**Title:** Communicating cardiovascular disease risk to people with psoriasis: What techniques do practitioners use?

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**Abstract**

**Purpose**

Psoriasis can be associated with unhealthy lifestyle behaviours such as smoking, excess alcohol use and insufficient physical activity, consequently increasing cardiovascular disease (CVD) risk. Healthcare practitioners are expected to discuss lifestyle risk factors with patients with a view to reducing health-related risk for patients. However, little is known about the techniques used to communicate information about risk to patients with psoriasis. We aimed to examine how primary care practitioners communicate risk information when conducting CVD risk assessments.

**Methods**

Consultations (n=44) between primary care practitioners (general practitioners and practice nurses) and patients with psoriasis across 10 practices were audio-recorded and analysed using content analysis. A coding frame was used to record specific techniques used by practitioners to communicate risk information.

**Results**

Most frequently used communication methods were verbal descriptors of risk factors accompanied by numerical data (n=28) rather than verbal descriptors alone (n=16). Practitioners did not use numerical risk communication methods alone. Where CVD risk factors were discussed with patients (n=156 occasions across all consultations), interpretations of this information was provided to patients on 131 (84%) occasions. However, specific advice about behaviour/risk modification was only given on 60 (38.5%) out of a possible 156 occasions.

**Conclusions**

Specific advice about how to change lifestyle behaviour to modify CVD risk factors was not always given by the practitioner, particularly when discussing behavioural risk factors. Developing best practice for communicating complex health risk information would ensure that people with psoriasis are empowered to make lifestyle modifications to reduce CVD risk.

**Introduction**

Cardiovascular disease (CVD) is one of the biggest causes of mortality globally, but individual risk of CVD can be reduced by making changes to modifiable risk factors such as smoking, obesity and excess alcohol use [[1](#_ENREF_1)]. Public health guidelines recommend that individuals identified as being at increased risk of CVD are supported with appropriate lifestyle and pharmacological interventions to reduce their risk [[2](#_ENREF_2)].

The ways in which CVD risk information are presented to patients by healthcare professionals is likely to influence: (1) patients’ perceptions of risk magnitude; and (2) subsequent decisions to make lifestyle modifications to reduce their CVD risk [[3](#_ENREF_3), [4](#_ENREF_4)]. However providing risk information may only lead to positive behavioural changes if health professionals are able to communicate risk information clearly and effectively to patients, and check understanding [[5](#_ENREF_5)]. Health and risk information that is difficult to understand may lead to patients making ill-informed choices [[6](#_ENREF_6)]. Individualised health risk information must be presented in a way that increases understanding and supports individuals to make personally appropriate health decisions [[5](#_ENREF_5), [7](#_ENREF_7)]. For example, a study examining risk perceptions in patients with Type 2 diabetes, who had at least one CVD risk factor, found that only two thirds of patients could rank diabetes-related health risks, such as heart attack or stroke, based on the information presented to them by the researchers [[8](#_ENREF_8)]. When recommended risk formats such as individualised quantitative expressions of risk (statistics) were used, patients showed a lack of understanding of their diabetes-related health risks. This suggests that more effective communication methods for encouraging understanding are needed.

Policy development related to the prevention of CVD in clinical practice, specifically concerns recommended ways of communicating about CVD risk [[9](#_ENREF_9)]. However, whether the most effective risk communication strategies are used in practice is unknown. Whilst some research shows that numerical information (e.g. *‘your 10-year risk of cardiovascular disease is currently 5%’)* facilitates understanding of risk [[10](#_ENREF_10)], other studies have shown that percentages may be difficult for patients to process and interpret even amongst highly educated populations [[11](#_ENREF_11)]. Conversely, studies suggest that verbal descriptors (e.g. *‘your risk of cardiovascular disease is* high’) are effective communication techniques in improving patient understanding of risk and the benefits of behaviour change in reducing risk [[12](#_ENREF_12)]. A European study examining the use of different communication formats used in primary care consultations to communicate about CVD risk found that verbal descriptors were the most common form of risk communication (used in 73% of consultations observed), whereas a combination of verbal and numerical forms of risk communication was used in just 11% of consultations[[13](#_ENREF_13)]. The study concluded that a discrepancy exists between guidelines for communicating risk effectively which favour numerical and visual methods, and the reality of clinical practice, suggesting a need for further examination.

