

# Pharmacist-Managed Lipid Clinics: Development and Implementation in the Canadian Forces

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## ABSTRACT

**Background and Objectives:** Two previous studies performed at the authors' facilities demonstrated gaps in dyslipidemia management, especially for patients at high and very high risk for cardiovascular disease. Because lipid clinics have been shown to improve attainment of treatment goals and adherence with drug therapy, pharmacist-based lipid clinics were incorporated into existing ambulatory care family medicine clinics.

**Methods:** A pharmacist-managed protocol for a lipid clinic was developed on the basis of published literature and received formal approval from the Canadian Forces Pharmacy and Therapeutics Committee in January 2000. Pharmacists employed in Canadian Forces medical clinics were authorized to titrate dosages of lipid-lowering drugs, substitute drugs within a class of agents, order laboratory tests, provide lifestyle counselling, and refer patients to other health care professionals as required to attain or achieve lipid control. Initiation of a new medication, switch to a different drug class, or addition of a second lipid-lowering agent required physician consultation and approval. Clinic appointments were made on the basis of referral from physicians, pharmacists, or the patients themselves. The lipid clinic protocol was applied differently at each of the 3 designated Canadian Forces medical clinics (in Ottawa, Halifax, and Victoria). The pharmacist was available in the family practice office one afternoon per week in Ottawa; the other 2 sites operated the lipid clinics from their pharmacies on a full-time basis.

**Results:** Altogether, 144 patients were evaluated at least once by pharmacists employed at 1 of the 3 lipid clinics. Twenty-seven (19%) of the 144 patients were lost to follow-up. Of the remaining 117 patients, only 58 patients (50%) were meeting their goal for low-density lipoprotein (LDL) cholesterol at baseline, and only 39 patients (33%) met all target lipid levels as specified by the Canadian guidelines. At follow-up after pharmacist intervention and assessment, 94 (80%) of the 117 patients had achieved their LDL cholesterol goal, and 71 (61%) had met all target lipid goals. Only 24 (26%) of 93 pharmacists' recommendations were directly related to drug therapy; the remainder were nonpharmacological recommendations. The primary care physicians accepted all recommendations.

**Conclusions:** Pharmacist-based lipid clinics led to improved management of patients with dyslipidemia.

**Key words:** dyslipidemia, ambulatory-care clinics, pharmacists, pharmaceutical care

## RÉSUMÉ

**Contexte et objectifs :** Deux études antérieures menées aux établissements des auteurs ont mis en évidence des lacunes dans la prise en charge des dyslipidémies, particulièrement chez les patients dont le risque de maladie cardiovasculaire était élevé et très élevé. Comme on sait que les conseils sur les dyslipidémies contribuent à améliorer l'atteinte des objectifs et la fidélité au traitement avec des médicaments, des séances-conseils sur les dyslipidémies coordonnées par les pharmaciens ont été combinées aux cliniques de soins ambulatoires en médecine familiale.

**Méthodes :** Un protocole fondé sur la littérature et coordonné par les pharmaciens dans le cadre de séances-conseils sur les dyslipidémies, a été élaboré et a reçu l'approbation officielle du Comité de pharmacie et de thérapeutique des Forces canadiennes en janvier 2000. Les pharmaciens au service des cliniques médicales des Forces canadiennes ont été autorisés à doser les agents hypolipémiants, à substituer un de ces agents par un autre d'un même classe, à demander des épreuves de laboratoire, à prodiguer des conseils sur les habitudes de vie et à adresser les patients à d'autres professionnels de la santé, au besoin, en vue d'atteindre les taux lipidiques désirés. L'instauration d'un nouveau traitement médicamenteux, le passage à une classe de médicaments différente ou l'ajout d'un second hypolipémiant nécessitait la consultation et l'approbation d'un médecin. Les patients étaient dirigés par les médecins ou les pharmaciens vers les pharmaciens de ces centres pour des séances-conseils sur les dyslipidémies, ou encore ils se présentaient d'eux-mêmes. Le protocole était mis en œuvre de façon différente à chacune des trois cliniques médicales désignées des forces canadiennes (Ottawa, Halifax et Victoria). Le pharmacien était présent au bureau de médecine familiale un après-midi par semaine à Ottawa ; les deux autres sites donnaient des séances-conseils sur les dyslipidémies dans le cadre de leur pharmacie respective, à plein temps.

