REPORT NUMBER 2

Should the McGill University Health Centre initiate an antiviral treatment programme for patients with Chronic Hepatitis C?

A Technology Assessment

by

The Technology Assessment Unit (TAU)
of the McGill University Health Centre
(MUHC)

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This analysis was prepared for the Technology Assessment Unit (TAU) of the McGill University Health Centre (MUHC)

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Invitation. This document was designed to assist decision-making in the McGill University Health Center. Others are welcome to make use of it, preferably with acknowledgment. More important, to assist us in making our own evaluation, it would be *deeply appreciated* if potential users could inform us whether it has influenced policy decisions in any way, and even if it has not, whether it has been helpful in informing decision makers.

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Executive Summary

Recommendation

The TAU Committee recommends that the MUHC should initiate a program for the antiviral treatment of chronic HCV.

Background

Recent improvements in the treatment of hepatitis C have resulted in a higher cure rate and fewer side effects. There is at present a demand for the treatment of approximately 70 chronic hepatitis C patients, per year. This Technology Assessment was carried with the objective of helping the MUHC to decide whether a program for the antiviral treatment of chronic hepatitis C patients should be initiated or not. To estimate the effects of treatment it is first necessary to estimate the outcome of patients who remain untreated.

Outcome of Untreated HCV infection

Hepatitis C is caused by infection with the hepatitis C virus. Following infection there is an acute phase lasting approximately 50 days, after which approximately 15 % of patients recover completely, while in the remaining 85% the infection becomes chronic. Chronic hepatitis C is an insidious process. For many years it is without symptoms and patients may be unaware of being infected. Eventually, a proportion of these patients develops cirrhosis of the liver after which death from liver failure and liver cancer follow in the subsequent five to ten years. The objective of antiviral therapy is to eradicate the virus and arrest progression before cirrhosis has developed. No data are available on which to base estimates of the lifetime risk of cirrhosis in untreated patients with chronic hepatitis C. As a first approximation it is estimated that a population of the same age and gender makeup as that attending the hepatitis clinic would have a lifetime risk of developing cirrhosis of 38 % with upper and lower bounds of probability (PB) of 29%-60%.

Outcome with Treatment

In a mix of patients comparable to that of the hepatitis C clinic, with the same mix of genotypes, treatment can be expected to eliminate the virus and arrest the progression of disease in 60% of those treated. Mild treatment side effects can be experienced by 90% of patients. These may be sufficiently severe to cause treatment to be stopped or reduced in 10% and to cause 25% to be unable to work.

It is estimated that the treatment of 70 chronic hepatitis clinic patients will have the following outcomes:

- 16 patients (PB 12-25) would be cured by treatment.
- Between 8 and 21 patients would be relieved of symptoms of HCV infection.
- 43 would have to undergo a prolonged course of unnecessary therapy.
- 63 would experience unpleasant side effects of treatment.

Costs

The costs of concern are the direct costs to the MUHC of a programme to treat 70 patients per year;

- The costs to the MUHC would be approximately $111,782.
- To compare with this it is necessary to consider the cost of *not treating* the 16 (PB 12-25) individuals who, as a result of treatment, would *not develop* cirrhosis with subsequent decompensation, hepatoma and death. A conservative estimate of the potential cost to the MUHC of caring for such patients in their last 5 years of life is $972,080. Discounted over an average of 12 years at a rate of 3% per year = $681,797.
- The economic impact of $111,782 per year on the budget of the MUHC would be relatively small. Nevertheless, it would be some years, estimated on average to be 12, before any potential savings were realized. Presuming a fixed budget, the services of the MUHC would have to be diminished by this sum.

Cost-effectiveness

Very approximate estimates of the direct costs, from the point of view of society, (without allowing for the diminished quality of life in the last 5 years of those who die) suggest that the cost per life year gained by such a programme would be of the order of $3,681 or $6,821, discounted at 3% and 5% respectively.

Conclusion

An MUHC program for the antiviral treatment of 70 patients per year should prevent the development of cirrhosis, with subsequent hepatic failure or hepatoma followed by death of 16, and possibly as many as 25 individuals per year, and cost the MUHC approximately $111,782. After an uncertain interval of possibly 12 years, the money saved would considerably exceed the costs of the programme.