Given some of the contradictions in the risk communication literature, there is a clear need for further studies investigating risk communication within current healthcare interactions. A systematic review of CVD risk communication methods was largely inconclusive, based on a limited number of studies mostly using hypothetical risk scenarios (such as a hypothetical drug, or being at risk of a hypothetical disease), rather than a realistic and personally relevant health threat [[4](#_ENREF_4)]. Waldron et al suggest that increasing patient awareness of risk may lead to accurate risk perceptions and consequently decisions about treatment and risk reduction through behaviour change.

*CVD and psoriasis*

CVD risk may be particularly important to address in people living with psoriasis. Psoriasis is a long-term inflammatory condition affecting around 2% of the population [[14](#_ENREF_14)], which manifests predominantly on the skin. Psoriasis can be associated with a number of lifestyle-related risk factors known to increase the risk of CVD [[15](#_ENREF_15)]. These include smoking, excess alcohol intake [[15](#_ENREF_15)] high BMI [[16](#_ENREF_16)], and being sedentary [[17](#_ENREF_17)]. Recognised public health strategies in the UK emphasise the prevention of health problems at the heart of every NHS contact [[18](#_ENREF_18)], such as using health practitioners’ contact time to communicate key health messages related to unhealthy lifestyle behaviours (Making Every Contact Count; <http://www.makingeverycontactcount.co.uk/>). Health promotion and lifestyle behaviour change is also recognised by healthcare professionals [[19](#_ENREF_19)] and in clinical guidelines [[20](#_ENREF_20)] as being central to the management of psoriasis.

Whilst current evidence suggests an increased prevalence of behavioural CVD risk factors within people with psoriasis [[21-23](#_ENREF_21)], opportunities to discuss issues of risk and risk reduction in consultations between practitioners and patients with psoriasis may often be missed [[19](#_ENREF_19), [24](#_ENREF_24), [25](#_ENREF_25)]. However, little is known about the specific methods which are used by healthcare professionals during CVD risk assessments to communicate information about risk.

*Study Aim*

This study aimed to examine how practitioners communicate information about CVD risk to patients with psoriasis. This is a nested study within the Identification and Management of Psoriasis Associated Co-Morbidity (IMPACT) Programme of research (<http://www.impactpsoriasis.org.uk/>) aimed at improving care for people with psoriasis [[25](#_ENREF_25)].

In this paper we report a systematic examination of how practitioners communicate information about CVD risk when undertaking CVD risk assessments with patients with psoriasis, in the UK primary care setting.

Specific research questions are:

1. What *type* of information about CVD risk is communicated to patients?
2. *How* do practitioners communicate information about CVD risk?

**Materials and Methods**

*Ethics Approval*

Ethical approval was obtained from a regional NHS Research Committee (REC ref: 11/NW/0654).

*Design and Procedure*

Consultations between practitioners (general practitioners and practice nurses) and patients with psoriasis were audio-recorded as part of a CVD risk assessment study conducted in 10 general practices in North West England [[26](#_ENREF_26)]. Practitioners were advised to conduct the assessments in line with their regular practice for conducting CVD health checks. Before the consultation both practitioners and patients were fully informed, consented to take part in the study and agreed for the consultation to be audio-recorded. One hundred and thirty risk assessment consultations were recorded.

This paper reports analysis of a sub-sample (n=44) from 130 consultations recorded as part of an overarching risk communication study [[25](#_ENREF_25)]. These were randomly selected and sampled in order to obtain maximum variation in terms of primary care practice and the type of practitioner conducting the risk assessment. Consultations were selected from 13 practitioners (nine practice nurses, of which two had an additional role as a research nurse, and four GPs) who participated in the study across 10 primary care practices where an audio-recorded consultation had been collected. At least three consultations from each practice, with a minimum of two consultations conducted by each practitioner, were sampled.