**Résultats :** Au total, 144 patients ont été évalués au moins une fois par les pharmaciens au cours des séances-conseils sur les dyslipidémies. De ce nombre, 27 (19 %) ont été perdus de vue. Des 117 patients restants, seulement 58 (50 %) avaient atteint leur taux de cholestérol LDL (lipoprotéines de basse densité) à la date de la visite de référence, et seulement 39 patients (33 %) ont atteint tous les taux de lipides cibles, conformément aux lignes directrices canadiennes. À la visite de suivi, après l'intervention et l'évaluation des pharmaciens, 94 (80 %) des 117 patients avaient atteint leur taux de cholestérol LDL cible et 71 (61 %) avaient atteint leur taux lipidique cible. Seulement 24 (26 %) des 93 recommandations émises par les pharmaciens étaient directement liées au traitement médicamenteux ; les autres consistaient en des recommandations non pharmacologiques. Les médecins des soins primaires ont accepté toutes les recommandations.

**Conclusions :** Les séances-conseils sur les dyslipidémies coordonnées par les pharmaciens ont contribué à améliorer la gestion des dyslipidémies.

**Mots clés :** dyslipidémies, cliniques de soins ambulatoires, pharmaciens, soins pharmaceutiques



## INTRODUCTION

Many clinical studies have demonstrated that mortality and morbidity can be reduced with lipid-lowering therapy in patients with risk factors for cardiovascular disease.<sup>1</sup> Despite the established benefit of such therapy, many patients who are eligible for treatment do not receive it, for either primary or secondary prevention of coronary artery disease.<sup>2-5</sup> The need for more rigorous control of serum cholesterol levels has been described both in national guidelines<sup>6,7</sup> and in an editorial,<sup>8</sup> in which the role of the pharmacist was clearly outlined.

The benefits of pharmacist involvement in lipid management<sup>9-13</sup> have been established. Pharmacist involvement in lipid management has been varied, however, ranging from cholesterol-screening programs and management based in community pharmacies<sup>9,10</sup> to multidisciplinary collaborations led by nurse practitioners.<sup>14,15</sup> Lipid clinics, in particular, have shown greater success than usual care in promoting both patient adherence to therapy and achievement of therapeutic goals.<sup>16-18</sup> In addition, lipid clinics have been described in which the pharmacist serves as the primary health care professional responsible for dyslipidemia management,<sup>11-13</sup> usually in conjunction with medical specialty practices associated with teaching institutions.

Two previous studies performed at the authors' facilities demonstrated gaps in dyslipidemia management, particularly among patients at high and very high risk of cardiovascular disease. The first formal evaluation<sup>19</sup> was undertaken after implementation of a substitution policy for hydroxymethylglutaryl-CoA (HMG-CoA) reductase inhibitors (statins) in Canadian Forces members; this review noted small but significant reductions in total cholesterol and low-density lipoprotein (LDL) cholesterol among 164 and 190 patients, respectively, after modification of their drug therapy by the pharmacist. More importantly, the proportion of patients meeting the goals of the National Cholesterol Education Program<sup>20</sup> increased from 42.7% to 60.9%. A subsequent cross-sectional chart review<sup>21</sup> of 1424 patients throughout the Canadian Forces highlighted the fact that hyperlipidemia was not optimally managed, particularly among patients at greater risk of coronary artery disease, despite the fact that cholesterol screening was performed in over 84% of patients older than 45 years of age.

On the basis of the established benefits of pharmacist contributions to hyperlipidemia management, the demonstrated efficacy of lipid clinics, and the results of prior studies on hyperlipidemia management in the

Canadian Forces,<sup>19,21</sup> a pharmacist-managed hyperlipidemia protocol was developed and implemented. These pharmacy-based clinics were designed to be incorporated into the existing multidisciplinary family medicine clinics in Canadian Forces health care facilities. Other similarly designed specialty clinics, including consultations with physiotherapists and dietitians, smoking cessation initiatives, and other wellness programs, are provided in these facilities. This article describes the treatment protocol and the impact of pharmacist-managed lipid clinics on hyperlipidemia management.

