

Thromboprophylaxis for varicose vein procedures – A national survey

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Abstract

Background: Venous thromboembolism is rare following varicose vein ablation procedures, but uncertainty about its incidence combined with a lack of evidence-based clinical guidelines regarding thromboprophylaxis has led to debate about best practice. We conducted a national survey to investigate current practice among Irish vascular surgeons.

Methods: An anonymous online questionnaire was emailed to all members of the Irish Association of Vascular Surgeons and the Northern Ireland Vascular Society.

Results: Response rate was 60%. With regard to procedure type, 36.7% of respondents use only endovenous techniques and 53% use a combination of open and endovenous. Formal duplex imaging on all patients is obtained by 53.3%. With regard to VTE prevention, 73.3% always give thromboprophylaxis. For those who give it selectively, a variety of factors were considered as risks. Pharmacological agents used are enoxaparin in 73.3% of cases or tinzaparin, and 71.4% use a single dose (either 20/40 mg or 3500/4500 IU respectively). If patients are already taking anticoagulation, this is continued by 46.7% of respondents. Routine post procedure duplex imaging is carried out by 23.1% of recipients, either by the surgeon or formally and 80% review patients clinically. Moreover, 43.3% of respondents claim to know their post-operative VTE rate and this varies from 0 to 1% with one mortality reported.

Conclusions: The majority of respondents use single-dose thromboprophylaxis periprocedurally for varicose vein ablation procedures. VTE rates are low but the true incidence may be unknown.

Keywords

Ambulatory phlebectomy, compression stockings, deep vein thrombosis, duplex ultrasound, endovenous thermal ablation

Background

Venous thromboembolism (VTE) is rare following varicose vein ablation procedures¹ but can be associated with significant morbidity and mortality.^{2,3} An epidemiological study of six countries in Europe showed that VTE causes over 370,000 deaths every year, with almost three quarters of these being hospital-acquired VTE.⁴

The risk of deep venous thrombosis (DVT) following varicose vein ablation procedures is usually quoted as <1%⁵ although the risk can vary between different studies, and has been estimated as 5–10 times higher in studies which use formal imaging to detect DVT. The European Society of Vascular Surgery (ESVS) guidelines quote a DVT rate of between 0.3% and 7.8% and specify that the risk has not been found to be greater after endovenous treatment.⁶

However there is no evidence to support routine thromboprophylaxis for ambulatory vein surgery.

The Society for Vascular Surgery and American Venous Forum guidelines,⁷ and European guidelines⁶ state that evidence is insufficient. One study frequently quoted is that by Enoch et al.,⁸ who published a study of thromboprophylaxis for day case hernia and open varicose vein surgery and showed no benefit in terms of DVT rates, with 2186 varicose vein procedures included. San Norberto Garcia et al. conducted a randomised controlled trial of thromboprophylaxis after varicose vein surgery and found no benefit in the study group

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but this may have been due to the low event rate as there were no cases of DVT in either arm of the study.⁹

While thromboprophylaxis is recommended for high-risk patients (i.e. some thrombophilia's, previous DVT etc.) there appears to be some practice variation with regard to routine thromboprophylaxis in average risk patients. A recent survey of vascular surgeons in Greece showed that 52% use routine thromboprophylaxis for open varicose surgery and 58% for endovenous, suggesting a lack of consensus.¹⁰

Given this uncertainty, the aim of this study was to assess thromboprophylaxis practice for varicose vein procedures among vascular surgeons in Ireland.

Methods

An online questionnaire was developed (SurveyMonkey.com). Questions relating to varicose vein practice (i.e. open/endovenous, type of anaesthetic), use of duplex imaging, thromboprophylaxis practice and experience with post-procedural VTE were included. The questionnaire was sent to all vascular surgeons who are members of the Irish Association of Vascular Surgery (IAVS) and the Northern Ireland Vascular Society (NIVASC).

An email was sent to all vascular surgeons inviting them to complete the questionnaire with a link to the questionnaire. They were informed their responses were anonymous. A reminder email was sent two weeks later.

Information was gathered using the Survey Monkey website and data were transferred to an excel spreadsheet for analysis. Chi-squared tests were used to compare data where appropriate and a p value of <0.05 was considered significant.