Introduction

On May 14, 2002, the Technology Assessment Unit (TAU) of the McGill University Health Center (MUHC) was requested by the Associate Director of Professional Services, Dr. Michel Marcil, "to undertake a review detailing the costs, benefits, complications and relevant ethical issues of instituting a comprehensive policy for the treatment of hepatitis C patients, and to formulate a recommendation for the MUHC on this issue". The issue arises because of the absence of nursing support for the HCV clinic. If the clinic is to be maintained, let alone expanded, new MUHC funds will have to be allocated for this purpose.

Background

At present the MUHC Hepatitis C (HCV) Clinic, situated at the Royal Victoria Hospital (RVH), has approximately 600 patients (anti HCV positive) enrolled, of whom approximately 130 have received treatment and 20 are currently under treatment. In the short term there is an immediate demand for the treatment of approximately 70 registered patients, awaiting treatment. Others have been told that no treatment is presently available [1].

In the long-term the demand may become much greater. It is estimated that approximately 0.8% Canadians [2], and between 40-50,000 Quebecers [3] are at present infected by the HC virus. In Montreal the prevalence has been estimated to be approximately 15 per thousand of population [4]. Many of the affected individuals are unaware that they are infected, or that effective treatment exists. Furthermore, the treatment regime that is about to be introduced has fewer side effects and results in more successful outcomes than the treatment that has been available up to now. As a result it is anticipated that the percentage of patients electing antiviral treatment will

increase. (See below). There is thus a potential for the demand to increase considerably in the future.

Medication is administered by subcutaneous injection and patients are managed as outpatients. However, there is a high incidence of side effects, and patients need careful monitoring with frequent clinic visits. To respond to Dr. Marcil's request it is necessary to consider the following issues:

- Efficacy. What are the net health benefits (beneficial health outcomes less side effects of treatment) to be expected from the treatment of chronic HC?
- Cost-effectiveness. What is the cost of achieving any health benefits there may be?
- Economic impact. What would be the total cost to the MUHC of offering HCV treatment?
- Other factors. What are the opportunity costs involved? Would this initiative be consistent with the mission of the MUHC? What are the ethical and legal issues?

The following report is a brief presentation of the available information that must be considered in evaluating these questions. It is prepared with the objective of assisting the MUHC to develop policy on this issue

Method

The medical literature was reviewed for relevant publications (see Appendix 1). Data concerning the present HC population enrolled in the MUHC clinic were prepared by Dr. Deschênes and his colleagues in the HCV clinic.

Efficacy

To arrive at an estimate of the benefits of treatment it is necessary to first estimate the health consequences of *not* treating individuals infected with HCV, and then to estimate the extent to which this might be changed by treatment.

The Natural History of HC Infection.

Hepatitis C is a slowly progressive disease caused by the hepatitis C virus. Until 10 years ago the major cause of infection was transfusion of contaminated blood. Present causes are needle sharing during intravenous drug use, nasal drug use, needlestick injury, acupuncture, tattooing, body piercing, mother to child transmission, and rarely sexual contact [3]. Amongst the clientele of the HCV clinic, the cause is unknown in approximately 25 % of these patients, most of whom are immigrants to Canada.

Acute phase. Following exposure, HCV RNA can be detected in blood within three weeks. After an average interval of 50 days (maximum 150 days), virtually all patients develop liver cell injury with elevation of serum alanine aminotransferase (ALT). The majority of these patients are asymptomatic, but 25-35% may develop malaise, weakness, and anorexia, and some may become jaundiced. Thereafter, in approximately 15 % of cases there is complete recovery, while in 85 %, HC infection becomes chronic [5].