## METHODS

### Revision of Institutional Policies Governing Pharmacist Clinical Activities

To achieve maximal efficiency in pharmacist interventions, several institutional policies were formally revised and/or amended by the Canadian Forces Pharmacy and Therapeutics Committee. Additional privileges, outside the usual scope of ambulatory pharmacy practice, were accorded to pharmacists. Most notably, all pharmacists were authorized under the Canadian Forces Surgeon General's "Delegated Medical Acts" to order laboratory tests for outpatients as required to monitor for toxic and therapeutic effects of drug therapy. The results of such tests were to be provided to both the ordering pharmacist and the treating physician for review. In addition, referrals to other allied health care professionals (e.g., dietitians or internists) could be initiated if necessary.

### Development of a Hyperlipidemia Protocol

A hyperlipidemia protocol was subsequently drafted which clearly defined the additional acts a pharmacist could perform for the purposes of managing hyperlipidemia. This protocol allowed pharmacists practising in lipid clinics to perform tasks such as automatic substitutions, protocol-driven dosage adjustments, and substitution of medications in the same therapeutic class.

Evidence-based guidelines current at the time were used to develop the hyperlipidemia protocol. A pharmacist practising in cardiology was involved in drafting the protocol, and physician specialists experienced in managing hyperlipidemia reviewed it to verify the content and application of the guidelines. Among the evidence-based tools incorporated in the protocol were a risk-assessment tool (originally based on the 1998 Framingham calculations<sup>1</sup> and subsequently updated to

year 2000 calculations<sup>6)</sup> and monitoring forms specifying the recommended cholesterol levels to be targeted. This revised protocol was submitted to the Canadian Forces Pharmacy and Therapeutics Committee for review and received the committee's sanction.

### **Design of the Hyperlipidemia Protocol**

The hyperlipidemia protocol recommended dedicated appointments in the family practice clinic involving the pharmacist and the patient, but alternative methods for enabling patient-pharmacist encounters were also suggested depending on existing facilities. Individualized care was encouraged through the use of a structured history-taking questionnaire and the risk assessment tool described above, which identified the individual patient's risks for coronary artery disease. The pharmacist would then perform the following tasks:

1. Establish an initial plan.
2. Reinforce lifestyle recommendations according to the guidelines.
3. Order blood work for monitoring as required.
4. Identify drug-related problems.
5. Write prescriptions to modify dosages of hyperlipidemia therapy.
6. Suggest additional preventive strategies or referrals to other health care practitioners to decrease overall risk of coronary artery disease.
7. Document the plan in the physician's notes.

The protocol outlined specific dosage titration schedules or further assessment required in the case of undesirable laboratory parameters, including indications for referral to the primary care physician. Efficacy and adverse event monitoring included lipid parameters, liver function tests, creatine phosphokinase, fasting blood sugar, and uric acid levels, stipulated for each drug at serial time points. Initiation of drug therapy with an agent in a new therapeutic class required verification with the referring physician.

Patients were referred to the pharmacy lipid clinic by the primary care physician, by outpatient pharmacists, or through self-referral.

### **Data Collection**

The number of referrals, patient visits, and pharmacist interventions were recorded prospectively by the treating pharmacist. Patient characteristics assessed at baseline included age, sex, Framingham risk category, and referring health care professional. LDL cholesterol levels, the ratio of total cholesterol to high-density lipoprotein (HDL) cholesterol, and triglyceride levels were recorded

at baseline and at follow-up, with stratification of patients according to their initial risk category. The percentage of patients in each risk category (according to Canadian cholesterol guidelines<sup>6)</sup> who met their therapeutic goals (in terms of LDL cholesterol level, ratio of total to HDL cholesterol, and triglyceride levels) and overall attainment of hyperlipidemia goals were evaluated at baseline and at follow-up. Because of the small number of patients anticipated, no statistical tests were planned. Where available, information was collected to identify the types, quantity, and frequency of interventions performed by the pharmacists to enhance lipid management. Data were also collected regarding the frequency and types of toxic effects potentially related to lipid-lowering therapy that were observed by the pharmacists. Data on costs associated with drug therapy, laboratory monitoring, and pharmacists' workload were not collected.

