Original Article

Awareness of Familial Hypercholesterolemia Among Healthcare Providers Involved in the Management of Acute Coronary Syndrome in Victoria, Australia

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ABSTRACT

Background: Familial hypercholesterolemia (FH) is a common under-diagnosed autosomal dominant lipid disorder carrying a significant risk of premature coronary artery disease. The aim of this study was to evaluate the awareness and knowledge of heterozygous FH of healthcare providers in coronary care units (CCUs).

Methods: Medical staff working in CCUs in 4 sizable metropolitan health networks in Melbourne, Australia, were requested to complete a structured anonymised questionnaire with regard to FH. The results were tabulated and analysed with the Statistical Package for the Social Sciences version 23 (IBM, New York, NY).

Results: A total of 121 participants (67% response rate) completed the survey. Some 76% claimed to be at least modestly familiar with

RÉSUMÉ

Contexte : L'hypercholestérolémie familiale (HF) est un trouble lipidique autosomique dominant courant et sous-diagnostiqué, associé à un risque important de coronaropathie prématurée. Le but de cette étude consistait à évaluer la sensibilisation et les connaissances à l'égard de l'HF hétérozygote parmi les professionnels de la santé œuvrant en unité de soins coronariens (USC).

Méthodologie : Les membres du personnel médical des USC de quatre réseaux de santé métropolitains relativement importants de Melbourne, en Australie, ont été invités à remplir un questionnaire anonyme structuré sur l'HF. Les résultats ont été mis sous forme de tableaux et analysés à l'aide de la trousse logicielle SPSS (*Statistical Package for the Social Sciences*, IBM, New York, NY), version 23.

Epidemiological evidence demonstrates familial hypercholesterolemia (FH) as a common genetic cause of long-standing elevated plasma level of low-density lipoprotein cholesterol (LDL-C), causing accelerated development of atherosclerotic cardiovascular disease by at least 1 to 2 decades.[1] Globally, it is estimated that 20 million people are affected by FH, of whom approximately 45,000 are living in Australia, with the

majority of them currently unidentified and inadequately treated.[1,2]

The actual prevalence of heterozygous FH in the general population has been reported as up to 1:200 to 250, which is substantially higher than was formerly estimated at approximately 1:500.[1] Although the diagnostic criteria for FH remain debatable, the Dutch Lipid Clinic Network criteria[1] is the currently preferred method for detecting index cases in Australia. A recent Australian study reported a high prevalence of phenotypical FH ($\sim$14%) among patients in a coronary care unit (CCU) who were identified with premature coronary artery disease.[3] The precise frequency of FH in patients with acute coronary syndrome (ACS) is unclear and has been broadly reported as varying from 1.60% to 15.40% among diverse ethnic populations.[3-5]

A large body of epidemiological evidence shows that the majority of patients with FH have had inadequate

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FH, and more than half of them adequately described FH; however, only 16% and 43%, respectively, were aware of the prevalence of FH and existence of lipid guidelines. In regard to epidemiological knowledge and update in the management of FH in CCUs, knowledge was suboptimal. In regard to FH care, General Practitioners were rated by 72% of participants as the first most efficient healthcare provider in the management of FH, and cardiologists were rated by 54% of participants as the second most efficient healthcare provider in the management of FH. Some 36% of respondents advocated a form of alert system in laboratory reports to facilitate the diagnosis of FH.

Conclusions: This survey identified substantial gaps in the knowledge and awareness of FH among healthcare providers involved in the management of acute coronary syndrome. Focused education and clinical training are warranted to raise awareness of FH among healthcare providers working in CCUs.

Résultats : Au total, 121 personnes (taux de réponse de 67 %) ont participé à l'enquête. Environ 76 % des répondants ont indiqué posséder à tout le moins quelques connaissances sur l'HF, tandis que plus de la moitié d'entre eux en ont donné une définition adéquate; en revanche, seuls 16 et 43 %, respectivement, connaissaient la prévalence de l'HF et l'existence de lignes directrices sur les lipides. Par rapport aux connaissances épidémiologiques et à l'actualisation des stratégies de prise en charge de l'HF en USC, les connaissances étaient sous-optimales. Soixante-douze pour cent des répondants ont jugé que le médecin généraliste était le professionnel de la santé le plus à même de soigner et de prendre en charge l'HF; le cardiologue a été mentionné en seconde position par 54 % des répondants. Quelque 36 % des répondants ont préconisé la mise en place d'un système d'alerte, dans les rapports de laboratoire, pour faciliter le diagnostic d'HF.