Results

The response rate was 60% of the 50 vascular surgeons who were contacted.

With regard to varicose vein practice, 53% use both open and endovenous techniques, while 36.7% use only endovenous and 10% only open. For those surgeons who use endovenous techniques, radiofrequency ablation (RFA) was more common than endovenous laser treatment (EVLT) – 51.9% vs. 11.1%, although 33% of surgeons use a combination of techniques including foam sclerotherapy and glue. The majority of our respondents (56.7%) perform phlebectomies at the same time as the truncal ablation procedure. Only 20% perform varicose vein procedures in a dedicated ambulatory unit. The majority of surgeons use either main theatre or day theatre, with 30% only using main theatre. With regard to anaesthetic practice, 31% use general anaesthetic, 41% use local and the remaining surgeons use a combination of techniques. Pre-

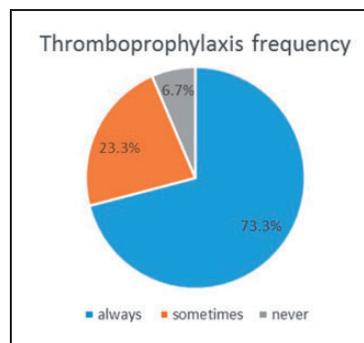


Figure 1. Frequency of periprocedural thromboprophylaxis for varicose vein procedures.

operatively 53.3% obtain formal duplex imaging on all patients, 33% get formal imaging only in certain cases (i.e. unusual venous anatomy, leg swelling etc.) and the remainder image patients in clinic at the time of outpatient consultation.

When asked about thromboprophylaxis, 73.3% of vascular surgeons always give it routinely. Only 6.7% do not give it and the remainder give it sometimes (Figure 1). The commonest reason given for not giving thromboprophylaxis was the lack of evidence to support its routine use.

When asked to rate which risk factors they consider most important, the highest scoring risk factors were a history of thrombophilia, malignancy, bilateral procedures i.e. both legs treated in one session and obesity (Figure 2).

The thromboprophylactic agent given most frequently is enoxaparin (73.32%), followed by tinzaparin (23.3%), and while a variety of doses were given, those giving tinzaparin gave a lower dose more frequently compared to enoxaparin (85.7% give 3500 IU tinzaparin vs. 27% give 20 mg enoxaparin, $p=0.204$). Of those giving prophylaxis, 71.4% give a single dose, the remainder give a longer course.

There was also variation in practice in other related areas. With regard to the oral contraceptive pill (OCP), 56.7% hold it peri-operatively and 26.7% continue it. Some surgeons only hold oestrogen-containing OCP. For patients already on anticoagulants, 46.7% continue, 10% continue but check an International Normalised Ratio (INR) if the agent is warfarin, and 30% hold it pre-operatively and check INR (if the agent is warfarin). The remainder adopt a variety of approaches including bridging with a low molecular weight heparin in some cases.

Responses regarding post-operative practice are shown in Table 1. All surgeons use compression hosiery post ablation but for variable durations and most surgeons review patients clinically but do not image them routinely.