*Coding frame*

A pre-determined coding frame was developed to classify data collected in the audio-recorded risk assessments with the aim of answering the two key research questions: the *type* of information about CVD risk communicated to patients, and *how* this information is communicated. Information about CVD risk factors were categorised into either: (1) *biomedical measurements* (blood pressure, waist/hip circumference, cholesterol, and Body Mass Index (BMI)); or (2) *behavioural factors* associated with increased CVD risk (alcohol, physical activity, eating patterns, and smoking).

Information was further classified in order to answer the two key research questions: (1) what *type* of information about CVD risk communicated to patients, and (2) *how* this information is communicated:

1. Whether information was clear, specific and individualised [[27](#_ENREF_27)]. Information was assessed on the basis of *specificity*, and categorised as either generic *(‘the older people get, the risk goes up’*) or individualised, with reference to the patient’s own risk factor (*‘your main risk factor is* smoking’). To further examine the type of information presented, and to address the gap in the literature relating to practitioners risk communication methods, CVD risk information was categorised according to whether numerical information (for example: *‘your total cholesterol is 2.5’*) or verbal descriptors (for example: *‘your cholesterol is very high’)* were used.
2. Information was classified according to *how* different CVD risk factors were communicated. Specifically whether practitioners are providing *interpretation* of risk information to patients, and whether *specific advice* about how to modify CVD risk is offered. Interpretation was defined as providing additional statements indicating the relevance of the information provided (*‘those readings are on the high side’*). *Specific advice* was defined as specific information or recommendations relating to the benefits of behavioural change to reduce CVD risk (*‘the way to reduce your cholesterol is yes to increase your exercise and also to add things like porridge to your diet’*).

The coding frame was informed by Whitlock et al’s [[27](#_ENREF_27)] framework for evaluating primary care behavioural counselling. The model emphasises the importance of promoting health lifestyles during every practitioner-patient consultation as a way of preventing long-term health problems. This may include the benefits of making behavioural modifications such as dietary changes or increasing the amount of exercise undertaken. This provides a useful framework for recommended practice for clinicians when communicating about CVD risk factors, particularly given the absence of a formal framework in the literature specifically used to evaluate CVD risk communication consultations.

*Data analysis*

A content analysis approach [[28](#_ENREF_28)] was used. Instances of CVD risk communication were recorded verbatim by the principle author using the coding frame. Observations for all consultations were evaluated in terms of information content. Occurrences of discussions about CVD risk were quantified according to each category of the coding frame.

Coding was conducted by recording verbatim examples of discussion related to each risk factor directly from the audio recordings into the coding frame. The audio recordings were listened to repeatedly as a familiarisation exercise prior to the transcription and coding stage. Any identifying information from the transcriptions was removed and participants were given a unique identification number for the purposes of illustrative quotes.

A sub-sample (approximately 10%) of the coded occurrences was checked by a member of the research team (LC) and discrepancies were discussed between two of the study authors (LC and CK) until a final consensus was reached. The final analysis was discussed and agreed upon by the study team.

**Results**

*Participant characteristics*

Patient and practitioner demographics are presented in Table 1. Patients (n=44) were aged between 23 and 77 years with a mean age of 52.4 years and were predominantly White British (n=42; 95.4%) and female (n=26; 59.1%). Clinicians (n=13) were predominantly female (n=11) and included practice nurses (n=9), and General Practitioners (n=4). The length of the consultations varied from 7m24s to 39m57s, with a mean length of 18m05s.

Table 1 about here

Of the 44 consultations analysed, at least one *biomedical measurement* was discussed in every consultation. Blood pressure was discussed in every consultation (n=44), waist/hip circumference was measured and the result given to the patient in 23 (52%), BMI/weight in 22 (50%), and cholesterol in 16 (36%) of the total number of consultations. However, cholesterol was not always provided at the time of the initial consultation, due to a lack of blood test results, and instead may have been given to patients in a follow-up appointment as part of the larger study [[25](#_ENREF_25)].

