Clinical Interventions in Aging

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ORIGINAL RESEARCH

Graduated compression stockings in prevention of venous thromboembolism among acutely ill medical patients aged over 75 years: a French national survey

This article was published in the following Dove Press journal:
Clinical Interventions in Aging

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Background: The thromboprophylactic efficacy of graduated compression stockings (GCS) has not yet been demonstrated in acutely ill medical patients, and guidelines vary considerably. Older acutely ill medical patients appear to constitute a distinctive population presenting high risks of both thrombosis and bleeding.

Objective: To evaluate the practices and beliefs of a panel of French geriatricians regarding GCS management in acutely ill medical patients aged over 75 years.

Methods: A survey was designed to study French geriatric practice concerning GCS use for thromboprophylaxis.

Results: A total of 111 geriatricians answered the questionnaire. Among the responders, 46% declared frequent or very frequent prescription of GCS for preventing venous thromboembolism (VTE) in acutely ill, hospitalized medical patients, 54% declaring that they frequently re-evaluated GCS prescription during the patient's hospitalization. The main reason reported for discontinuing GCS use was patient request. Regarding complications of GCS, 87% of responders declared having already noted adverse effects with the use of GCS, although 80% estimated the risk of complications to be low or very low. In the context considered, the efficacy of wearing GCS was believed to be high or very high for 73% of responders. GCS prescription was judged to be in accordance with evidence-based medicine for 69%.

Conclusion: There is a gap between the frequent use of GCS to prevent VTE in older patients presenting an acute medical illness and the availability of data concerning their efficacy, safety, and management by nurses. Prospective trials including clinical and cost effectiveness are needed.

Keywords: thromboprophylaxis, mechanical prophylaxis, thrombosis, geriatrics, elderly

Introduction

While the efficacy in thromboprophylaxis of graduated compression stockings (GCS) has not yet been demonstrated in acutely ill medical patients,[1] even among patients with acute stroke,[2] guidelines vary considerably from one scientific society or country to another; some suggesting a systematic association of anticoagulant therapy and GCS in patients with high-risk of venous thromboembolism (VTE),[3] others not recommending the use of GCS except in patients who are bleeding or at high risk for major bleeding,[4,5] and others recommending against the use of them.[6]

Older adults hospitalized for an acute medical illness represent a particular population for the development of VTE. Indeed, in addition to their age, their

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submit your manuscript | www.dovepress.com
DovePress
http://doi.org/10.2147/CIA.S197603

reduced mobility in the context of both hospitalization and acute illness imply a Padua prediction score for VTE of ≥4 points, leading to consider all such patients as having a high risk of VTE.[7] At the same time, older patients frequently have a higher risk of bleeding after receiving pharmacological VTE prophylaxis than younger patients, partly due to frequent occurrences of renal impairment and drug interactions.[8] In addition, among the risk factors for bleeding reported in a multinational observational study including 10,866 hospitalized medical patients, an age ≥85 years (compared to age <40) was identified as one of the strongest risk factors for bleeding.[9]

So, older acutely ill medical patients appear to be a distinctive population in which both high thrombotic and hemorrhagic risks co-exist, but no specific trials evaluating the efficacy of GCS in term of VTE prevention have been conducted to date,[10] and usual practices are unknown. The aim of this survey was to evaluate the practices and beliefs among a panel of French geriatricians, regarding the management of GCS in acutely ill medical patients aged over 75 years.

Methods

Survey design

We designed a survey to study the French geriatrics practice in terms of GCS use for older patients hospitalized in geriatric wards for an acute medical illness. An electronic questionnaire, built by using LimeSurvey software, was sent by mail to geriatricians using the phone book from December 2017 to May 2018. Moreover, the survey was available online and diffused by the social network of young geriatricians. The survey included 39 questions divided into five parts: demographic characteristics of responders (part 1), frequency of GCS use, alone or with pharmacological thromboprophylaxis (part 2), criteria considered for GGS prescriptions (part 3), management of GCS during hospitalization (part 4), and beliefs of physicians about efficacy, safety, benefits, and risks of GCS (part 5).

The results are reported as medians and interquartile range (IQR) or numbers and percentages (%).

Patient and public involvement

This survey included physicians; no patients were involved in this study.

Results

One hundred and eleven physicians, working across 39/95 different counties and 22/29 university hospitals in metropolitan France, answered the questionnaire. Among the responders, 68% were attending physicians and 59% had more than 5 years of clinical experience in a geriatric ward. The median age of the responders was 34 years (range=24–63).

Among the respondents, 46% declared prescribing frequently or very frequently a GCS for the prevention of VTE in acutely ill medical patient hospitalized in a geriatric acute ward (Table 1). Eighty-six respondents (78.9%) declared prescribing a GCS in association with anticoagulant therapy, and, for patients who are bleeding or at high-risk of bleeding, 77% prescribed a GCS alone.