Chronic phase. Chronic HC is "an insidious process, progressing, if at all, at a slow rate without symptoms or physical signs in the majority of patients during the first two decades of the infection. A small percentage of patients with chronic hepatitis C, perhaps fewer than 20%, develop nonspecific symptoms, including mild intermittent fatigue and malaise" [5]. In the experience of local hepatologists the proportion of chronic HC patients who are symptomatic is closer to 50 %[1]. There is also a degree of cognitive impairment that is unaccounted for by depression or fatigue [6]. *For purposes of the present study it will be assumed that 20%-50% of patients in the pre-cirrhotic stage of chronic HC are mildly symptomatic.*

Cirrhotic phase. The proportion of patients with chronic HC who develop hepatic cirrhosis is variable, and hard to determine from the literature. It varies with the population studied, the time since infection, how the disease was transmitted, and the prevalence of factors such as male gender, age at the time of infection, and alcohol consumption [7].

In order to estimate the impact of treatment it is first necessary to estimate the lifetime probability of HCV patients developing cirrhosis in the absence of specific treatment. However, the long-term outcome of such patients is unknown since no series has been followed for more than 20 years. The following estimates must therefore be considered a first approximation.

In a recent meta-analysis of the natural history of the disease, involving 57 studies and 18,821 patients [8], studies were divided into four categories:

1) Liver clinic series, consisting of cross sectional studies of individuals referred to specialist liver clinics.
2) Post transfusion cohorts, consisting of longitudinal studies of individuals with post-transfusion hepatitis.
3) Blood donor series, consisting of cross sectional follow-up studies of individuals diagnosed with chronic HCV infection at the time of blood donor screening.
4) Community-based cohorts, consisting of longitudinal community-based studies of patients followed up after acute infections due to various causes.

For each of these categories the authors estimated the percentage of patients with chronic HC who would progress to cirrhosis within 20 years after infection, standardized for a mean age at infection of 25 years, as follows: Liver clinic 23.7%, Post-transfusion 11.8%, Blood donor 7.4%, Community-based 5.8%.

Of these, the liver clinic series is the most comparable to the MUHC Hepatitis C Clinic. The latter is also a specialty center whose patients are almost all referred. At the time of

referral they were 64% male and their average age was 47 years. Their infections were attributable to blood transfusion in 40%, to intravenous drug use in 35%, to sexual contact in 4%, and was unknown in 26%[9]. Approximately 20 % were cirrhotic when referred [1]. By comparison, in the Liver clinic series in the meta-analysis of Freeman et al., the prevalence of cirrhosis by average age 45 was 23.7%. *For present purposes* it *will be assumed that on average, the cirrhosis rate 20 years after infection of a clientele comparable to that of the MUHC HC clinic will be 24%. For purposes of sensitivity analysis it will be assumed that this rate is unlikely to be lower than 18% or higher than 30% (the Probability Bounds, or PB).*

The average life expectancy of a Canadian population consisting of 64 % males, of average age 47 years is approximately 35 years. Assuming an exponential survival model where the hazard ratio for cirrhosis 20 years after infection is 24%, it can be predicted that approximately 38% of individuals of average age 47 years, would contract cirrhosis in their lifetime while the remainder would die of competing causes. Lower and upper bounds of 18% and 30% cirrhosis 20 years after infection would, based on an exponential model, translate to a lifetime incidence of cirrhosis of 29% and 46%, respectively. However, it is possible that an exponential model is inappropriate, and that the incidence of cirrhosis may accelerate with the passage of time. To allow for this possibility the upper bound of probability will be arbitrarily set at 60%. (There is no experience on which to base confident predictions). *Thus, the estimated lifetime risk of cirrhosis = 38% (PB 18%-60%).*

Decompensation. Even after histological cirrhosis has developed the majority of patients remain free of serious symptoms for several years before the onset of end-stage liver disease (decompensation) or hepatic carcinoma. The duration of this asymptomatic (or only mildly symptomatic) cirrhotic stage is variable. It appears to be unaffected by virologic factors, but is shorter with more advanced age at the time of infection, with male gender, with an immunosuppressed state [10], and with high levels of alcohol consumption [11]. In one study of 112 patients with compensated HCV cirrhosis, it was estimated that within 5 years decompensation would take place in 22.2%, and cancer of

the liver in 10.1% [12]. Once decompensated cirrhosis has developed, the five-year survival has been estimated at 50 % [5].