At least one self-reported *lifestyle behavioural* CVD risk factor was discussed with patients in 16 (36%) of the consultations. Where lifestyle was raised, alcohol was discussed on all of these occasions (n=16; 36% of the total number of consultations), exercise/physical activity was discussed in 15 (34%), diet/eating patterns in 11 (25%) of the total number of consultations. Smoking was discussed in 9 of the total number of consultations; however only six (14%) patients reported being current smokers, and 26 (59%) patients reported ever smoking. General information about CVD risk (examples given in Table 2 below) was given by the practitioner in 26 (59%) of the consultations. Results will be reported according to each research question:

1. What *type* of information about CVD risk is communicated to patients?

*Generic versus individualised risk information*

Results are presented in Figure 1. There was variation in the type of risk information communicated to patients during the CVD consultations. *Generic* risk information given alone was rare (n=2 consultations). Risk information mostly consisted of *individualised* information (n=23 consultations), or a combination of both generic and individualised (n=19). Examples of each category are presented in Table 2**,** with practitioner identification numbers displayed in parentheses.

Of the consultations that included individualised risk information, 12 consisted of a blood pressure reading only, and an individualised CVD risk calculation was given in 2 (4.5%) of the total number of consultations**.** The tool used to calculate the CVD risk (such as Framingham or QRisk) was unclear from the audio recordings.

Figure 1 about here

Table 2 about here

*Numerical information versus verbal descriptors*

Results are presented in Figure 2. The most common method of CVD risk communication was a combination of numerical and verbal descriptors (n=28), followed by verbal descriptors alone (n=16). There were no examples of practitioners using numerical information alone. Exemplars of each category are presented in Table 3, with practitioner and patient identification numbers displayed in parentheses.

Figure 2 about here

Table 3 about here

1. How do practitioners communicate information about CVD risk?

The second level of analysis examined the content of CVD risk information discussed. Specifically whether *interpretation* of risk information was provided by the practitioner and if *specific advice* was offered to the patient regarding behavioural modifications needed to reduce CVD risk. Results on both these domains are categorised into *biomedical* and *lifestyle/behavioural* risk factors.

*Biomedical measurements of CVD risk*

Results are presented in Figure 3. For biomedical risk factors, across the physiological markers of CVD risk (blood pressure, waist/hip circumference, cholesterol and BMI/weight) interpretation of CVD risk factor information was given on 87 (out of a total of 105) occasions (across all risk factors discussed). Interpretation was given for every discussion about blood pressure (44 out of 44 occasions), followed by BMI/weight (17 out of 22 occasions; 77%), waist/hip circumference (13 out of 23 occasions; 57%) and cholesterol (13 out of 16 occasions; 81%).

Specific advice (both informational, such as outlining the benefits of a healthy diet for example, and instructional, such as suggesting specific foods to incorporate into a patients diet) about how to make lifestyle behavioural modifications was given in 8 of the 16 (50%) discussions about cholesterol, followed by BMI/weight (10 of 22 occasions; 46%), blood pressure (5 out of 44 occasions; 11%) and waist/hip circumference (3 out of 23 occasions; 13%).

Figure 3 about here

*Lifestyle behavioural factors*

Results are presented in Figure 4. Across the lifestyle/behavioural CVD risk factors (alcohol, smoking, physical activity and diet/eating patterns) interpretation of information was provided on 44 (out of a total of 51) occasions across all risk factors discussed. This was mostly given in discussions about alcohol (15 of 16 occasions; 94%) followed by physical activity (13 of 15 occasions; 87%), diet/eating patterns (9 of 11 occasions; 82%) and smoking (7 of 9 occasions; 78%).

Specific advice about how to make lifestyle behavioural modifications was given in all discussions about diet/eating patterns (11 out of 11 occasions), followed by physical activity (12 out of 15 occasions; 80%), alcohol (9 out of 16 occasions; 82%) and smoking (2 out of 9 occasions; 22%).

Figure 4 about here

**Discussion**

This study has systematically identified and examined communication methods currently used by healthcare professionals when discussing CVD risk with patients with psoriasis, in the context of primary care risk assessment consultations.