Conclusions : Cette enquête a mis en évidence des lacunes considérables dans la sensibilisation et les connaissances à l'égard de l'HF parmi les professionnels de la santé intervenant dans la prise en charge du syndrome coronarien aigu. Un enseignement et une formation clinique ciblés s'imposent pour accroître la sensibilisation à l'égard de l'HF parmi les professionnels de la santé qui travaillent en USC.

LDL-C—lowering management.[6] Even with the widespread use of statins, patients with FH and ACS remain at higher risk of recurrent events within the first 12 months after discharge from cardiac care.[7] This perhaps reflects both the refractory nature of elevated LDL-C in FH and a possible suboptimal lipid-lowering therapy. To assist treating physicians and to raise awareness, several guidelines and models of care for FH have been provided by Cardiovascular Societies.[8,9] There has also been recent advancement in the range of pharmacological management available with associated reduction of cardiovascular events in patients with FH after the introduction of proprotein convertase subtilisin/kexin 9 (PCSK9) inhibitors.[10]

Suboptimal awareness of the importance of FH among community healthcare providers in Australia has been demonstrated.[11] The outcome of this Australian survey was consistent with other international studies demonstrating a deficit in the knowledge and awareness of FH among primary care physicians.[12-14] Analogous findings were reported in a cross-sectional multicenter study among tertiary hospital physicians in the Persian Gulf region.[15] A report from the United States indicated a fundamental FH education gap in the curriculum within both medical and pharmacy training.[16]

When sought for, FH is relatively common in CCUs,[3] yet there has not been an extensive survey to evaluate the knowledge and awareness of healthcare providers working in the CCU. Therefore, we designed a cross-sectional study to assess the awareness of heterozygous FH in this potentially influential group of care providers. We hypothesized that high FH awareness in CCUs would allow the diagnosis of index cases and, subsequently, appropriate treatment for patients with FH and their first-degree relatives. Improved identification would allow provision of an adequate lipid-lowering regimen for primary and secondary prevention, patient education, cascade screening, and optimization of the overall management of heterozygous FH in the community.

Methods

Subjects

Cardiologists, cardiology trainees, and cardiac nurses working in 4 large tertiary health networks in Melbourne, Australia, were approached between January and June 2018. We selected our population study by a multistage sampling method. Multistage sampling was obtained by using 2 stages. The first stage involved a random selection of 4 different health networks based on the distribution of demographics. In the second stage, a random sample of the nested population within the selected district was obtained. Multistage sampling was particularly used in preference to simple random sampling because the population was geographically diverse in Victoria. Subsequently, systemic random sampling was applied by including those who met the following criteria: (1) consultant cardiologists, cardiology fellows, cardiology registrars, and cardiac care nurses with at least 2 years clinical experience since graduation; (2) minimum half of practice time in a clinical setting; (3) attend to $\geq$ 50 patients per month. The eligible clinicians were asked to complete an anonymous print-based survey without time compensation. The participants received no financial motivation, the survey was entirely voluntary, and announcements were made by a dedicated site researcher in the routine educational meeting by inviting the staff to participate in the study if they were interested.

Questionnaire

The measurement tool was primarily adapted from a study involving General Practitioners (GPs) in primary care by Bell et al.[11] in 2014, in conjunction with experts' recommendations on FH and national guidelines.[2,3] The study questionnaire has 23 comprehensive questions, a mix of opinion questions, and quiz (1 correct answer) questions on the important aspects of FH: awareness of the condition, clinical manifestation, epidemiology, genetics, risk of atherosclerotic cardiovascular disease, and choices and awareness of explicit

lipid services (Supplemental Appendix S1). Despite the lack of a standard method to assess FH awareness, we designed our comprehensive questions in this tool to yield a minimum variability in answers from the healthcare providers in CCUs. Printed survey forms were distributed among participants, and adequate time was provided for completion. They were not allowed to discuss the questions with each other nor was searching electronically permitted.

