Physician Survey on Knowledge and Reporting Practices of Transfusion-transmitted Infections in Canada

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ABSTRACT

Objective: To assess physicians' knowledge and reporting practices of transfusion-transmitted infections (TTI).

Design: Cross-sectional postal survey.

Target population: Family physicians and specialists.

Methods: A survey questionnaire was sent by mail to 1,359 randomly selected physicians across Canada, and was followed up by a reminder telephone call.

Results: A total of 546 (40%) physicians completed and returned the questionnaire. The data from 512 eligible practitioners across Canada were analyzed. Almost all physicians were knowledgeable on the transmission of HIV, HBV and HCV through blood and plasma derivatives. However, physicians' knowledge, particularly the family physicians', was generally lower for less well-known TTIs. For example, only 7.2% of family physicians recognized Babesiosis as a TTI. Of the total 318 physicians who have encountered patients with possible TTI, 50% of them reported such cases to public health or other authorities and many reported to more than one organization. Of the total 159 non-reporting physicians, 91.1% explained that the cases were already reported by laboratories or other physicians. More than 90% of respondents think that it is important or very important that physicians report the cases of TTI to public health authorities for the purpose of surveillance, and more than 80% of them think that it is important or very important to include TTI as a separate entity in the communicable diseases surveillance systems.

Conclusion: The majority of physicians recognize the more common TTIs and only 50% of them reported such cases. The majority of physicians support the reporting of TTI to public health authorities for surveillance. Recommendations are made to increase physicians' knowledge and reporting of TTI.

La traduction du résumé se trouve à la fin de l'article.

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In the late 1970s through the 1980s, thousands of recipients of blood and blood products were infected by transfusion-transmitted human immunodeficiency virus (HIV) and hepatitis C virus (HCV).¹

Today, due to ongoing application of improved screening tests for transfusion-transmitted infections, Canada's blood supply is very safe. However, blood transfusion still carries some risk of transmission of infections to the recipients of blood and plasma derivatives.²⁻⁹ Also, the risk of emerging pathogens will be a continuing challenge to the safety of blood, as recently evidenced by the transmissibility of West Nile Virus through blood.^{9,10}

Justice Krever indicated in the Report of the Commission of Inquiry on the Blood System¹ that the public health system has an important role in the safety of the blood supply through surveillance of infectious diseases transmitted by blood/blood products. He further expressed that the success of such a surveillance system greatly depends on physicians' reporting of such incidences to public health authorities and recommended that reporting of such cases should include the means of transmission.

Since the accuracy and completeness of a surveillance system depends on physicians' reporting, we conducted a survey of physicians in Canada to compile basic information on physicians' knowledge and their current reporting practices of transfusion-transmitted infections (TTI), and to identify their reasons for not reporting such cases. To our knowledge, no similar study has been conducted in Canada. The results obtained from this survey could be used, in the future, for development of any enhanced surveillance system for TTIs.

METHOD AND MATERIAL

This study was undertaken in February 2002 and included a sample of family physicians and specialists who were members of the College of Family Physicians of Canada and the fellows of the Royal College of Physicians and Surgeons of Canada respectively; who were likely to have encountered possible cases of transfusion-transmitted infections (TTI); and who were practising medicine at the time of the survey.

The required sample size for the survey was based on an estimation of the propor-

TABLE I
Characteristics of Physicians Surveyed

	Total
Specialty	
FP	221 (43.2)
GE/HEP	141 (27.5)
HEM/TM	104 (20.3)
ID	46 (9.0)
Practice setting	
Outpatient	135 (26.4)
Hospital	211 (41.2)
Both	166 (32.4)
Length of practice	
<5 years	99 (19.4)
5-15 years	204 (40.0)
>15 years	207 (40.6)
Gender	
Male	307 (60.0)
Female	205 (40.0)

Note: Data are no. (%) of physicians.
FP, family physicians; GE, gastroenterologist;
HEP, hepatologist; HEM, hematologist; TM,
transfusion medicine; ID, infectious disease

tion of physicians who would ask for the history of transfusion when they meet a patient infected with a blood-borne pathogen. This parameter was estimated based on expert opinions. It was determined that a sample size of 896 was needed to determine physicians' knowledge of TTI of 30% $\pm$ 3% within a 95% confidence interval, however, the questionnaire was sent to 1,359 physicians to compensate for an estimated 35% non-response rate.