Based on the above, it will be assumed that of every 100 individuals enrolled in the MUHC HCV clinic who did not to receive antiviral treatment, 38%(PB 29%-60%) would develop cirrhosis during their lifetime. Thereafter, on average, one in five of these individuals would experience decompensated hepatic failure, and one in ten contract liver cancer, within the next five years.

In what percentage of individuals can these outcomes be avoided by treatment? For simplicity, let us estimate the percentage in whom cirrhosis can be prevented.

Treatment

Until recently routine treatment has consisted of interferon and ribavirin. However, a new formulation consisting of peginterferon and ribavirin is clearly superior, with a higher therapeutic response and fewer side effects [10]. The success of treatment is judged by the absence of detectable virus 24 weeks after therapy, referred to as a sustained viral response (SVR). Three trials reviewed in the recent NIH consensus conference gave consistent results. These suggest that a sustained viral response can be expected following treatment with this medication in approximately 44% of infections with genotype I, and in 80 % of infections involving genotypes 2 and 3 [10]. To judge from one published study, outcomes appear to have been judged on the basis of "intention to treat" and to include all patients who received at least one dose of medication [13].

An as yet unpublished randomized controlled trial of 1284 adults from 21 countries, (average age 42.4 years, 65% male), with chronic HCV, was reported at the Biennial Meeting of the International Association for the Study of the Liver in April 2002 by Shepherd et al [17]. In this study an SVR was obtained in 51% of genotype 1 infections after 48 weeks treatment (the SVR in patients who were already cirrhotic was slightly lower, 41%). The SVR in "genotype non-1" infections after 24 weeks treatment and was

78%. Though less well documented, the treatment response of genotype 4 appears to be comparable to genotype 1, and for this analysis will be considered as identical. *For the purposes of this study it will be assumed that a sustained viral response can be expected in 50% infections with genotypes 1 and 4, and in 80% infections with genotypes 2 and 3.*

The mix of patients in the Hepatitis C clinic at the RVH is as follows: 68% genotypes 1 and 4,and 32% genotypes 2 and 3 [9]. *Thus, in any mix of patients comparable to that in the MUHC HCV clinic, it can be expected that treatment will, on average, result in an SVR of 60%. (Probability bounds would be very close to this estimate).*

Furthermore there is increasing evidence that to achieve a sustained viral response can be considered close to achieving a "cure". In a series of 80 patients followed for an average of four years, serum HCV RNA remained undetectable in 96%, while there was "significant associated histological improvement" [15].

There is still uncertainty as to whether this treatment should be recommended for all cases of chronic HC who do not have important contraindications or confined to those patients who are at the greatest risk for progression to cirrhosis, i.e. those with a positive HCV RNA, and a liver biopsy with either portal or bridging fibrosis, and at least a moderate degree of inflammation and necrosis [5].

For purposes of this analysis it will be assumed that all chronic HC patients who do not have contraindications, will be offered this treatment, and those who accept, will receive this medication. *For the reasons stated above, it will be assumed that of 100 chronic HC patients who receive treatment, 60% will be restored to normal health with a normal life expectancy*.

Side Effects of Treatment

The side effects of peginterferon-ribavirin therapy, although milder than previous therapy, are significant and can be expected in approximately 90 % of patients treated.

They include influenza-like symptoms, hematologic abnormalities, and neuropsychiatric symptoms. According to the NIH consensus statement, symptoms are of sufficient severity to cause discontinuation of treatment in approximately 20% [10]. By contrast, in one reported series treatment was only discontinued in 2.6% while in a further 12% the dosage had to be reduced because of side effects [13]. In the European study [14] treatment was withdrawn in approximately 3.7 % due to "adverse events" and in between 1and 2 % due to the development of laboratory abnormalities. In the experience of the MUHC HCV clinic treatment has had to be discontinued because of side effects in approximately 10% of patients, while approximately 25% have had to stop working during treatment [1].

Outcomes of Treatment. Summary.