Analysis

Analysis was performed using Microsoft Excel 2013 (Microsoft Corp, Redmond, WA) and the Statistical Package for the Social Sciences version 23.0.0 (IBM, New York, NY). Descriptive statistics were presented as percentages for the discrete variables and as median for the continuous variables. Results were rounded to the nearest tenth. The chi-square test was used to assess whether the years of clinical experience as a categorical variable (≤ 10 years) was a determinant of difference in FH knowledge and practice.

Ethics

The proposal was approved by the institutions' Human Research Ethics Committees (September 2017), in accordance with the National Health and Medical Research Council. Informed consent was not required.

Results

Participants' details

A total of 180 potentially eligible staff were randomly approached; 28 did not meet the inclusion criteria (mostly because of insufficient practice time in the CCU), 13 did not return the survey, and 18 did not entirely complete the questionnaire. A total of 121 participants (67% response rate) completed the survey; 37% were cardiologists (n = 45), 23% were cardiology fellows/registrars (n = 28), and 40% were cardiac care nurses (n = 48). The majority of participants had more than 5 years of clinical experience working in CCUs (62%) and described their workload as moderate or high, treating at least 50 patients per month (75%) (Table 1).

Awareness and knowledge of FH

In regard to awareness of FH, 76% considered their familiarity with FH as average, 43% were aware of current lipid guidelines, 56% were aware of PCSK9 inhibitors as a modality of treatment for FH, and only 36% were aware of available clinical lipid services (Supplemental Appendix S1).

In regard to knowledge of FH, 63% were able to describe and characterize FH correctly, 68% recognized the lipid profile consistent with FH, and 56% accurately selected the requirement of genetic testing for an accurate diagnosis. Regarding identifying the prevalence of FH, only 16% and 19% were able to correctly specify the prevalence of this condition in the general population and coronary care settings, respectively. Concerning cardiovascular risk in FH, 18% recognized the age definition for premature cardiovascular disease, and 48% accurately identified the cardiovascular disease risk in untreated FH and rate of coronary events recurrence in patients with FH (Table 2). The length of

Table 1. Basic characteristics of participants

Characteristics	N (%)
Respondents	121 (67)
Clinical background	
Consultant Cardiologist	45 (37)
Cardiology Fellow	12 (10)
Registrar in Training	16 (13)
Cardiac Nurse	48 (40)
Clinical work experience	
> 5 y	75 (62)
< 5 y	46 (38)
Clinical workload	
Above moderate ($\geq$ 50 patients monthly)	91 (75)
Below moderate (30-50 patients monthly)	30 (25)
Self-concept of familiarity with FH	
Average and above	92 (76)
Below average	29 (24)

FH, familial hypercholesterolemia.

clinical experience working in CCUs (≤ 10 years) was not statistically associated with FH knowledge ($P = 0.76$).

Screening FH

With regard to their opinion on which healthcare provider was best placed to detect FH, 72% considered GPs as the most efficient healthcare provider for the timely management of FH, with 54% identifying cardiologists as the second most efficient healthcare provider. Some 36% thought a laboratory report alert system would be useful assistance in the early detection of FH. With regard to previous experience in managing FH, 44% had managed patients with FH, 8% would routinely screen the close relatives of patients with FH, and 45% would perform phenotypical screening for FH in patients with premature cardiovascular disease. The majority believed the age group of 13 to 18 years as the most appropriate for screening young individuals in a family with premature ACS (42.9%), and only 3.3% nominated below the age of 6 years as an appropriate time for screening.

Discussion

To the best of our knowledge, this is the first specific formal survey of FH awareness in staff in an Australian coronary care setting. Although a majority of staff claimed knowledge of FH as adequate or above, the results suggest that there is a notable scope for improvement in the area of FH recognition and management. The survey results are in line with current literature indicating shortcomings in the knowledge of FH, including an unawareness of the prevalence, the early onset of coronary artery disease, and the fact that FH is the most common and underdiagnosed hereditary lipid disorder.[12-14]

Fifty-six percent of CCU staff stated they had not had former experience in managing patients with FH, potentially indicating that the importance of FH has often been underestimated in the coronary care setting. GPs and cardiologists were nominated by the participants as the most appropriate healthcare providers in the diagnosis and management of FH. A majority of participants (> 60%) were unaware of specialist