Family physicians, hematologists, hepatologists, gastroenterologists, and infectious disease specialists across Canada were selected randomly to obtain a representative sample of Canada's physicians.

A bilingual questionnaire with 25 questions was developed to collect information on physicians' knowledge and reporting practices of TTI. (Questionnaire available from corresponding author upon request.) Subsequently, many professional societies and other relevant groups were consulted for their input to this survey. After pilot testing and revising, the questionnaires were mailed to 560 family physicians and 799 specialists with a cover letter explaining the study, as well as a postage-paid reply envelope. The cover letter also included the definition of blood, plasma derivatives, blood-borne pathogens, possible and confirmed transfusion-transmitted infections and the traceback investigation. (List of definitions available from corresponding author upon request.)

The questionnaires were followed up with a reminder telephone call, and a second questionnaire was mailed upon

TABLE II
Knowledge of Physicians on Transfusion-transmitted Infections

	Specialty					Total	p-value
	GE/HEP N=141	HEM/TM N=104	ID N=46	All Specialist N=291	FP N=221	N=512	
HIV	141(100)	104(100)	46(100)	291(100)	221(100)	512(100)	
HCV	141(100)	104(100)	46(100)	291(100)	221(100)	512(100)	
HBV	137(97.2)	104(100)	46(100)	287(98.6)	218(98.6)	505(98.6)	0.7
CMV	125(88.7)	103(99)	46(100)	274(94.2)	142(64.3)	416(81.3)	<0.01*
HTLV-I	97(68.8)	103(99)	45(97.8)	245(84.2)	165(74.7)	410(80.1)	0.01*
HTLV-II	93(66)	99(95.2)	44(95.7)	236(81.1)	163(73.8)	399(77.9)	0.08
HAV	33(23.4)	53(51)	23(50)	109(37.5)	42(19)	151(29.5)	0.02*
HGV	92(65.2)	75(72.1)	34(73.9)	201(69.1)	88(39.8)	289(56.4)	<0.01*
PV-B19	33(23.4)	78(75)	30(65.2)	141(48.5)	47(21.3)	188(36.7)	<0.01*
Malaria	93(66)	92(88.5)	46(100)	231(79.4)	135(61.1)	166(71.5)	<0.01*
Chagas	39(27.7)	77(74)	39(84.8)	155(53.3)	31(14.0)	186(36.3)	<0.01*
Babesiosis	26(18.4)	70(67.3)	40(87)	136(46.7)	16(7.2)	152(29.7)	<0.01*

Note: Data are no. (%) of physicians. FP, family physicians; GE, gastroenterologist; HEP, hepatologist; HEM, hematologist; TM, transfusion medicine; ID, infectious disease

* Statistical significance between all specialists vs. family physicians

TABLE III
Characteristics of Physicians Surveyed by Reporting Practice*

	Reporting Physicians n=159	Non-reporting Physicians n=159	Total	OR (95% CI)†
Specialty				
FP	39 (40.2)	58 (59.8)	97	
Specialists	120 (54.3)	101 (45.7)	221	1.8 (1.1, 2.9)
Practice setting				
Outpatient	22 (35.5)	40 (64.5)	62	
Hospital	88 (57.9)	64 (42.1)	152	2.5 (1.3, 4.8)
Length of practice				
≤15 years	71 (40.6)	104 (59.4)	175	
>15 years	88 (62.0)	54 (38.0)	142	2.4 (1.5, 3.8)
Gender				
Male	107 (51.4)	101 (48.6)	208	
Female	52 (47.3)	58 (52.7)	110	1.2 (0.7, 1.9)

Note: Data are no. (%) of physicians. FP, family physicians; GE, gastroenterologist; HEP, hepatologist; HEM, hematologist; TM, transfusion medicine; ID, infectious disease

* Physicians who reported they have never had patients with possible TTI were excluded from the reporting practices analysis, but later were included for the analysis of opinion questions

† Odds ratios are all specialists vs. FP, hospital vs. outpatient setting, length of practice >15 years vs. ≤15 years, and male vs. female

TABLE IV
Reporting of Possible Cases of TTI to Organizations

	Reporting Physicians				
	Total No.	Reporting to Single Organization	Reporting to Multiple Organizations	Public Health†	Blood Manufacturer‡
FP	39	29 (74.4)	10 (25.6)	33 (84.6)	7 (17.9)
Specialists	120	56 (46.7)	64 (53.3)	85 (70.8)	48 (40)
P value		0.002	0.002	NS	0.01

Note: Data are no. (%) of physicians.