For the purposes of this assessment it will be assumed that the treatment of 100 chronic HC patients will have the following outcomes:

Of the 38(PB 29-60), who, untreated, would have developed cirrhosis
23 (60% of 38) would be cured by treatment (PB 17-36).
Of the 20-50 who would be symptomatic from chronic HCV infection,
12-30 (60%) would be relieved of symptoms.
Of the 62 who, even untreated would not have developed cirrhosis
all would receive a prolonged course of debilitating and unnecessary
therapy (PB 40 to71).
Of all of the 100 patients undergoing treatment,
90 would experience unpleasant and potentially dangerous side effects.
and ***25 of these would be unable to work.***
For genotypes 2 and 3(32%) treatment, and its side effects, will last for 24 weeks.
For genotype 1 and 4 (68%), there will be 50% responders (34 individuals), for whom treatment and side effects will last for 48 weeks.
For the 50% non-responders, treatment will be stopped at 12 weeks (see below).

Costs

Costs to MUHC

The following analysis concerns primarily the *direct costs* of the program from the *point of view* of the MUHC. In addition there are costs that are not incurred by the MUHC, and these are also shown below.

For the purpose of estimating the costs to the MUHC of achieving these health benefits, it will be assumed that in all cases referred to the HCV Clinic the diagnosis will have been already established. These patients will then be evaluated, including physical examination, tests and a liver biopsy (Appendix 2).

Of those evaluated, it is estimated that approximately half will have contraindications to treatment or will refuse it [1]. Thus, for every patient treated two must be evaluated. Of those for whom treatment is undertaken, the duration of treatment will be continued for 12, 24, or 48 weeks as outlined below.

The treatment regimen that is in accordance with the results of the European trial [14] and will be followed in the HCV Clinic will be as follows:

Peginterferon 180 μg, subcutaneous, weekly, + ribavirin 800 mg, daily.

For genotype 1,4 viral response will be tested at 12 weeks. In non-responders, (expected to be 20%) treatment will be stopped at 12 weeks.

The 80% with a positive viral response at 12 weeks will receive 48 weeks treatment.

For genotype 2,3, all will receive 24 weeks treatment.

Estimation of the costs of evaluation, and of delivery of each of the three courses of treatment, omitting nursing costs and institutional overheads, are shown in Appendix 2 and 3. It has been estimated that the appropriate nursing staffing for the intensity of care required in an outpatient clinic setting is approximately one full-time equivalent nurse per 70 patients [1]. Thus, in the following analysis nursing costs are initially treated separately. The costs to the MUHC of each course, excluding nursing and overheads, are

shown below. In addition, costs not charged to the MUHC are shown in parenthesis( ):

Evaluation costs…..……	$171	($148)	(Appendix 2)
48 Weeks treatment…….	$226	($30,257)	(Appendix 3)
24 Weeks treatment……	$211	($15,166)	(Appendix 3)
12 Weeks treatment…….	$115	($7,591)	(Appendix 3)

Thus, the costs of treatment of 100 cases of the same mix as in the HCV Clinic would be as follows:

1) Evaluation costs (of 200 individuals)

$171 x 200 =……..$34,200

2) Treatment of Genotypes 1,4 (68% Cases). In 50% of these (34 individuals), HCV RNA will be undetectable by 12 weeks. They will receive 48 weeks treatment., costing: 34 x $226 =……....$7,684

For the 34 individuals with detectable HCV RNA at 12 weeks, treatment will be stopped at 12 weeks at a cost of: 34 x $115 =……$3,910

3)Genotypes 2,3 (32% Cases). All receive 24 weeks treatment costing:

32 x $211 =…….……$6,752

COSTS to MUHC of treating 100 patients, excl nursing(1+2+3) = ……..$52,546

Or for 70 patients excl nursing =……..$36,782

Assume cost of one FT nurse =…… $75,000

TOTAL costs to MUHC of a programme, for 70 patients pa =……..…..$111,782

Societal Costs

The estimated cost of $111,782 refers only to the direct costs of the programme *to the MUHC*. However, the programme would include other direct cost items that are not charged to the MUHC. These include professional fees paid by the Québec Ministry of health, and medication fees paid partly by the Ministry and partly by patients. These are reflected in Appendix 2 and 3. The total of these non-MUHC costs, estimated as shown in Appendix 4 = $1,271,826.