### **Initial Canadian Forces Clinics**

At the outset of the program, 3 pharmacy-based lipid clinics were initiated in the Canadian Forces, one each in Halifax, Nova Scotia; Ottawa, Ontario; and Esquimalt (in Victoria), British Columbia. Because the medical facility at each Canadian Forces base is managed independently, the lipid protocol was established uniquely at each site. The clinic in Ottawa is part of the existing health care facility. At this site, appointments are booked and patients are assessed and managed according to the hyperlipidemia protocol. The clinic in Esquimalt operates as part of the pharmacy itself; at this site, patients are assessed and managed according to the hyperlipidemia protocol, but all interventions are confirmed verbally with the physician before implementation. The clinic in Halifax identifies patients on the basis of prescription processing and uses the military pharmacy computer system to track patients and laboratory results. The hyperlipidemia protocol is used to modify drug therapy, and interventions are confirmed with the physician. This report documents the therapeutic endpoints achieved at each clinic along with their respective approaches to lipid management.

## **RESULTS**

### **Patient Population and Baseline Characteristics**

The characteristics of the pharmacy lipid clinics of the Canadian Forces are shown in Table 1. The Ottawa clinic was the first ambulatory care clinic to be



**Table 1. Characteristics of Canadian Forces Pharmacy-Based Lipid Clinics**

Clinic	Period in Operation (months)	Location	Referral Patterns	Follow-up Time Frame
Ottawa	18	Physician's office	Physician consult (70%) Prescription processing (30%)	12 months
Esquimalt	9	Pharmacy	Physician consult (30%) Prescription processing (70%)	3–6 months
Halifax	12	Pharmacy, with use of a computer system	Primarily prescription processing	6 weeks to 12 months

**Table 2. Characteristics of Patients Assessed in Pharmacy-Based Clinics**

Clinic	Age, Median and Range (Years)	No. (and %) of Patients		
		At Initiation of Study	On Follow-up	High or Very High Risk*
Ottawa	48 (27–54)	66	53	8 (15)
Esquimalt	48 (36–53)	10	10	3 (30)
Halifax	42 (32–54)	68	54	26 (48)
Total	48 (32–54)	144	117	37 (32)

\*Risk was assessed according to the Canadian cholesterol guidelines.<sup>6</sup> Percentages are based on number of patients at follow-up.

established according to the hyperlipidemia protocol under the “Delegated Medical Acts” policy and served as the model for the development of the other clinics. In Halifax, the lipid clinic was implemented as part of an existing clinical pharmacy service intended primarily for patients with diabetes or known coronary artery disease. Esquimalt is the newest clinic for which data are available. The referral patterns for patients attending the clinics reflect differences in clinic location and set-up.

Baseline characteristics of patients assessed at pharmacy lipid clinics are shown in Table 2. Most of the patients were male (64 of 66 patients in Ottawa, all 10 patients in Esquimalt, and 67 of 68 patients in Halifax) and under 55 years of age, and most required control of dyslipidemia for primary prevention; all of these characteristics reflect the Canadian military population.

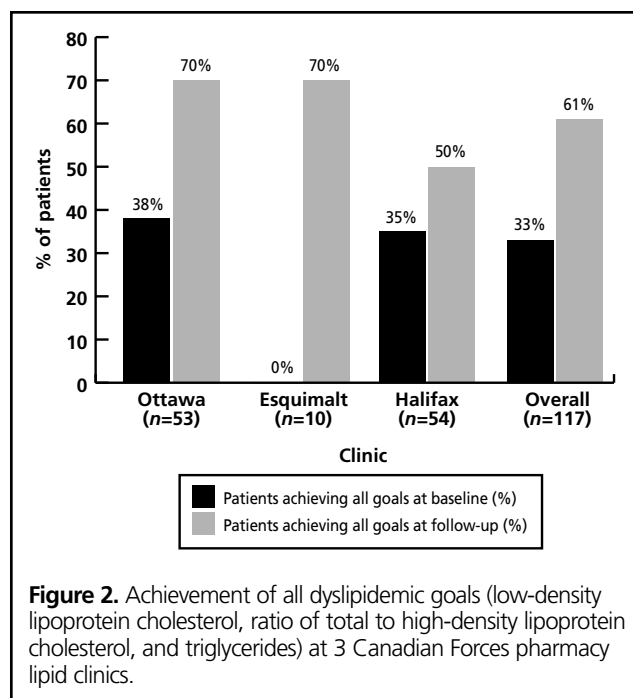
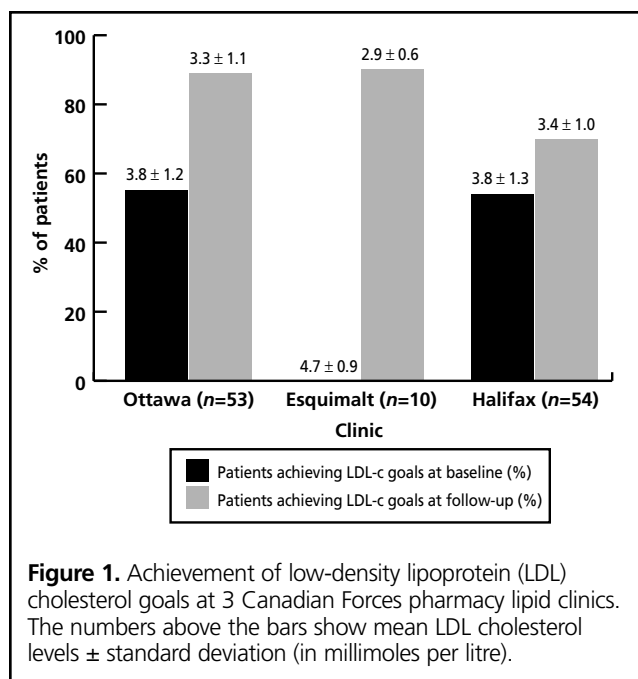
Of the patients assessed at the Ottawa clinic, 13 could not be reassessed at the 1-year follow-up, 7 because they had relocated (and were no longer considered patients at the facility) and 6 because follow-up lipid levels were unavailable. Thus, 53 patients were available for follow-up assessment. In Halifax, a total of 14 patients were not available for follow-up; further data on these patients are lacking because of incomplete documentation. All the patients attending the Esquimalt clinic were available for their 3- to 6-month follow-up, but data on follow-up at the 1-year point are not yet available. Therefore, of a total of 144 patients initially assessed by the lipid clinics, 117 (81%) were available for complete analysis at baseline and follow-up.

