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Analysis of online travel health information provision for patients travelling with cardiovascular disease

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Abstract

Background: Cardiovascular disease (CVD) is the leading cause of death among international travellers. Online travel health information is largely focused on infectious disease despite the higher burden of CVD in this patient population. There have not been any studies assessing the availability of key travel health information online for patients with CVD.

Methods: Websites of national societies of cardiology (NSC) affiliated with the European Society of Cardiology (ESC) were included in the study. A list of NSCs affiliated with ESC was obtained from the ESC website. All travel health information on the websites identified was analysed. Additional websites of medical societies not affiliated with ESC were assessed for comparison. Each NSC was individually contacted and asked to complete an anonymised questionnaire to identify any measures taken by each NSC towards travel health promotion among travellers with CVD.

Results: Two (4.5%) NSC websites contained relevant travel information. Topics addressed were venous thromboembolism (VTE) and pulmonary embolism (PE) prophylaxis, high altitude travel, implanted cardiac devices (ICD) and atrial fibrillation. The questionnaire arm of the study revealed that the majority of NSCs agree that travel health is an important aspect of CVD prevention and that there is a lack of online travel health information for this population.

Conclusion: Considering the significant risks travel can impose on patients with CVD, there is a disproportionate lack of information on this subject online.

Keywords: Travel health, cardiovascular disease, preventive medicine, European Society of Cardiology, air-travel.

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Introduction

Background

Cardiovascular disease (CVD) is one of the leading causes of death among international travellers.[1,2] Air travel presents specific challenges for patients travelling with CVD. Specific recommendations regarding air travel are not included in the European Society of Cardiology (ESC) guidelines. Complications, contraindications, and clinical recommendations for patients with CVD travelling by air are found in the literature.[3] Cardiac arrest is the leading cause of death in travellers engaging in strenuous long distance treks for recreational or pilgrimage purposes.[4,5]

Common conditions can be of increased significance to patients travelling with a history of CVD. For example, traveller's diarrhoea can cause volume depletion. Strict fluid balance is a mainstay of treatment for patients with heart failure. Volume depletion from gastrointestinal losses can have a significant impact on the patient's wellbeing. It is essential for practitioners to consider the appropriate vaccinations for patients travelling with CVD. Recommended vaccinations are determined for specific destinations and diseases.

The internet is being increasingly used among international travellers as a primary source of travel health information.[6] Considering the significance of travel as a risk factor for decompensation of CVD there is a

disproportionately scarce amount of information online for this patient population. Analysis of online resources from NSCs may help to highlight the potential for improved delivery of preventive medicine via the internet.The purpose of this study was to assess the quality and availability of travel health information online for patients with CVD.

Methods

Study Design

Qualitative and quantitative approaches were used to analyse the websites of the NSCs affiliated with the ESC (Table 1). Information pertaining to travel health and CVD was retrieved. Examples of relevant travel health topics are included in Table 2. Each website was carefully analysed and all links to additional resources pertaining to travel health were investigated. An original questionnaire was drafted and individually distributed to the NSCs. The aim of the questionnaire was two-fold, to assess the attitudes of each NSC towards travel health and CVD, and to determine any educational or preventive measures being taken by the NSC in the field of travel health that did not feature on their website.

Table 1. National society of cardiology travel health information provision

National Society of Cardiology with URL	Travel Health Information
Association of Cardiologists of Bosnia and Herzegovina https://ukbih.com/ukbih/bs/pocetna/	No
Azerbaijan Society of Cardiology http://www.akc.az/en/pages/1	No
Bulgarian Society of Cardiology https://bgcardio.org/	No
Croatian Cardiac Society https://www.kardio.hr/	No
Cyprus Society of Cardiology https://cycardio.com/	No
Czech Society of Cardiology https://www.kardio-cz.cz/en/	No
Danish Society of Cardiology https://www.cardio.dk/	No
Estonian Society of Cardiology https://www.eks.ee/en/info/	No
Finnish Cardiac Society https://www.fincardio.fi/	No
French Society of Cardiology https://www.sfcardio.fr/	No
Georgian Society of Cardiology http://geosc.ge/eng/	No
German Cardiac Society https://dgk.org/	No
Hellenic Society of Cardiology https://www.hcs.gr/	No
Hungarian Society of Cardiology https://mkardio.hu/info.aspx?sp=312&web_id=	No
Icelandic Society of Cardiology https://hjarta.is/en/	No
Irish Cardiac Society https://irishcardiacsociety.ie/	No
Italian Federation of Cardiology https://ifcardio.org/	No