Among transitional criterion of VTE-risk, 73.9% of geriatricians considered immobilization, at least 3 days, as an indication to prescribe GCS, and 69 geriatricians (62,2%) considered an acute infection as an indication to prescribe GCS. Among permanent criterion of VTE-risk, medical history of VTE was considered by 91 respondents (82%) to be an indication of GCS.

During the period of hospitalization, 54% of the respondents declared frequently reevaluating the prescription of GCS, and, when it was made, it was mainly related to the patient's complaint and/or related to ischemic complications and or skin injury (nearly 80% of cases). In detail, the main usual causes for stopping GCS were the patients' request (78% of the cases), the presence of pain (66%), an ischemic complication (58%), and the ability of the patient to walk without help (60%) (Table 2).

Regarding complications of GCS, 97 respondents (87%) declared having already noted side-effects with use of GCS, even if 80% of geriatricians judged the risks of GCS to be low. The most observed complication was an isolated pain of the lower limbs (62%). Fifteen percent of the respondents had already observed an ischemic complication, and 37% declared having already noted a cutaneous complication. Patient falls induced by the wearing of GCS were noticed by 10% of the respondents.

Nearly 40% of geriatricians did not know how nurses were trained to put on and manage GCS, and considered that the nursing time dedicated to the management of GCS for one patient per day per patient was low or very low (Table 2).

The efficacy of wearing GCS for acutely ill medical patients in a geriatric ward was believed to be important or very important for 73% of the responders. In addition, the safety of GCS appeared for French geriatricians to be very good, with a risk of complication estimated to be low or very low for 80% of them. Finally, their GCS prescription

Table 1 Frequency and circumstances of prescription of GCS

Use of GCS (n=111)	Responders, n (%)
Very frequently	15 (14)
Frequently	36 (32)
Not frequently	40 (36)
Not at all frequently	20 (18)
GCS and pharmacological thromboprophylaxis (n=109)	
In association with anticoagulant therapy	
Very frequently	49 (45)
Frequently	37 (34)
Not frequently	15 (14)
Not at all frequently	8 (7)
Use GCS alone if bleeding or high-risk of bleeding	
Very frequently	55 (50)
Frequently	29 (27)
Not frequently	16 (15)
Not at all frequently	9 (8)
Criteria for GCS prescription (n=111)	
Transient VTE-risk	
Planned immobilization <30 days	82 (74)
Recent stroke	73 (66)
Acute respiratory failure	50 (45)
Congestive heart failure (NYHA class III or IV)	66 (59)
Acute infection	69 (62)
Other	4 (4)
Permanent VTE-risk	
Personal history of VTE	91 (82)
Personal history of thrombophilia	60 (54)
Personal history of myocardial infarction	3 (2,7)
Personal history of stroke	20 (18)
Cancer	76 (68)
Obesity	26 (23)
Chronic respiratory failure	13 (12)
Chronic heart failure	38 (34)
Varicose veins or postphlebitic syndrome	78 (70)
Other*	24 (22)

Abbreviations: GCS, graduated compression stockings; NYHA: New York Heart Association Functional Classification; VTE, venous thromboembolism.

was also judged, for 69% of them, to be in accordance with evidence-based medicine (Table 2).

Discussion

To our knowledge, this is the first survey reporting the clinical practice and feelings of French geriatricians about GCS in acutely ill medical older patients. This question appeared of great importance, as no specific guidelines or trials exist in this population, despite its high risk of thrombosis. We found that approximately half of the responding geriatricians prescribed frequently or very frequently GCS in prevention of VTE among acutely ill medical patients aged over 75 years, even in the absence of contraindication to anticoagulant prophylaxis. Geriatricians think that the efficacy of GCS in terms of VTE prophylaxis is important and that their use is in accordance with the Evidence Based Medicine. So, there is a great gap between their knowledge and the Evidence Based Medicine. Indeed, only two randomized studies have been performed in acutely ill medical patients comparing the use of GCS with no GCS. These studies (including 80 patients with myocardial infarction and 2,518 post-stroke patients, respectively) did not show any evidence for an efficacy of GCS,[2,11] although it is important to note that the CLOTS trial failed to measure patients legs when fitting the GCS, and did not have a robust fitting protocol.[12] The confusion could possibly be created or induced by the recommendations made by medical authorities or experts that propose mechanical prophylaxis for all acutely ill medical patients.[3,13,14] This confusion could also be maintained by guidelines that propose mechanical prophylaxis in acute medically ill patients with contraindication to anticoagulants, even if it has never been tested in a randomized trial.[4,5]