* Some respondents reported to more than one organization, therefore the sum is larger than 100%

† Includes local/regional/provincial public health authorities

‡ Includes blood suppliers and manufacturers of plasma derivatives

§ Includes hospital blood banks and hospital infection control authorities

|| Not statistically significant

request. The questionnaire asked physicians about their knowledge of transfusion-transmitted infections and their reporting practices of possible cases of TTI, including reasons for not reporting cases. It also explored their opinion on the importance of reporting possible cases of TTI to public health for surveillance and to the blood-

supplying agencies for confirmation of cases by traceback investigations. The questionnaire also included demographic questions about sex, specialty, primary practice, number of years in practice and the province of practice.

The SPSS version 10.0 and Epi-Info version 6.04 statistical softwares were used to

TABLE V

Physicians Reporting Practice and Reasons for Not Reporting Possible Cases of TTI by Provinces

Province of Practice	Reporting Physicians	Non-reporting Physicians	Reporting to At Least One PH*	Reasons for Not Reporting Possible TTI Cases†			
				Reported by Other Professionals‡	Barriers§	Perceived as Not Necessary/Important	No Specific Reason
Eastern Prov.	13 (44.8)	16 (55.2)	11 (84.6)	16 (100)	1 (6.2)	0 (0.0)	0 (0.0)
QC	44 (71)	18 (29.0)	31 (70.5)	17 (94.4)	4 (22.2)	0 (0.0)	0 (0.0)
ON	57 (46.3)	66 (53.6)	46 (80.7)	59 (89.4)	8 (12.1)	8 (12.1)	2 (3.0)
MB/SK	4 (23.5)	13 (76.5)	3 (75.0)	11 (84.6)	2 (15.4)	0 (0.0)	2 (15.4)
AB	18 (47.4)	20 (52.6)	15 (83.3)	17 (85)	6 (30)	2 (10)	1 (5.0)
BC	23 (46.9)	26 (53.1)	12 (52.2)	23 (88.5)	4 (15.4)	0 (0.0)	2 (7.7)
Total	159 (50.0)	159 (50.0)	118 (74.2)	143 (89.9)	25 (15.7)	10 (6.3)	7 (4.4)

Note: Data are no. (%) of physicians.

* PH = public health authorities and includes local, regional and provincial public health

† Some respondents selected more than one reason, therefore the sum is more than 100%

‡ Includes laboratories, another physician, and diagnosed in another province

§ Includes do not know where to report and do not have time to report

|| statistically significantly different from the average proportion for total

TABLE VI

Physicians' Opinions on Reporting and Surveillance of Possible Cases of TTI

Opinion Questions	Physicians' Responses	
	No. (%)	
How important do you think it is to have policies/procedures from public health authorities or other relevant organizations for reporting of possible cases of TTI?	286 (56.7)	very important
	174 (34.5)	important
	34 (6.8)	somewhat important
	3 (0.6)	not important
	7 (1.4)	do not know
How important do you think it is that physicians report possible cases of TTI to public health authorities for surveillance purposes?	323 (63.7)	very important
	142 (28.0)	important
	31 (6.1)	somewhat important
	5 (1.0)	not important
	6 (1.2)	do not know
How important do you think it is that hospitals, blood banks and public health authorities report possible cases of TTI to blood-supplying agencies for the purpose of traceback investigation?	438 (85.7)	very important
	65 (12.7)	important
	4 (0.8)	somewhat important
	0 (0.0)	not important
	4 (0.8)	do not know
How important do you think it is that each possible case of TTI go under traceback investigation by blood-supplying agencies for confirmation?	400 (78.6)	very important
	90 (17.7)	important
	12 (2.3)	somewhat important
	0 (0.0)	not important
	7 (1.4)	do not know
How important do you think it is that blood-supplying agencies report the results of traceback investigation to public health authorities for surveillance purposes?	374 (73.3)	very important
	109 (21.4)	important
	16 (3.1)	somewhat important
	2 (0.4)	not important
	9 (1.8)	do not know
How important do you think it is to include TTI, as a separate entity, in the provincial/territorial and national notifiable diseases surveillance system?	228 (44.7)	very important
	186 (36.5)	important
	46 (9.0)	somewhat important
	22 (4.3)	not important
	28 (5.5)	do not know

perform descriptive and univariate analysis to determine physicians' knowledge of TTI and to compare frequency of physicians' characteristics among reporting and non-reporting physicians. For comparison of proportions, the χ^2 test or Fisher exact test (if the expected cell values were less than five) were used to determine the statistical significance.