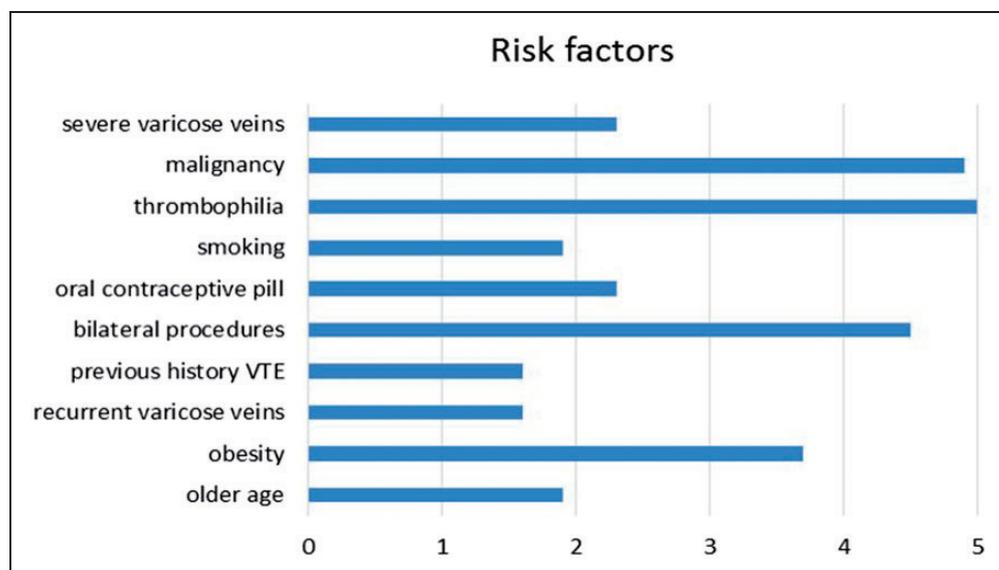


Figure 2. Importance of various thromboembolic risk factors as rated by survey respondents where 1 = not important and 5 = very important.

Table 1. Responses to questions about post-operative practice.

Question regarding post-op practice	% Answering yes
Do you use compression hosiery post-op?	100 (1–6 weeks duration)
Do you advise patients about DVT risk?	97
Do you advise patients not to fly post-op?	89.7
Routine post op duplex?	23.3 (not all formal)
Routine post-op review	80

With regard to VTE, 43.3% claim to know their event rate. Personal surgeon VTE rates varied from 0 to 1%, and occurred anytime between 3 and 31 days post-operatively. (This figure can be assumed to represent clinically symptomatic VTEs as not all patients have routine post-procedural imaging.) There was variability regarding symptoms, outcome and treatment modality (events occurred after all modalities i.e. RFA, EVLT, mechanochemical ablation and foam sclerotherapy) and there was one 30-day mortality recorded.

Discussion

There still exists considerable uncertainty about the true incidence of VTE after varicose vein procedures and a lack of evidence regarding the need for routine

thromboprophylaxis. The aim of this survey was to assess practice patterns among Irish vascular surgeons.

Practice patterns

The biggest development in varicose vein treatment in recent years has been the move towards ambulatory endovenous procedures, although as we have demonstrated in this survey, many Irish vascular surgeons still use open techniques and over a third use general anaesthetic. There is also considerable practice variation with regard to location of procedure (i.e. theatre, dedicated ambulatory unit etc.) and concomitant phlebectomies. The NICE¹¹ and ESVS⁶ guidelines do not make specific recommendations in all areas – for example the NICE guidelines state that endovenous ablation should be performed in preference to open surgery where available, with endothermal ablation the technique of choice.¹¹ Anecdotally the majority of Irish vascular surgeons have access to endovenous equipment although this can be site-dependant. The NICE guidelines also recommend pre-procedural duplex ultrasound to plan treatment and assess the extent of truncal incompetence. Just over half of our respondents obtain formal pre-operative imaging although many surgeons perform their own imaging at the time of consultation. Before the introduction of endovenous techniques many surgeons would have planned open varicose vein surgery based on clinical assessment only. The ESVS guidelines recommend that patients are treated in an outpatient setting under local tumescent anaesthesia, which permits early ambulation,

reducing the risk of possible thromboembolic complications.⁶

We found more consensus around post-procedural practice with all surgeons recommending at least some form of compression hosiery although there were variations in duration, from 1 to 6 weeks. Patients are specifically warned about post-procedural DVT by nearly all respondents (97%). The majority of surgeons review patients post-operatively in an outpatient clinic setting but do not image them routinely.