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Table 2. Summary of coronary care staff replies to questions about FH

Awareness and knowledge	Proportion
Considered familiar with FH ranked as average	76%
Aware of guidelines	43%
Awareness of any specialised clinical lipid services to whom you can refer patient	36%
Familiarity with PCSK9 inhibitors for treatment of FH ranked as average or above	56%
Properly described FH	63%
Properly recognised the lipid profile	68%
Properly identified the prevalence of FH in the community	16%
Properly identified the prevalence of FH in the CCU	19%
Properly identified the rate of coronary events recurrence in patients with FH	48%
Properly selected the age definition for premature CVD	18%
Properly selected the requirement of genetic testing for accurate diagnosis of FH	56%
Opinion on healthcare provider to detect early FH	
Selected GPs as the most effective healthcare provider for the early diagnosis of FH	72%
Selected cardiologist as the second most effective healthcare provider for the early diagnosis of FH	54%
Selected laboratory report alerting system as a useful assistant in early detection of FH	36%
Practice and previous experience on management of patients with FH	
Phenotypical screening for FH in premature CVD	45%
Screening family members for FH	8%
Previous experience in care of patients with FH	44%
Age 0-6 y was selected as the appropriate age for screening young individuals for FH in a family with premature CAD	3%

CAD, coronary artery disease; CCU, coronary care unit; CVD, cardiovascular disease; FH, familial hypercholesterolemia; GP, General Practitioner; PCSK9, proprotein convertase subtilisin/kexin 9.

lipid clinics, which are considered essential for the adequate treatment of individuals identified with FH.[2] More than one-third of participants were not familiar with PCSK9 inhibitors as a novel recently available LDL-C modulator. PCSK9 inhibitors are available in well-developed healthcare systems, including in Australia, and they are an effective LDL-C−lowering therapy to reduce the risk of cardiovascular events.[17] Although there is no consensus with regard to the age of testing and commencement of statin therapy in children with a first-degree relative with FH, screening from age 5 years or even younger is recommended if homozygous FH is clinically suspected.[18]

Recognition of the importance of familial screening in FH, in particular of offspring, was markedly suboptimal in this survey. Poor documentation of family history with inadequate treatment plans in the medical records of both primary and tertiary practices may perpetuate this deficiency.[19,20] This is

important because, in contrast to the index case detection, the diagnosis of FH in immediate relatives by cascade screening has been shown to be effective and inexpensive.[21] Although the traditional diagnosis of FH is clinical, genetic testing to increase the accuracy of early diagnosis in addition to facilitating further cascade screening in their relatives is recommended.[22]

Because FH is a relatively common, but treatable lipid disorder, the World Health Organization criteria for disease screening in FH is applicable.[23] Cascade screening paves the way for subsequent diagnosis and treatment of FH in the first-degree relatives of index patients with early-onset coronary artery disease admitted to the CCU as part of a primary prevention strategy. Also, this will draw attention to the management of the index cases with FH who have already developed ACS for optimization of LDL-C−lowering therapy to improve secondary prevention. The strength of this study is that for the first time in Australia, data are exclusively addressing the awareness of FH among healthcare providers working in CCUs.

Study limitations

This study had a modest sample size; however, the response rate is noticeably high. To a certain extent, the selection of 4 health institutions was related to accessibility and the print-based design of the survey. It is possible that the knowledge gap is greater in subjects who did not complete the survey. We did not inquire about knowledge of other aspects, such as lipoprotein(a), which has a higher prevalence in FH, screening for elevated lipoprotein(a), or potential use of lipid apheresis for treatment. Finally, this survey was performed in only 4 health networks, located diversely in Melbourne metropolitan regions that may not reflect the overall knowledge of FH in Australia.

Conclusion

This qualitative study draws attention to a suboptimal FH awareness and proficiency of hospital-based healthcare providers involved in the management of ACS. Education and a holistic approach toward patients with FH through an integrated model of care, led by a dual trained cardiologist and lipid specialist, may enhance the current standard of care for patients with FH in CCUs across Australia.

Acknowledgements

Disclosures

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Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at https://www.cjcopen.ca/ and at https://doi.org/10.1016/j.cjco.2019.05.001.