Thus, the societal direct cost (MUHC and non-MUHC), of the programme would be:
$1,271,826 + $111,782 =…… $1,361,101

Discussion

The beneficial effects of current therapy can be estimated with reasonable confidence. Antiviral treatment of 70 patients per year will have the following outcomes: 16 individuals (PB 12-25) will be cured, and will not develop cirrhosis, with subsequent liver failure, hepatoma and death, while 12-21 will be relieved of the symptoms associated with chronic HCV infection.

The economic impact on the budget of the MUHC of achieving these health benefits would be relatively small, ($111,782). Nevertheless, if it is assumed that the budget of the MUHC is fixed, other hospital services will inevitably be reduced by this amount.

The above cost estimates take no count of the potential cost to the MUHC of *not treating* patients with chronic HCV infection. We have estimated above that in a programme treating 70 patients per year the number cured would be approximately 16 (PB 12-25). Had these patients not been treated, the costs of their subsequent management between their first developing symptomatic hepatic failure or hepatoma, and the approximately five years before they succumb, would be considerable, while several would certainly proceed to liver transplant. If it is assumed, conservatively, that on average each of these patients, during the five years of severe illness preceding death,

might spend 80 days in an acute care bed ($273 per day*) and a further 20 days in intensive care ($977 per day***),** and that 10 would undergo liver transplantation ($31,000 for transplant admission only), the inpatient cost alone to the MUHC would be $972,080 (* Direct nursing costs only. Pharmacy,drugs, overheads excluded. Based on MUHC annual report, AS 471. 2001-2).

However, these costs would not be incurred until some years after the time when the patients would have received antiviral treatment. Assuming this interval to be on average 12 years, with discounting at 3 %, these preventable costs for the management of advanced disease would have a present discounted value of $681,797 (and at 5%, a value of $541,290). If the number of cases of cirrhosis prevented corresponded to the upper probability bound of 25 instead of the point estimate of 16, the preventable costs, similarly discounted at 2%and 5%, would be $852,246 and $670,242 respectively.

This program would be a relatively cost-effective intervention. Using the above extremely rough estimate of the direct costs to society associated with advanced liver disease that would be prevented, and making no allowance for reduced quality of life in the terminal five years, the estimated cost per life year gained would be $3,681 or $6,821 when both health gains and costs are discounted at 3% and 5%, respectively.

In summary, it is estimated that a programme for the antiviral treatment of 70 patients per year could be expected to prevent the development of cirrhosis, with subsequent hepatic failure or hepatoma followed by death, of 23nd possibly as many as 36 individuals. It would cost the MUHC approximately $111,782 per year. After a period of approximately 12 years the treatment costs saved would substantially exceed the costs of the program to the MUHC.

Recommendation. In the light of the above estimates, the TAU Committee recommends that the MUHC should initiate a program to deliver antiviral treatment to individuals with chronic HCV infection.

Appendix 1

Method

The preparation of this report was facilitated by the publication of a recent comprehensive meta-analysis [8], two Consensus Reports prepared by the National Institutes of Health [5,10] the Proceedings of a Consensus Conference of the Canadian Association for Study of the Liver [16] and a Health Technology Assessment prepared by the Wessex Institute of the UK [17].

In addition, the following databases were scanned for publications (language unspecified) from January 1999 to June 30 2002:
PUBMED, NHSCRD (University of York, Center for Review and Dissemination), ICES, CCOHTA, INAHTA briefs, MSAC (Medical Services Commission of Australia), SBU (Swedish Council on Technology Assessment), NCE (Networks of Centers of Excellence, Canada), Canadian Association for the Study of the Liver.

The following keywords were employed:
Hepatitis C, in combination with; Review, Systematic review, Meta-Analysis, Study, Ethics, Complications, Benefits, Cost, Treatment, Hepatology, Gastroenterology, Ribavirin, Interferon Alfa-2b, Drug Therapy.

The reference lists from published articles and reviews were also consulted.

Appendix 2

Costs to MUHC of evaluation of a patient referred with chronic HCv infection.

Nursing, and overheads approximately 30%, not included. Additional costs not charged to MUHC shown in parenthesis ( ).