National Society of Cardiology with URL	Travel Health Information
Latvian Society of Cardiology https://kardiologija.lv/	No
Lebanese Society of Cardiology http://www.lscardio.org/	No
Libyan Cardiac Society https://www.lcs.org.ly/	No
Lithuanian Society of Cardiology https://lcs.lt/	No
Luxembourg Society of Cardiology http://slcardio.lu/	No
Maltese Cardiac Society https://www.mcardios.org/	No
Moroccan Society of Cardiology http://smcmaroc.org/	No
North Macedonian Society of Cardiology http://mscardiology.org.mk/en/home-v1-2/	No
Norwegian Society of Cardiology https://www.legeforeningen.no/	No
Polish Society of Cardiology https://ptkardio.pl/	Yes
Portuguese Society of Cardiology https://spc.pt/	No
Romanian Society of Cardiology https://www.cardioportal.ro/	No
San Marino Society of Cardiology https://www.ssc.sm/	No
Cardiology Society of Serbia http://uksrb.rs/	No
Slovak Society of Cardiology https://www.sks.sk/	No
Slovenian Society of Cardiology https://sicardio.org/	No
Spanish Society of Cardiology https://secardiologia.es/	Yes
Swedish Society of Cardiology https://www.sls.se/svkf	No
Swiss Society of Cardiology https://www.swisscardio.ch/public/home/francais.asp?l=fr	No
Tunisian Society of Cardiology and Cardiovascular Surgery http://www.stcccv.org.tn/	No
Turkish Society of Cardiology https://tkd.org.tr/en/	No
Ukrainian Association of Cardiologists https://strazhesko.org.ua/	No
British Cardiovascular Society https://www.britishcardiovascularsociety.org/	No
Association of Cardiologists of Uzbekistan https://uzcardio.uz/?lang_is=set&lang_data=en	No

Table 2. Travel health topics examined in national cardiology society websites

Phase of Travel	Travel Health Topic
Pre-travel	Pre-travel consultation
	Vaccination
	Chemoprophylaxis
	Risk factor optimisation
	Contraindications to air travel
	Travel Insurance
During travel	Prevention of venous thrombosis
	Accessing medical services abroad
	Travelling with implanted cardiac devices
	Medication adherence
	Dietary behaviour at destination
	Physical activity
	Fluid status
Post-travel	Providing a travel history
	Importance of reporting symptoms

Sample and Participants

A list of NSCs officially affiliated with ESC was obtained from the ESC website. Only websites available in English were included. Websites that were unavailable, for example undergoing maintenance at the time of data collection, were excluded. Additional prominent medical societies from English-speaking countries were included for comparative purposes. These additional societies were not analysed. These websites included the American Heart Association (AHA), International Society of Travel Medicine (ISTM), British Thoracic Society (BTS), Irish Heart Foundation (IHF), Croí and the British Heart Foundation (BHF).

Data Collection

Data were collected from April to June 2022. The Google search engine was used to access each eligible website. For each website, all available pages and links to additional resources were investigated. Integrated search tools for each website were utilised where available. Key words were used to identify relevant data. Key words included: "Travel health", "Flying with CVD", "Patient advice for travelling with CVD", "Holiday with CVD", and "Pre-travel advice". Searches were conducted in English or using translations where NSC websites did not provide an official English version. Relevant information from each website was recorded using Microsoft Excel.

Data Analysis

The quantity of travel health variables addressed was recorded, as was the extent of information provided. Only NSCs affiliated with the ESC were included for statistical analysis. The six additional websites were analysed for comparative purposes. In the questionnaire arm of the analysis, categorical data were collected from the responses of each NSC. Each NSC was invited to provide additional comments on their society's role in the promotion of travel health in patients with CVD. Thematic analysis of the qualitative data from the questionnaire responses was not conducted and each response was assessed individually.