## Therapeutic Endpoints

### LDL Cholesterol

Information on the attainment of LDL cholesterol goals appears in Figure 1. Participation in the pharmacy lipid clinics led to an increase in the proportions of patients attaining target LDL cholesterol levels, with an overall increase from 46% (66 of 144 patients) at baseline to 80% (94 of 117 patients) at the 3- to 12-month follow-up. In assessing goal achievement among just those patients who were available for follow-up, the Esquimalt clinic noted the greatest absolute improvement in meeting LDL cholesterol goals, from 0% at baseline to 90% (9 of 10 patients) at follow-up. In Ottawa, the proportion increased from 55% (29 of 53 patients) to 89% (47 of 53 patients) and in Halifax, from 54% (29 of 54 patients) to 70% (38 of 54 patients). Of particular importance, 7 (88%) of the 8 evaluable patients in the high and very high risk group in Ottawa and all 3 of the patients in this group in Esquimalt were able to achieve the targets set by the Canadian guidelines<sup>6</sup> at follow-up. In Halifax, goal attainment for the 26 patients who remained at high or very high risk at follow-up did not change as dramatically, from 38% (10 of 26 patients) to 50% (13 of 26 patients). Nonetheless, LDL cholesterol values improved from baseline for the majority of patients attending the lipid clinics.





### Overall Achievement of Cholesterol Goals

The Canadian guidelines<sup>6</sup> now emphasize attainment of goals for both ratio of total to HDL cholesterol and triglyceride levels as essential to dyslipidemic management. Overall achievement of lipid targets (including these 2 measures) improved over baseline values across all of the pharmacy lipid clinics (Figure 2) increasing from 30% (43 of 144 patients) to 61% (71 of 117 patients). In Ottawa, improvement was noted in the very high risk group, which experienced a substantial increase in the proportion of patients meeting all cholesterol target levels (from 2 to 5 of 6 patients; data not shown). The proportion of very high risk patients who attended the Esquimalt clinic and met all goals at follow-up also increased, from 0% to 67% (2 of 3 patients). In Halifax, goal attainment did not change in the high and very high risk patients (7 of 26 patients at both baseline and follow-up). However, a substantially higher proportion of patients achieving all lipid goals was noted for Halifax patients in the low and moderate risk categories (from 43% [12 of 28 patients] to 71% [20 of 28 patients]).