DVT rates

While a rate of <1% is usually quoted, there is variation in VTE rates in different studies. The ESVS guidelines quote a rate of 0.2%–1.3%⁶ and state there is no difference in VTE rates following endovenous and open techniques, although some papers have shown lower rates with endovenous, i.e. Kurihara et al. quote a VTE rate of 0.3% post RFA and 0.4% post EVLT.¹² Other studies quote a slightly increased risk with RFA compared to EVLT.¹³ Barker et al., in a retrospective study, found the risk of DVT was lower at 30 days with foam sclerotherapy compared to other modalities.¹⁴ One of the issues is that most retrospective case series report an incidence of DVT of approximately 1%, based on a clinical diagnosis. As we have shown in this study, the majority of vascular surgeons see patients clinically but do not routinely image them post op. Despite this 43% of surgeons claimed to know their personal VTE rates and quoted figures. Typically patients who present with clinical symptoms post varicose vein procedures will have a duplex performed. However, prospective studies which systematically detected DVT by means of duplex ultrasound showed that the true incidence might be 5–10 times higher than expected on a clinical basis.^{5,14,15} There is also a recognised increased risk of DVT in primary care patients who have varicose veins regardless of surgery.¹⁶ Also in the Republic of Ireland there is no universal health record number meaning that patients who are diagnosed with a VTE in a different hospital from where they had their venous procedure may not be notified to the surgeon who performed it, particularly if the event is diagnosed some time after the procedure. Anecdotally, in our centre a patient was seen by a medical team with a DVT several days after endovenous ablation but this was not notified to the vascular team and was only noted when the patient returned for their routine post-operative review to a vascular outpatient clinic. There is a universal health care number in Northern Ireland, making it easier to track complications. In this study, VTE was diagnosed at various stages post op including one case at 31 days. Although the DVT may have been present before

this, it is clear that formal imaging at for example one week post-op may miss some cases of DVT.¹⁴

The other issue is the difference between endovenous heat-induced thrombosis (EHIT) and formal DVT. EHIT can be divided into four categories, the fourth of which is often classified as a DVT; therefore, some would view EHIT and DVT as both on the same continuum.¹⁷ It can be argued that the aim of varicose vein ablation is to induce Class 1 EHIT, and some authors have demonstrated that while EHIT may occur frequently it is usually self-limiting and of little clinical significance. Kane et al.¹⁸ describe an EHIT rate of 5.1% but reported no pulmonary embolism (PE) and all cases resolved fully with treatment. It has been found more frequently in some studies. Kitagawa and Nagao¹⁹ report an EHIT rate of 21% after RFA with formal duplex surveillance when imaged at seven days post procedure, but the incidence dropped when imaged subsequently. This may lead to differences in reporting standards and inconsistencies in diagnosis. There have also been reports of VTE not preceded by EHIT, so clearly post-procedural DVT can occur by different mechanisms. Interestingly, a recent large systematic review by Healy et al. which examined thrombotic events after endovenous thermal ablation of the great saphenous vein in studies where a duplex was performed within 30 days found that DVT rates may be as low as 0.3% (as distinct from deep venous thrombotic events which includes EHIT).²⁰ Although this figure is in keeping with the ranges quoted in the European guidelines and other studies it seems lower than expected, and may be related to timing of imaging and publication bias. Despite this, given the huge numbers of venous ablation procedures performed, periprocedural thrombotic events remain a significant issue.

Thromboprophylaxis – Practice and factors

There is a lot of variation in practice with regard to routine thromboprophylaxis. Nikopoulos et al. surveyed Greek vascular surgeons in 2012¹⁰ and found that 58% give thromboprophylaxis routinely after endovenous procedures. An older survey from 1995 of the Vascular Surgical Society of Great Britain and Ireland²¹ showed that only 12% gave routine prophylaxis after open varicose vein surgery. With the passing of time, increasing numbers of surgeons appear to be giving prophylaxis despite the lack of evidence. Puggioni et al. suggested giving prophylaxis to any patients aged > 50 given the increased rate of spontaneous DVT in the older population.²² Our survey showed less practice variation among Irish vascular surgeons as nearly 75% of surgeons always give prophylaxis. However there is variation among type of agent, dose and number of doses. However almost all

our respondents give a subcutaneous agent although there is evidence that oral agents such as rivaroxaban may be a suitable alternative with a similar bleeding risk.²³ Interestingly, some of the patients who had a VTE in this study had been given thromboprophylaxis but the event rate is too low to draw any conclusions.

Some surgeons use thromboprophylaxis selectively, i.e. only in those patients who they consider to be high risk. There are evidence-based risk factors for VTE following general surgical procedures, and these include age, obesity, a past history of thromboembolism, varicose veins, the oral contraceptive pill, malignancy, Factor V Leiden gene mutation, general anaesthesia and orthopaedic surgery.²⁴ However some surgeons may be unaware of the relative importance of such risk factors. For example the factor V Leiden mutation is the only thrombophilia associated with a higher risk of VTE²⁴ yet vascular surgeons in this survey ranked thrombophilias in general as the most important risk factor for VTE. There is clear evidence to recommend prophylaxis for high-risk patients,^{6,25–27} although risk assessment should be calculated individually for different patients.