In the respondents' clinical practice, previous history of VTE and planned immobilization <30 days were the main risk factors considered to prescribe GCS, while cancer, lower-limb paralysis, and congestive heart or respiratory failure, for example, were not cited alone as a main indication of GCS. In acutely ill younger medical patients, three large international datasets showed that all these diseases were the main reasons for a pharmacological prophylaxis prescription, with a very low use of mechanical prophylaxis, alone or not (1.2%, 6%, and 7.2%, respectively).[15–17] In fact, for French geriatricians, everything happens as if, no matter the initial cause of hospitalization, an immediate immobilization is by itself a good indication of GCS as it was yet observed.[18]

The large use of GCS in geriatric wards is also supported by the feeling of geriatricians that GCS is safe, do not need a particular monitoring and is not time consuming for nurses. This is not totally supported by the literature. Indeed, in the only trial in which adverse effects of thigh-length GCS were prospectively explored, the rate of adverse events, including skin breaks, ulcers, blisters, skin necrosis,

Table 2 Management and beliefs of GCS use

Management of GCS (n=107)	Responders, n (%)*
Re-evaluation of GCS during hospitalization	
Very frequently	8 (7)
Frequently	50 (47)
Not frequently	43 (40)
Not at all frequently	6 (6)
Re-evaluation criteria	
Systematically	22 (21)
Patient able to walk with help	12 (11)
Patient able to walk without help	61 (57)
Related to patient's complaint	88 (82)
Related to fall	21 (20)
Related to ischemic complication	79 (74)
Related to skin injury	84 (79)
Usual reasons for discontinuing GCS use	
Patient's request	83(78)
Pain	71 (66)
Acute ischemia	62 (58)
Fall	14 (13)
Slippage of GCS	41 (38)
Patient able to walk without help	64 (60)
Skin injury	42 (39)
Nurse's request	17 (16)
Attitudes towards GCS use (n=103)	
Evaluation of time consumption	
Very important	2 (2)
Important	59 (57)
Not important	40 (39)
Not at all important	2 (2)
Evaluation of time (minutes) needed for GCS management, median (IQR)	5 (3–7,25)
Estimation of benefits of GCS	
Very high	11 (11)
High	64 (62)
Not high	26 (25)
Not at all high	2 (2)
Estimation of risks of GCS	
Very high	1 (1)
High	20 (19)
Not high	78 (76)
Not at all high	4 (4)
Estimate agreement with EBM	
In agreement with EBM	71 (69)
Not in agreement with EBM	25 (24)
Do not know	7 (7)

Abbreviations: EBM, evidence-based medicine; GCS, graduated compression stockings; IQR, interquartile range.

and lower limb amputation was low (less than 6%), but significantly more common in patients allocated to GCS than in those allocated to avoid GCS.[2] In the same way, it has been well reported that, due to the complexity of achieving a good fit, a proportion of patients could have poorly adapted GCS.[2,19] It is important to note that the fit of GCS has a significant impact on effectiveness, tolerance, and complications. However, hospital investments in GCS adapted to the majority of their patients.[20] Finally, more information (eg, appropriate application time and effective minimum application time) as well as educational programs are claimed by nurses, themselves, as they consider they don't feel trained enough for the application of GCS.[21,22]

Our study has several limitations. First, because the number of French geriatricians who work in an acute geriatric ward is unknown, we could not evaluate the rate of respondents. However, 75% of the responders work in a university hospital. We think that the results of this survey reflect the main opinion of geriatricians in France. Second, we reported the beliefs of geriatricians rather than their actual practices. Therefore, the reported responses may reflect the politically desirable answer, rather than the respondents' actual beliefs.

Our findings show a diversity of use of GCS. New randomized controlled trials are necessary to evaluate risks and benefits of GCS in older patients. These trials will have to take into account the optimal fit of GCS, the pressure exerted on the legs, the characteristics of the patients, in particular their degree of mobility, the evaluation of the arterial state, and the impact of the GCS on the quality-of-life during hospitalization. The safety of GCS must also be carefully assessed in future trials. Finally, the evaluation of the GCS training and fitting program must be a key element.

Conclusion

This survey reveals that a large proportion of French geriatricians use GCS in first line, alone or in association with anticoagulant therapy to prevent VTE in older patients who are hospitalized for an acute medical illness. Knowledge about VTE prophylaxis in older patients, including pharmacological prophylaxis, is limited. The use of GCS remains heterogeneous, and the risks are possibly underestimated by physicians. Our findings support the need for prospective trials to better define the risks and benefits of GCS in older patients.

Acknowledgments

This survey did not include patients or patient data, and was a non-mandatory questionnaire for physicians; it did not need to receive ethical approval. This study is not affected by the French law n°2002-300, March 5, 2012 and did not require ethical approval.

Author contributions

All authors contributed toward data analysis, drafting and critically revising the paper, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work.

Disclosure

All authors declare no conflicts of interest in regard to this work.

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