### Pharmacist Interventions

The lipid clinic pharmacists in Ottawa and Esquimalt made a total of 93 recommendations, excluding recommendations for follow-up; because of insufficient documentation, no data about recommendations were available for the lipid clinic in Halifax. The largest

proportion of interventions directly related to drug therapy (Table 3) were for initiating drug therapy and for increasing doses of currently prescribed medications. Recommendations involving nonpharmacological interventions are summarized in Table 4. Recommendations regarding diet were common, as evidenced by the large number of referrals to dietitians; many of these patients had never received dietary counselling or required reinforcement of counselling received previously. Additional laboratory tests that were recommended included tests for thyroid-stimulating hormone, homocysteine, and lipoprotein (a). In all cases, the pharmacists' recommendations were accepted and implemented by the primary physician.

In addition to making recommendations, the pharmacists also collaborated with the treating physician in managing adverse effects. In Ottawa, only 3 instances of adverse effects were noted, all of which developed during therapy with an HMG-CoA reductase inhibitor and none of which required discontinuation of therapy. In 2 instances, the side effects (nausea and abdominal pain in one patient and insomnia in the other) resolved when therapy was switched to a different HMG-CoA reductase inhibitor. In the third instance, a slight increase in creatine phosphokinase levels was noted despite discontinuation of the medication. These levels remained slightly elevated, and the same agent was subsequently restarted without further adverse effects. At the time of this report, no adverse events had been noted in the small number of Esquimalt patients, and data were not available from the Halifax clinic.



**Table 3. Drug-Related Recommendations Made by Lipid Clinic Pharmacists\***

Type of Intervention	Location; No. of Recommendations	
	Ottawa	Esquimalt
Increase in dose of current drug regimen	6	0
Initiation of therapy with statin or fibrate	5	3
Change from one drug class to another	4	4
Addition of a second drug to the drug regimen	1	1

\*Data for Halifax clinic not available.

## DISCUSSION

The interim results presented in this report compare favourably with the results of similar initiatives by pharmacists already reported in the literature. O'Donnell and others<sup>12</sup> reported an improvement in goal attainment for LDL cholesterol values, from 26.7% at baseline to 76.0% at 1- to 3-year follow-up for patients who had experienced acute coronary artery disease events or undergone revascularization procedures. Bozovich and others<sup>13</sup> managed patients at a private cardiology practice site, where the pharmacist intervened to improve the achievement of LDL cholesterol goals, from 33% at baseline to 69% after 6 months of follow-up. However, the current report appears to be the first to document a positive impact resulting from implementation of pharmacists' lipid services in a family practice setting. There was an improvement in LDL cholesterol goal attainment from 46% at baseline to 80% after 3 to 12 months of follow-up. The difference in patient care settings may explain the relatively higher rates of success to date among patients at the Canadian Forces pharmacy lipid clinics. Furthermore, in Ottawa and Esquimalt, improvements in achievement of LDL cholesterol goals were also demonstrated for high and very high risk patients, who had previously been shown to require better goal attainment.<sup>21</sup> However, the achievement of LDL cholesterol goals for high and very high risk patients in Halifax remained low. Because the Halifax clinic had a large number of these high risk patients, success in achieving the target LDL cholesterol goals might have been lower despite overall decreases in LDL cholesterol values.

This report is also among the few presenting data on the achievement of all lipid goals, which are not based only upon LDL cholesterol measurements. Measurement of triglycerides and ratio of total to HDL cholesterol have recently been recognized as predictive risk factors for cardiovascular disease.<sup>6</sup> This report provides valuable

**Table 4. Nonpharmacological Recommendations Made by Lipid Clinic Pharmacists\***

Type of Intervention	Location; No. of Recommendations	
	Ottawa	Esquimalt
Referral to other health care professionals	35	3
Additional laboratory tests	12	0
Lifestyle behaviour modification	11	0
Management of comorbid conditions	8	0

\*Data for Halifax clinic not available.

guidance to pharmacists and other health care professionals regarding interventions that can help to achieve these endpoints, and the potential success rates that might be expected. Overall goal attainment improved for these values, from 30% (43 of 144 patients) at baseline to 61% (71 of 117 patients) at follow-up. However, a smaller proportion of patients met these goals than met LDL cholesterol goals. It can be difficult to improve triglyceridemia and inappropriate ratios of total to HDL cholesterol with single-drug therapy, and significant concomitant changes in lifestyle may be required. This situation was evidenced by the large number of referrals to dietitians. Niacin is often indicated but can be difficult to use, and the discontinuation rate is high.<sup>22</sup> The use of niacin was low in this population (less than 3% of patients overall); it may be necessary to use niacin more aggressively if lifestyle changes prove ineffective.