RESULTS

Of the 1,359 questionnaires sent to physicians in Canada, 546 (40%) were returned. The provinces had similar response rates,

except for Quebec, which had a lower rate (32.5%). Of the total respondents, 34 (6%) did not meet the eligibility criteria and were excluded from the database.

Due to small numbers of physicians in Eastern provinces and some Western provinces, the data from these regions were analyzed collectively to keep the identity of all respondents confidential.

Data were analyzed from 512 eligible practitioners across Canada. Characteristics of physicians with regard to their specialty, practice setting, length of practice and gender are shown in Table I.

About 100% of family physicians and specialists recognized that HIV, HCV and HBV could be transmitted by transfusion of blood and plasma derivatives (Table II). With few exceptions, physicians' knowledge was generally lower for other transfusion-transmitted infections as compared with their knowledge of these well-known TTIs. Family physicians were even less aware of these TTIs than the specialists and the differences were, for the most part, statistically significant. Their knowledge of the transfusion transmissibility of Chagas disease was 14%, and only 7.2% of them recognized Babesiosis as a TTI.

About 99% of responders reported that they routinely ask for the history of blood transfusion when they encounter patients with blood-borne pathogens.

At the time of the survey, 318 of the surveyed physicians reported that in their practice, they had encountered patients with possible TTI, and 159 of them (50.0%) had reported these cases to relevant authorities/organizations for the purpose of surveillance or traceback investigation. Specialists, physicians who work primarily in hospitals and those with more than 15 years of experience were more likely to report the possible cases of TTI (Table III).

Reporting physicians reported the cases to a variety of organizations and many listed more than one organization (Table IV). Family physicians more frequently reported possible cases of TTI to a single organization and to public health organizations as compared to specialists.

On examining the physicians' reporting pattern and the reasons for not reporting in different provinces (Table V), it was

noticed that a high proportion of physicians in Quebec (71%) were among the reporting group ($p < 0.01$) while in Manitoba/Saskatchewan, 76.5% were non-reporting ($p < 0.05$). Among the non-reporting physicians, the reasons for not reporting cases varied and some selected more than one reason.

52.8% of reporting physicians and 18.5% of non-reporting physicians indicated they had been provided with policies/procedures from public health authorities or other relevant organizations for the reporting of possible cases of TTI with an odds ratio of 4.9 (95% CI 2.9-8.1).

Finally, all eligible survey physicians were asked their opinions on a number of questions related to reporting and surveillance of TTIs. The results are shown in Table VI.

88.3% of all respondents believed that physicians should be informed by the public health authorities or other relevant organizations about the result of traceback investigation after they report the possible cases of TTI. However, our survey showed that 42.1% of those who reported the cases had never been informed about the results.

DISCUSSION

Currently, most of the existing communicable diseases surveillance systems in Canada do not include all transfusion-transmitted infections, and for those that are reported, the means of transmission, i.e., blood transfusion, are not indicated.

From the comments received from the respondents, it seems that most physicians reported possible cases of TTI for the purpose of compensation programs and not necessarily as part of a systematic reporting for their surveillance.

Reporting of TTIs is unique and somewhat different from other infectious diseases and requires cooperation and collaboration of many parties. In addition to reporting of cases to public health authorities, there is also a need to report them to blood-supplying agencies for confirmation of route of transmission by traceback investigation. The result of such investigations could lead to prevention and control measures such as donor deferral, notification of recipients, and recall of suspect blood/plasma derivatives to prevent further spread of infectious diseases through blood transfusion.

The survey demonstrated that all physicians were aware of HIV, HCV and HBV as transfusion-transmitted infections (TTIs), but their knowledge was generally less for other TTIs. Increased physicians' knowledge of transmissibility of these infections through blood is crucial for the reporting and surveillance of these infections.

The data showed that reporting physicians reported the possible cases of TTI to up to 6 different organizations. This might be an indication that there is confusion on the part of physicians as to whom they should report the possible cases.

When asked the reason(s) for not reporting, the majority (91.1%) of non-reporting physicians responded that cases had been reported by another physician or by a laboratory, and some did not know where to report. It is important to note that, in general, the laboratory physicians are not aware of patients' risk factor profiles, including the history of transfusion. Therefore, even if the public health authorities receive the report of blood-borne pathogens from the laboratories, they need to further investigate and extract the history of transfusion from the treating physicians.