Ethical Approval

Ethical approval was granted by the Clinical Ethics Committee of Galway University Hospitals (approval number: C.A. 2759).

Results

Website analysis study arm

The website analysis arm of this study included the official websites of 44 (77%) of NSCs affiliated with the ESC. Of the 44 NSC websites assessed, two (4.5%) contained information specific to travel health and CVD. The travel health topics addressed by these websites included: VTE prophylaxis, pulmonary embolism (PE) prophylaxis, travelling to high-altitude destinations, travelling with implanted cardiac devices, and travelling with atrial fibrillation. Six (13.6%) contained information pertaining to CVD intended for patients and professionals. 19 (43%) websites contained links to additional resources for CVD information online. Eight (18%) websites contained links to ESC guidelines.

VTE prophylaxis

Patient information about PE and VTE prophylaxis was found on one NSC website. This included general information about VTE as well as specific advice for travelling patients. Information was provided on the website regarding safe travel for patients with a history of VTE through original posts and as responses in the "frequently asked questions" window. Long journeys were listed as a minor risk factor for VTE. Journeys over four hours were described as increasing the patient's risk of VTE, with journeys exceeding six hours increasing risk two-fold. Despite this relative risk, flying was deemed safe for those with a history of VTE. Prior to departure patients were advised to discuss their risk of VTE with a medical professional. Patients were advised to discuss pharmacological prophylaxis and compression stockings

with a doctor when planning long-distance flights. Risk factors such as obesity and active malignancy were listed as potential indications for compression stockings and potentially subcutaneous low-molecular weight heparin. Recommendations included physical activity, reducing immobility, hydration, healthy weight management, and smoking cessation.

Patients were encouraged to remain mobile during travel. A five-minute walk was recommended for every hour one spent travelling. Travellers were also advised to regularly move their feet while seated to promote circulation. Measures to limit physical restriction during travel were recommended. This included storing luggage away from one's feet to allow for unobstructed movement of the feet while seated. Patients were advised to prefer aisle seats for ease of access to space to walk during flight.

Atrial Fibrillation

Travelling with paroxysmal atrial fibrillation was discussed on the website of one NSC. This topic was covered in the "frequently asked questions" section of the NSC website. The website stated that travelling with stable atrial fibrillation was safe. Patients were advised that travelling by plane does not increase the risk of cardiac arrest in patients with stable atrial fibrillation. The website also stated that the risk of developing paroxysmal atrial fibrillation is not increased by flying.

Cardiac Devices

Advice surrounding travel with cardiac devices was provided on one NSC website. The information was provided in response to a question submitted by a patient regarding the safety of air travel with a cardiac monitor. It was recommended that patients travelling with cardiac devices carry appropriate documentation during their travels. This documentation should describe the patient's cardiac device and its purpose. This documentation should ideally be available in the language native to the traveller's destination. This website advised patients that while cardiac devices do not interfere with airport metal detectors, there is a small risk of this happening and hence documentation should be presented prior to interaction with security personnel. This website explained that during travel cardiac monitors will continue to function and monitor the patient's heart rhythm. Air travel was not regarded as a risk factor for inducing arrhythmia and was deemed safe from this perspective.

High Altitude

Travelling to high-altitude destinations was discussed on one NSC website. This website provided advice for patients who intend on travelling to high-altitude destinations for mountaineering. Specific information pertaining to patients with a history of PE was provided. The NSC website stated that, provided the travelling patient was physically fit and medically stable, travelling to high-altitude destinations should not significantly increase their risk of adverse cardiovascular outcomes. Advice included to maintain appropriate levels of hydration at high altitude.

