0.00
7 PAVILLON L'HÔTEL-DIEU DE QUÉBEC	57	14.3	0.39 [0.30 ; 0.50]	4	0.10 [0.03 ; 0.23]
8 PAVILLON MAISONNEUVE/PAVILLON MARCEL-LAMOUREUX	85	21.3	0.45 [0.36 ; 0.55]	12	0.24 [0.13 ; 0.40]
9 HÔPITAL DU HAUT-RICHELIEU	34	8.5	0.62 [0.43 ; 0.84]	4	0.26 [0.07 ; 0.58]
11 HÔPITAL PIERRE-LE GARDEUR	22	5.5	0.53 [0.33 ; 0.77]	6	0.53 [0.19 ; 1.04]
12 CENTRE HOSPITALIER UNIVERSITAIRE SAINTE-JUSTINE	12	3.0	5.00 [2.57 ; 8.23]	1	1.22 [0.00 ; 4.78]
14 CENTRE HOSPITALIER RÉGIONAL DE LANAUDIÈRE	15	3.8	0.32 [0.18 ; 0.50]	1	0.08 [0.00 ; 0.30]
15 HÔPITAL FLEURIMONT	26	6.5	0.44 [0.29 ; 0.63]	7	0.61 [0.24 ; 1.14]
16 HÔPITAL RÉGIONAL DE RIMOUSKI	7	1.8	0.28 [0.11 ; 0.53]	0	0.00
18 HÔTEL-DIEU DE LÉVIS	8	2.0	0.20 [0.09 ; 0.36]	0	0.00
19 HÔPITAL CITÉ DE LA SANTÉ	20	6.7	0.23 [0.14 ; 0.35]	8	0.26 [0.11 ; 0.47]
20 HÔPITAL DE CHICOUTIMI	12	3.0	0.30 [0.16 ; 0.50]	3	0.31 [0.06 ; 0.76]

21	HÔPITAL SAINT-LUC DU CHUM	30	10.0	0.55 [0.37 ; 0.76]	2	0.11 [0.01 ; 0.31]
23	HÔTEL-DIEU D'ARTHABASKA	4	1.0	0.30 [0.08 ; 0.66]	0	0.00
25	HÔPITAL DU SACRÉ-COEUR DE MONTRÉAL	43	10.8	0.51 [0.37 ; 0.67]	13	0.51 [0.27 ; 0.82]
26	HÔPITAL DE VERDUN	24	6.0	0.37 [0.24 ; 0.54]	6	0.34 [0.12 ; 0.67]
29	HÔPITAL GÉNÉRAL DE MONTRÉAL	27	6.8	0.44 [0.29 ; 0.63]	10	0.71 [0.34 ; 1.22]
31	PAVILLON SAINT-JOSEPH	27	6.8	0.33 [0.22 ; 0.47]	7	0.32 [0.13 ; 0.61]
35	HÔPITAL HONORÉ-MERCIER	16	5.3	0.53 [0.30 ; 0.82]	0	0.00
36	HÔPITAL GÉNÉRAL DU LAKESHORE	9	2.3	0.19 [0.09 ; 0.33]	3	0.19 [0.04 ; 0.46]
37	HÔTEL-DIEU DE SOREL	13	3.3	0.54 [0.28 ; 0.87]	6	0.91 [0.33 ; 1.78]
40	HÔPITAL DE HULL	32	8.0	0.34 [0.23 ; 0.47]	6	0.29 [0.10 ; 0.56]
44	HÔPITAL SAINTE-CROIX	7	1.8	0.35 [0.14 ; 0.65]	0	0.00
46	HÔPITAL DE GRANBY	6	2.0	0.33 [0.12 ; 0.66]	0	0.00
47	HÔPITAL DE ROUYN-NORANDA	1	0.3	0.13 [0.00 ; 0.49]	0	0.00
48	CENTRE HOSPITALIER DE ST. MARY	9	2.3	0.22 [0.10 ; 0.39]	3	0.26 [0.05 ; 0.65]
49	CENTRE DE SANTÉ ET DE SERVICES SOCIAUX MEMPHRÉMAGOG	1	0.3	0.18 [0.00 ; 0.69]	0	0.00
51	HÔPITAL DE MANIWAKI	3	1.0	0.48 [0.09 ; 1.18]	0	0.00
53	HÔPITAL DE CHANDLER	-	-	-	0	0.00
58	HÔPITAL DU SUROÛT	10	2.5	0.24 [0.12 ; 0.42]	1	0.09 [0.00 ; 0.36]
63	HÔPITAL DE SAINT-GEORGES	1	0.5	0.28 [0.00 ; 1.08]	0	0.00
65	HÔPITAL ET CLSC DE VAL-D'OR	5	1.7	0.42 [0.13 ; 0.86]	4	1.02 [0.27 ; 2.27]

70	CENTRE DE SOINS DE COURTE DURÉE LA SARRE	0	0.0	0.00	0	0.00
72	HÔPITAL ET CENTRE D'HÉBERGEMENT DE SEPT-ÎLES	1	0.3	0.36 [0.00 ; 1.40]	0	0.00
74	HÔPITAL DE DOLBEAU-MISTASSINI	0	0.0	0.00	1	0.65 [0.00 ; 2.53]
81	HÔPITAL DE MONT-LAURIER	2	0.5	0.13 [0.01 ; 0.38]	0	0.00
89	HÔPITAL DE MONTMAGNY	-	-	-	1	0.69 [0.00 ; 2.72]
96	CENTRE DE SANTÉ DE CHIBOUGAMAU	0	0.0	0.00	0	0.00
101	HÔPITAL RÉGIONAL DE SAINT-JÉRÔME	63	15.8	0.68 [0.52 ; 0.86]	7	0.31 [0.12 ; 0.58]
111	HÔPITAL DE PAPINEAU	-	-	-	2	0.85 [0.08 ; 2.44]
113	HÔPITAL DE THETFORD MINES	3	1.5	0.73 [0.14 ; 1.79]	0	0.00

Facility	2010-2014*		2014-2015		
	Number of cases	Mean number of cases per year	Rate/100 pp	Number of cases	Rate/100 pp
10th			0.00		0.00
25th			0.15		0.00
50th			0.34		0.19
75th			0.50		0.51
90th			0.72		0.70

* Changes in rates within individual facilities were not subjected to statistical analysis, given the small number of cases involved.

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[1] <http://www.fistulafirst.org/AboutFistulaFirst/FisultaFirstCatheterLastFFCLData.aspx>

[2] http://cclin-sudest.chu-lyon.fr/Reseaux/DIALIN/Resultats/rapport_annuel_2011_V2.pdf

[3] <https://www.inspq.qc.ca/en/file/10885/download?token=XZyItbVE>