In an era of defensive medicine,²⁸ and given that varicose vein surgery has been known as the most litigious area of vascular surgery,²⁹ it may therefore be advisable to give at least one routine dose perioperatively. There is little risk associated with a single dose, and if 75% of our colleagues in this country give it routinely, it may be advisable to do so based on the Bolam principle³⁰ despite the lack of evidence supporting its routine use.

Although the VTE rate is low, there has been at least one mortality in this dataset, and as discussed VTE rates may be under-reported, or not made known to the vascular team who performed the venous procedure.

Limitations

Our survey has some limitations. We had a response rate of 60% however this would usually be considered acceptable for an email survey.³¹ By their own admission, while many surgeons who responded claimed to know their DVT rates, very few undertake formal duplex imaging so VTE rates are likely underestimated. However this reflects real-life, current practice. There is also considerable practice variability peri-operatively (anaesthesia, concomitant phlebectomies, etc.) which may affect DVT rates, and the majority of surgeons do not perform formal imaging pre-operatively so pre-existing DVT cannot be ruled out.

Conclusions

In conclusion, we have identified considerable practice variation around the treatment of varicose veins, with more consensus regarding thromboprophylaxis. The majority of our respondents (73.3%) give thromboprophylaxis routinely, despite a lack of high quality evidence to support this. VTE rates are low but the true incidence may be unknown. However, we feel the benefits of thromboprophylaxis outweigh the risks and we would welcome national guidelines around the peri-operative treatment of varicose veins in order to reduce practice variation within this country.

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Ethical Approval

Not required.

Guarantor

None.

Contributorship

EB researched literature and designed/disseminated the survey, analysed results and wrote the first draft of the manuscript. JR, MO'D and DH were involved in literature review and conception of the study and survey design. SB was involved in conception of the study, survey design analysis of results and edited the first draft of the manuscript. All authors approved the final version.

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References

1. Mundy L, Gawenda M, Heckenkamp J, et al. Meta-analysis of endovenous laser treatment of varicose veins. *Br J Surg* 2005; 92: 1189–1194.
2. Goldhaber SZ, Visani L and De Rosa M. Acute pulmonary embolism: clinical outcomes in the International Cooperative Pulmonary Embolism Registry (ICOPER). *Lancet* 1999; 353: 1386.