Educational resources

19 (43%) of NSC websites had educational components to provide information on CVD in general. 14 (74%) of these websites provided information on CVD directed towards patients. 15 (79%) of these websites contained information on CVD directed towards healthcare professionals. Some of these websites included additional lifestyle advice for patients with CVD. For example, advice was provided on appropriate physical activity, diet, and smoking cessation. Information was available in the form of online articles, downloadable PDF documents, online videos, and online forums for communication. Two (10%) of the NSC websites that contained patient information provided advice for travel health and CVD.

Nineteen (43%) of the NSC websites provided hyperlinks to additional educational resources. There were no links to dedicated travel health information sources provided in the website analysis. Many of the additional resources linked by the NSC websites included hyperlinks to NSC scientific journals, scientific journals in cardiology and websites of other societies, including ESC. Hyperlinks to ESC guidelines were located on 8 (18%) of the websites analysed.

Analysis of non-NSC medical websites

Six additional websites of cardiac societies not officially affiliated with the ESC were selected for comparison. Five (83%) of these websites contained travel health advice, while 4 (66%) provided specific advice for patients travelling with CVD. Advice on pre-travel consultations was found on 4 (66%) of these additional society websites. Patients were advised to undergo a focussed medical assessment prior to travelling abroad. Recommended topics to be discussed during this consultation included VTE prophylaxis assessment, chemoprophylaxis specific to the traveller's destination and requirement for supplementary in-flight oxygen. One website published an article for patients with cardiac

devices, containing key questions that should be answered during their pre-travel consultation.[7] A directory was available on one website to allow patients to locate appropriate medical facilities to meet their travel health needs.This included medical practices offering vaccination and chemoprophylaxis specific to the traveller's destination. Travel insurance was addressed on 5 (83%) of the additional websites analysed. Patients were advised to obtain appropriate travel health insurance and to clarify the details of their insurance policy prior to departure. Advice regarding travelling with medications was provided on 3 (50%) of the websites analysed. Patients were advised to bring their prescriptions in their hand luggage as well as bringing a surplus of medications to ensure they do not run out of supplies.

Patient information on risk reduction for cardiovascular events whilst in transit was found on 5 (83%) of the additional websites assessed. Topics covered among these websites included: VTE prophylaxis, reducing levels of immobility, appropriate physical activity, and in-flight supplementary oxygen. One website provided specific VTE prophylaxis information for women travelling long distances. Patients were provided with a summary document on one website. This document gave general travel health advice for patients travelling with CVD. This article included dietary, physical activity, and other practical travel tips for patients.[8] This website also encouraged patients to bring a customisable wallet-sized card for patients travelling with implanted cardiac defibrillators and pacemakers. These cards contained the patient's details, the details of their doctor, and the specifications of their cardiac device.

Travel health advice for the patient after their arrival was found on 5 (83%) of the additional websites selected. Among the 5 websites, information was provided on high-altitude environments, temperature extremes, air pollution, physical activity, diet, and hydration. Patients travelling to high-altitude destinations were advised to not over-exert themselves physically and to pay particular attention to hydration. This information was also relayed to patients travelling to warm climates. Patient advice for cold weather conditions highlighted the increased risk of angina at cold temperatures and advised patients to be vigilant of symptoms and to avoid over-exertion.

Questionnaire study arm

Seven (14%) NSCs completed the online questionnaire arm of this study. One (14%) NSC felt that there was adequate travel health information online for patients with CVD. Two (28%) NSCs felt there was inadequate online information for medical professionals surrounding CVD and travel. Six (86%) of respondents agreed that travel health is an important aspect of CVD prevention. A single (14%) NSC in this arm of the study claimed to provide educational sessions in travel health and CVD that were not available on their website. Further information regarding choice of medium, frequency and content of these educational efforts was not provided. One (14%) NSC in this arm receives regular requests for travel health information. None of the NSCs in the questionnaire arm of this study had previously discussed the potential development of travel health guidelines for the prevention of CVD among travellers. All respondents to the questionnaire welcomed the idea of developing travel health guidelines for CVD in the future.