Item	Unit Cost ($)	Frequency	Total Cost	
Specimen Procurement. per visit	6.22			
AST(aspartate aminotransferase)	0.91			
ALT(alanine aminotransferase)	0.67			
AP (alkaline phosphatase)	0.61			
CBC(compl blood count, platelets)	4.98			
INR(international normalized ratio)	4.13			
TSH(thyroid stimulating hormone)	2.28			
AMA(antimitochondrial antibodies)	20.53			
SMA(smooth muscle antibodies)	8.11			
ANA (antinuclear antibodies)	10.36			
Bilirubin (total, direct)	1.33			
Albumen	0.59			
Quantitative IGG, IGM, IGA	7.89			
	68.61	2	137.22	
Abdominal Ultrasound		1		
Technical	33.78		33.78	
Professional(MD Fees.RAMQ) †	30.00			(30.00)
Liver Biopsy		1		
Pathologist, RAMQ †	35.00			(35.00)
MD Fees. RAMQ †	40.00			(40.00)
HCV Genotyping †		1		
Quantitative HCV RNA †		1		
MD Fees(RAMQ)				
Consults †	57.48	1		(57.48)
Follow up visits †	15.10	1		(15.10)
TOTAL……			….171.00 (147.58)	

. † Not charged to MUHC

Appendix 3

Costs to MUHC of one course of antiviral treatment.

Nursing costs and overhead, approximately 30%, not included. Additional costs, not charged to MUHC, showing in parentheses( ).

48 Weeks Course

Item	Unit Cost $	Frequency	Total Cost $	
Specimen procurement per visit	6.22	17	105.74	
CBC(compl blood count, platelets)	4.98	17	84.66	
AST(aspartate amino transferase)	0.91	17	15.47	
ALT(alanine amino transferase)	0.67	17	11.39	
TSH(Thyroid stimulating hormone)	2.28	4(Every 3 months)	9.12	
Qualitative HCV RNA †		4 (wks 48,72)		
Quantitative HCV RNA †		1 (12 wks)		
MD Fees (RAMQ)				
Follow up visits †	15.10	17		(256.70)
Medication costs †				(30,000)
TOTAL……...……..			226.38	(30,257)

24 Weeks Course

Item	Unit cost $	Frequency	Total Cost$	
Specimen procurement per visit	6.22	11	68.42	
CBC, AST, ALT	12.56	11	138.16	
TSH	2.28	2	4.56	
Qualitative HCV RNA †		2(Wks 24,48)		
Quantitative HCV RNA†		1(Wk 12)		
MDFees (RAMQ)				
Follow up visits †	15.10	11		(166.10)
Medication costs				(15,000)
TOTAL…… ……..			211.14	(15,16610)

† Not charged to MUHC

12 WeeksCourse

Specimen procurement per visit	6.22	6	37.32
CBC, AST, ALT	12.56	6	75.36
TSH	2.28	1	2.28
Qualitative HCV RNA †		1	
MD Fees (RAMQ)			
Follow up visits †	15.10	6	(90.60)
Medication costs			(7,500)
TOTAL ……			…114.96 (7,590.60)

† Not charged to MUHC

Appendix 4

Additional direct costs of antiviral treatment, *not* charged to MUHC.

Apart from a variable portion of medication costs which are partly paid by the patient, all other costs are paid by the Québec health-care system**..**

To estimate the total Costs of treating 100 patients under this program, the costs not charged to the MUHC, shown in (parentheses) in the appendices, must be added to the costs assumed by the MUHC. (The costs of certain tests that are carried out by Québec laboratories, indicated in the appendices, are not considered).

Programme costs *not* charged to MUHC (reflected in Appendix 2 and 3) involved in the treatment of 100 patients are as follows:

Evaluation.	$148 x 200=…….…..…	$29,600
48 Weeks Course.	$30,257 X 34 individuals…….	$1,028,738
2 4 Weeks Course.	$15,166 X 34 individuals……	$515,644
12 Weeks Course.	$7,591 X 32individuals……..…	$242,912

TOTAL	(per 100 patients)…….…..	$1,816,894
	(per 70 patients)……..…….	$1,271,826

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