The survey data showed that the majority of physicians (more than 80%) think it is very important or important that physicians report possible cases of TTI to public health for surveillance purposes, and that TTIs be included as a separate entity in the provincial/territorial/national notifiable diseases surveillance systems. These results indicate that most Canadian physicians would comply with the reporting of possible cases of TTI if there were a surveillance system in place.

In conclusion, the physicians were not aware of all transfusion-transmitted infections, only half of them reported possible cases of TTI, and over 90% of physicians think that it is important or very important to report TTI cases to public health authorities for surveillance purposes.

RECOMMENDATIONS

In order to improve surveillance of TTI and in the light of the survey findings, the following recommendations are proposed:

- Physicians need to be educated on all transfusion-transmitted infections and

the importance of reporting through medical school curricula or continuing medical education (CME).

- All practising physicians, regardless of their practice setting, should report without delay possible cases of TTI to their local public health authorities.
- The local public health authorities should put in place a strategy for immediate reporting of these cases to blood-supplying agencies for traceback investigation to confirm the route of transmission. This will prevent the overclassification of blood-borne infections under the TTI category.
- Physicians need to be provided with a clear guideline that includes a national standard case definition for TTI surveillance, and standard procedures for reporting mechanism and flow of information among all involved parties.
- Current communicable disease surveillance systems at the provincial/territorial and national level should include history of transfusion as a risk factor for TTIs.
- The blood-supplying agencies should report the results of traceback investigation to local public health authorities for surveillance purposes, and to the reporting physicians.

LIMITATIONS

The initial sample size for this survey was estimated to be 899; this was based on a much lower estimated proportion of physicians who would inquire about history of transfusion as one of the risk factors for blood-borne pathogens. However, the results of the survey showed that the majority of responding physicians reported that they routinely ask for the history of transfusion. Therefore, the number of responding physicians ($n=512$) provided sufficient statistical power to allow for a meaningful analysis of the data.

The low response rate of this survey (40%) might have introduced bias if there were significant differences between respondents and non-respondents with regard to their knowledge and reporting practices of TTIs. For example, if lack of knowledge or reporting of TTIs resulted in non-response, the results would represent those physicians who are better informed and have a more positive attitude towards reporting of TTIs.

In spite of these limitations, the results of this survey and its recommendations could provide useful baseline information for development of any enhanced surveillance system for TTIs in the future.

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RÉSUMÉ

Objectif : Évaluer la connaissance des infections transmises par transfusion (ITT) chez les médecins, ainsi que leurs méthodes de déclaration des ITT.

Formule : Enquête postale transversale.

Population cible : Médecins de famille et spécialistes.

Méthode : Nous avons posté un questionnaire d'enquête à 1 359 médecins sélectionnés au hasard dans tout le Canada, puis effectué un rappel par téléphone.

Résultats : En tout, 546 médecins (40 %) ont rempli et retourné le questionnaire. Nous avons analysé les données des 512 praticiens qui répondaient aux critères. Presque tous étaient bien renseignés sur la transmission du VIH, du VHB et du VHC par les dérivés du sang et du plasma, mais les connaissances des médecins (surtout des médecins de famille) étaient généralement plus faibles en ce qui concerne les ITT relativement rares. Par exemple, seuls 7,2 % des médecins de famille ont reconnu la babésiose parmi les ITT. Des 318 médecins qui avaient vu des patients possiblement atteints d'une ITT, 50 % avaient déclaré ces cas aux autorités de santé publique ou à d'autres autorités, et beaucoup les avaient déclarés à plusieurs organismes. Des 159 médecins n'ayant pas déclaré ces cas, 91,1 % ont expliqué que les cas avaient déjà été déclarés par des laboratoires ou par d'autres médecins. Plus de 90 % des répondants considéraient qu'il était important ou très important que les médecins déclarent les cas d'ITT aux autorités de santé publique à des fins de surveillance, et plus de 80 % considéraient qu'il était important ou très important d'inclure les ITT séparément dans les systèmes de surveillance des maladies transmissibles.

Conclusion : En majorité, les médecins savent reconnaître les ITT les plus répandues, mais seulement 50 % en font la déclaration. La majorité des médecins appuient la déclaration des ITT aux autorités de santé publique à des fins de surveillance. Il est recommandé d'accroître les connaissances des médecins à l'égard des ITT et leurs taux de déclaration de ces infections.

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