Each NSC was asked to provide additional comments regarding the role of travel health promotion in the prevention of CVD. One NSC expressed an interest to *"collaborate in the formation of travel guidelines"* in the future. The benefit of such guidelines was highlighted independently by another NSC, *"Having uniform recommendations which can be easily followed by all members will help streamline our recommendation".* Regarding the current availability of online information in this field, one NSC described the need "*to improve the knowledge of this topic in patients and cardiologists".*

Discussion

The primary finding of this study is that there was a lack of travel health information on NSC websites for this patient group. A small minority of websites analysed contained travel health information. Comparison with online information provided by alternative medical societies highlighted the relative paucity of information on NSC websites. The vast majority of NSCs agreed that travel medicine plays an important role in the prevention of CVD and unanimously welcomed the idea of developing travel health guidelines specifically for patients with CVD.

A cross-sectional study including 5000 patients found CVD to be one of the commonest comorbidities among travellers.[9] Travelling with a chronic illness can significantly increase the risk of developing travel-related medical complications including infectious disease.[10] A previous analysis of online sources of travel health information has found that there is a lack of travel health information available online for a variety of chronic illnesses.[11] Another analysis of airline company websites highlighted a lack of travel health information available for travellers.[12] This study has found that there is also a paucity of travel health information for patients with CVD available on NSC websites.

Environmental factors such as high altitude, air pollution and extreme temperatures can have a significant impact on patients with CVD.[13-16] In the analysis of NSC websites only VTE prophylaxis, travelling with atrial fibrillation, ICDs and travel to high-altitude destinations were discussed online among all 44 websites analysed. Attending a pre-travel medical consultation weeks before travelling can help patients to optimise their CVD risk before the additional risk of travel.[17] Reviewing the literature detailing common travel-related health issues may be useful for clinicians to appropriately counsel their CVD patients prior to travel.[18, 19] For example, some patients may benefit from pre-travel cardiac investigations such as exercise stress testing or echocardiography.[20]

Patients travelling with heart failure are at increased risk of travel related complications. Heart failure predisposes patients to oxygen desaturation during air travel.[21] Patients who maintain oxygen saturations greater than 90% at sea-level are unlikely to require supplementary oxygen during flight.[22] Other facets of heart failure management that can be influenced by travel include medication management, fluid balance and diet among others.[22]

Travelling with an ICD is generally considered safe and is not thought to cause interference with or lose function because of airport metal detectors.[23] Some companies that produce ICDs provide some travel advice online for patients equipped with their devices.[24] Information from these sources is limited and recommends that patients discuss travelling with their device with a medical professional.

Travel-focused medical consultations have been found to be effective in reducing rates of illness among travellers.[25] It is recommended that patients with chronic illness attend a specialised travel clinic prior to departure to reduce their risk of medical complications.[26] Pre-travel consultations have been associated with lower levels of various tropical diseases including illnesses with no available vaccine.[27]

Advice to attend a pre-travel clinic or prophylaxis for tropical diseases was not discussed on any of the websites of the NSCs assessed in this study. Health seeking behaviour can be uncommon among travellers.[18] The internet is a common source of travel health information for travellers and hence advice for patients travelling with CVD to attend a pre-travel medical consultation may help reduce their risk of travel related illness. A summary of immunisation recommendations was published by Ciszewski.[28]

It is recommended that patients travelling with CVD obtain travel health insurance. It is imperative that these patients investigate appropriate insurance coverage prior to departure. There is high variability in cover among policies with certain patients with CVD being denied medical insurance.[29] Therefore, it is essential that patients with CVD acquire appropriate insurance cover prior to travelling.

The ESC recommends that patients with CVD receive annual vaccination against influenza.[30] The incidence of acute myocardial injury and decompensation of heart failure have been found to be increased during influenza outbreaks.[31] Influenza vaccination has been shown to be effective in reducing adverse outcomes in the elderly including hospitalisation rates.[32] Despite a lack of randomised controlled evidence to support the benefit of routine pneumococcal vaccination, ESC recommends that patients with heart failure receive this vaccine.[33] In the website analysis of this study no information was found directed towards elderly patients travelling with CVD or specific immunisation advice for travellers.