3. Heit JA, Silverstein MD, Mohr DN, et al. Predictors of survival after deep vein thrombosis and pulmonary embolism: a population-based, cohort study. *Arch Intern Med* 1999; 159: 445–453.
4. Cohen AT, Agnelli G, Anderson FA, et al.; VTE Impact Assessment Group in Europe (VITAE). Venous thromboembolism (VTE) in Europe. The number of VTE events and associated morbidity and mortality. *Thromb Haemost* 2007; 98: 756–764.
5. Testroote MJ and Wittens CH. Prevention of venous thromboembolism in patients undergoing surgical treatment of varicose veins. *Phlebology* 2013; 28 (Suppl 1): 86–90.
6. Wittens C, Davies AH, Bækgaard N, et al.; European Society for Vascular Surgery. Management of chronic venous disease: clinical practice guidelines of the European Society for Vascular Surgery (ESVS). *Eur J Vasc Endovasc Surg* 2015; 49: 678–737.
7. Gloviczki P, Comerota AJ, Dalsing MC, et al. The care of patients with varicose veins and associated chronic venous diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *J Vasc Surg* 2011; 53: 2S–48S.
8. Enoch S, Woon E and Blair, SD. Thromboprophylaxis can be omitted in selected patients undergoing varicose vein surgery and hernia repair. *Br J Surg* 2003; 90: 818–820.
9. San Norberto García EM, Merino B, Taylor JH, et al. Low-molecular-weight heparin for prevention of venous thromboembolism after varicose vein surgery in moderate-risk patients: a randomized, controlled trial. *Ann Vasc Surg* 2013; 27: 940–946.
10. Nikolopoulos S, Charalimpidis DG, Georgakarakos EI, et al. Thromboprophylaxis practices following varicose veins surgery. *Persoc Vasc Endov Surg* 2012; 24: 80–86.
11. National Institute for Health and Clinical Excellence. *Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital*. London: National Institute for Health and Clinical Excellence.
12. Kurihara N, Hirokawa M and Yamamoto T. Postoperative venous thromboembolism in patients undergoing endovenous laser and radiofrequency ablation of the saphenous vein. *Ann Vasc Dis* 2016; 9: 259–226.
13. Brar R, Norden IM, Hinchcliffe RJ, et al. Surgical management of varicose veins: meta-analysis. *Vascular* 2010; 18: 205–220.
14. Barker T, Evison F, Benson R, et al. Risk of venous thromboembolism following surgical treatment of superficial venous incompetence. *Vasa* 2017; 46: 484–489.
15. van Rij AM, Chai J, Hill GB, et al. Incidence of deep vein thrombosis after varicose vein surgery. *Br J Surg* 2004; 91: 1582–1585.
16. Müller-Bühl U, Leutgeb R, Engeser P, et al. Varicose veins are a risk factor for deep venous thrombosis in general practice patients. *Vasa* 2012; 41: 360–361.
17. Marsh P, Price BA, Holdstock J, et al. Deep vein thrombosis (dvt) after venous thermoablation techniques: rates of endovenous heat-induced thrombosis (EHIT) and classical DVT after radiofrequency and endovenous laser ablation in a single centre. *Eur J Vasc Endovasc Surg* 2010; 40: 521–527.
18. Kane K, Fisher T, Bennett M, et al. The incidence and outcome of endothermal heat-induced thrombosis after endovenous laser ablation. *Ann Vasc Surg* 2014; 28: 1744–1750.
19. Kitagawa A and Nagao T. Endovenous heat-induced thrombosis after radiofrequency ablation for varicose veins – when and why it happened? *J Vasc Surg* 2017; 65: 25S–26S.
20. Healy DA, Kimura S, Power D, et al. A systematic review and meta-analysis of thrombotic events following endovenous thermal ablation of the great saphenous vein. *Eur J Vasc Endovasc Surg* 2018; 56: 410–442.
21. Campbell WB and Ridler BMF. Varicose vein surgery and deep vein thrombosis. *Br J Surg* 1995; 82: 1494–1497.
22. Puggioni A, Kalra M, Carmo M, et al. Endovenous laser therapy and radiofrequency ablation of the great saphenous vein: analysis of early efficacy and complications. *J Vasc Surg* 2005; 42: 488–493.
23. Keo HH, Baumann F, Diehm N, et al. Rivaroxaban versus fondaparinux for thromboprophylaxis after endovenous laser ablation. *J Vasc Surg Venous Lymphat Disord* 2017; 5: 817–823.
24. Edmonds MJ, Crichton TJ, Runciman WB, et al. Evidence-based risk factors for postoperative deep vein thrombosis. *ANZ J Surg* 2004; 74: 1082–1097.
25. Hirsh J, Dalen J and Guyatt G. The sixth (2000) ACCP guidelines for antithrombotic therapy for prevention and treatment of thrombosis. *Chest* 2001; 119: 1S–2S.
26. Scottish Intercollegiate Guideline Network: Guideline no. 62, www.sign.ac.uk (May 2004, accessed 21 January 2019).
27. Caprini JA. Risk assessment as a guide for the prevention of the many faces of venous thromboembolism. *Am J Surg* 2010; 199: S3e10.
28. McQuade JS The medical malpractice crisis—reflections on the alleged causes and proposed cures: discussion paper. *J R Soc Med* 1991; 84: 408–411.
29. Campbell WB, France F and Goodwin HM; Research and Audit Committee of the Vascular Surgical Society of Great Britain and Ireland. Medicolegal claims in vascular surgery. *Ann R Coll Surg Engl* 2002; 84: 181–184.
30. *Bolam v Friern Hospital Management Committee*, 1957, 1 WLR 582, <https://lexlaw.co.uk/wp-content/uploads/2018/02/Bolam.pdf>.
31. Nulty DD. The adequacy of response rates to online and paper surveys: what can be done? *Assess Eval High Educ* 2008; 33: 301–314.