The lipid clinic pharmacists were equipped with a comprehensive array of tools including protocols and policies authorizing modification of drug regimens. Many interventions did not involve changing or initiating pharmacotherapy. However, the ability to use these tools varied depending on the setting in which the pharmacy lipid clinic was located. Because each health care facility was managed locally, the clinics operating from the pharmacy itself had more limited access to patient information and were less integrated into the family practice clinic. Access to laboratory information and authority to order laboratory tests were available to all pharmacy lipid clinics and were the tools employed most often to achieve cholesterol goals. Nonetheless, comprehensive monitoring and ordering of laboratory tests alone did not appear sufficient to achieve dyslipidemic goals, especially in the highest risk patients.

## Further Considerations

Despite the promising results thus far, further modifications to the program may be required. In



particular, the referral methods used to direct patients to the pharmacy lipid clinics may require revision. The lipid clinic pharmacists in Ottawa observed that physicians tended to refer patients needing more complex care for pharmacist consultation, especially when medication noncompliance was suspected, rather than referring dyslipidemic patients to the pharmacist routinely. The Ottawa lipid clinic was perceived by prescribers and patients alike as a specialized service where a therapeutic plan would be initiated, while continuation and follow-up would be maintained by the family physician. The lipid clinic in Esquimalt had more success in identifying eligible patients through diligent screening of processed prescriptions. The patients in Esquimalt were all initiated on dyslipidemic therapy, and pharmacists therefore intervened on drug selection or initiated therapy on the basis of the lipid levels available to them. Physicians at this site have been receptive to pharmacist interventions and are beginning to refer patients needing complex care. In contrast, the clinic in Halifax assessed a large number of patients who were at high or very high risk for coronary artery disease, but these patients were primarily identified through other drug therapy for diabetes or coronary artery disease. Documentation specific to the lipid clinic was incomplete at this site, because such interventions were recorded as part of the usual pharmacy dispensary documentation tools; this lack of documentation hampered the authors' ability to assess the degree to which therapeutic plans were initiated, monitored, and modified.

As these results illustrate and the lipid clinic pharmacists have observed, patient follow-up was far from complete. Although some patients had left the area and were unavailable for follow-up, the remaining patients lost to follow-up had simply failed to schedule the repeat appointments necessary to undergo laboratory tests and physician/pharmacist re-assessment. Therefore, in these situations, the pharmacist must either incorporate additional duties (e.g., telephone call-backs, reminder slips, automatic scheduling) into their clinic time or delegate such duties to other clinic support personnel to encourage patient follow-up. A combination of aggressive follow-up, initiation of drugs, titration of doses, and modifications to lifestyle appear to be required to achieve dyslipidemic goals in all of these patients, especially those at highest risk for coronary artery disease.

Because of the substantial effects of pharmacist interventions in these lipid clinics, similar programs are now being implemented at other health care facilities within the Canadian Forces. The clinics described here

continue to operate, and enhanced patient participation is anticipated as physician, pharmacist, and patient awareness of their availability increases. Monitoring of lipid profiles and goal attainment will continue; however, evaluation of patient outcomes should be expanded to include statistics on the incidence of cardiovascular events. Pooling of such data across all pharmacist-managed lipid clinics in the Canadian Forces may yield more information on the potential impact of family physician–pharmacist teams on definitive outpatient outcomes such as hospitalization, morbidity, cardiovascular events, and death.

## CONCLUSIONS

The results of a detailed chart review at Canadian Forces practice sites<sup>21</sup> demonstrated that hyperlipidemia management was suboptimal and prompted investigations of methods by which pharmacists could assist in achieving compliance with guidelines. The resulting hyperlipidemia management protocol provides tools and authorizes activities that are required for pharmacists to provide comprehensive drug-related services. These results provide additional proof that pharmacist interventions, both drug-related and nonpharmacological, can help patients to achieve dyslipidemic goals outlined in treatment guidelines. More important, this program demonstrates that pharmacists' consultations can be implemented as part of a general medicine practice and can achieve success rates similar to those reported in cardiology-specific practice settings.

Incorporating pharmacy-managed lipid clinics into ambulatory care facilities would allow pharmacists to assist more patients. Achieving recommended therapeutic endpoints for dyslipidemic patients would enhance the pharmacist's role as a member of the primary health care team.

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