Medication adherence is a key component of chronic disease management and non-adherence can pose a significant clinical challenge. A qualitative analysis of patients travelling with CVD found that concerns regarding medications were prominent among travellers.[34] Travelling patients with low medication adherence rates have been found to have worse control of their cardiovascular disease.[35] Polypharmacy is common among patients with CVD, and this increases the risk of non-adherence. Specific barriers to adherence among international travellers can include loss of routine whilst travelling, access to medications while in transit and addition of new medications prior to travel.[36] Advice to maintain medication adherence for travelling CVD patients was found on one medical society website recommending that patients bring additional supplies of their medications as well as additional documentation. Another important consideration for patients and clinicians is drug-drug interactions among travelling patients. Some medications which may be prescribed for travelling patients for traveller's diarrhoea, malaria and altitude sickness prophylaxis may interact negatively with regular CVD drugs.[37] This information was not available on the NSC websites assessed in this study.

Effective delivery of online medical information can be influenced by health literacy. Misinformation from online sources has been associated with disruption of the therapeutic relationship between a patient and their doctor.[38] As well as potentially harming therapeutic relationships, lower levels of health literacy have been shown to be an independent risk factor for all-cause mortality among patients with heart failure.[39] More

research is required to investigate the role of health literacy and travel related illness among patients with CVD.

When planning web-based delivery of travel health information it is important to provide information that will be effectively understood by people of varying degrees of health literacy. Difficulties in using technologies has been found to be a key barrier to the delivery of digital health technologies.[40, 41] Website design can influence patient interaction and satisfaction when seeking health information online.[42] An analysis of online health seeking behaviour recommends that governments and societies present health information online in an accurate and accessible manner to provide an optimal service for patients.[43] This can be improved by creating user-friendly interfaces and designing websites based on human-centred principles with consideration for the intended users.

Recommendations for future practice and research

This study has highlighted the gap in the current availability of travel health information online for patients with CVD. NSCs may look to update their websites to include relevant information for these patients. Formulation of travel health focus groups within NSCs may help to develop the travel health resources these societies provide for their members and patients. An example of an effective travel health resource is the travel health telephone service established by The National Travel Health Network and Centre in the UK. This service provides many travelling patients with relevant travel health information. [48] Development of similar services focussed on travellers with CVD has the potential to provide many patients with important medical advice for travelling. Most NSCs organise public events, many of which are advertised on the NSC's own website. Integrating discussion around travel health and CVD with expert guest speakers into the agenda of some of these events may help to develop further interest in the field.

Limitations of study

Not all ESC affiliated NSC websites were available online to be analysed. This may have led to relevant travel health information being missed during data collection. Some documentation made available on NSC websites was not available in English. Many NSC websites focussed on providing information for events being hosted by their society. The questionnaire arm of the study was limited due to a low response rate. Some questionnaire responses may have been completed by members of NSCs without a full knowledge of NSC activities.

Conclusion

Patients with CVD face multiple challenges when travelling. There is insufficient information on NSC websites for these patients regarding the risks associated with travel. NSCs should fulfil their responsibility to promote healthy travel of cardiac patients by providing relevant and accurate information on their websites and by engaging with travel medicine experts to ensure that this information is evidence-based and readily accessible to travellers with CVD or its risk factors. Further research is required to help reduce the risk of medical complications among these patients.

Highlights

What Is Already Known?

Online travel health information of relevance to cardiovascular disease patients is largely focused on infectious disease despite the higher burden of CVD in this patient population. There have not been any studies assessing the availability of key travel health information online for patients with CVD.

What Does This Study Add?

Patients with CVD face multiple challenges when travelling. There is insufficient information on national cardiac society websites for these patients regarding the risks associated with travel. Such websites should promote healthy travel of cardiac patients by providing relevant and accurate information on their websites and by engaging with travel medicine experts to ensure that this information is evidence-based and readily accessible to travellers.

Authors' Contributions

GF was responsible for study conception, study design, supervision and editing of the draft manuscript. AK led the data collection and analysis and was responsible for preparation of the manuscript draft. Both authors read and approved the final version of the manuscript.

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Consent For Publication

Not applicable

Ethics approval

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Conflict of interest:

None declared.

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