Three key findings emerge from this study. Firstly, contrary to some of the current literature we found that numerical information (such as percentages) was only used when accompanied by verbal descriptors. We found no evidence of numerical forms of risk communication only, which could suggest that used alone, practitioners believe this may not be an effective method of communicating CVD risk information. Rather, practitioners may believe that by adding verbal descriptors to numerical information, this may facilitate patient understanding.

Secondly, the most common way of communicating risk information was through the use of either individualised information (e.g. *'your blood pressure is perfectly normal*), or a combination of individualised and generic information (e.g. *'The older you get the risk goes up, you're young and healthy…Your blood pressure is very good’*), as opposed to generic information alone. However we found that occurrences were often limited to informational or instructional statements (suggesting dietary instructions or instructing patients to reduce their alcohol intake). This resulted in a one-way passage of information, rather than a structured, collaborative shared discussion about CVD risk reduction, and how patients might address the risk identified.

Thirdly, there was a lack of emphasis on discussing lifestyle behavioural CVD risk factors (smoking, alcohol consumption, physical activity, and diet) or the link with psoriasis during the consultations. At least one LBC risk factor was discussed in just 16 (36.4%) of the 44 consultations. Physical activity was discussed in just 15 of the consultations, and diet was discussed in 11. This is particularly important given the risk profile of the patients in this study, both in terms of the number of patients who were overweight or obese, or had a waist circumference indicative of high or very high CVD risk. Indeed, linked work has demonstrated that opportunities to address CVD risk, and to support patients to engage in risk reducing behaviours, are often missed in such consultations [[25](#_ENREF_25)].

Addressing lifestyle behaviours is a core component of the healthcare professional general role [[29](#_ENREF_29)] and in primary prevention strategies for CVD [[30](#_ENREF_30)]. Additionally, in the context of psoriasis management lifestyle behaviour change support is recommended [[20](#_ENREF_20)], but may not be happening in practice [[25](#_ENREF_25)]. Our study extends this work by understanding the techniques used by primary care practitioners to communicate CVD risk and highlights that very little specific advice on how to modify risk factors is given to patients. Previous studies have helped us understand the methods used by healthcare professionals when communicating information about CVD risk [[13](#_ENREF_13)], whereas the present study goes beyond this to examine the specific content of discussions about CVD risk.

However, interpretation of risk information was not always linked to specific advice about how to modify CVD through behavioural change, particularly in relation to biomedical measurements such as blood pressure (10 patients had a higher-than-normal blood pressure; specific advice relating to lowering blood pressure was given to just 5 patients). This was surprising given that national public health guidelines for the prevention of CVD emphasise lifestyle modification (such as dietary changes) as part of patient management strategies [[30](#_ENREF_30)]. We found that such discussions were mostly absent in the consultations, which could be due to practitioners favouring pharmaceutical aids rather than behaviour change techniques. Based on our findings, we suggest that specific advice regarding risk modification should be more consistently linked with risk interpretation for all personally relevant CVD risk factors. This may not only facilitate patients conceptualisation of risk, but provide a way that patients can understand how to reduce CVD risk.

There was limited evidence of absolute risk being used to communicate risk to patients during CVD risk assessments; individualised CVD risk calculations such as the internationally-recognised Framingham risk equation [[31](#_ENREF_31)] and QRisk2 [[32](#_ENREF_32)]were given to patients in just two of the consultations (*‘your 10-year risk of CVD is 10%’*); although the specific tool used was unclear from the audio recordings. However, the cholesterol result was not always available at the time of the consultation, so it may not have always been possible to calculate such a risk score. However, given the recognition that risk calculators are a commonly used tools for assessing CVD risk, and recent research is focused on developing new ways of calculating absolute CVD risk [[33](#_ENREF_33)], it was interesting to find so few of the healthcare professionals in the present study adopting this method. A recent qualitative study with Australian GPs showed that CVD risk communication strategies may depend on the GP’s perception of patient risk, and patient motivation to take preventive action [[34](#_ENREF_34)]. It could be possible that the healthcare professionals involved in this study did not believe that a CVD risk score was necessary to convey risk information.

Traditional approaches to the primary care consultation focus on providing opportunistic health promotion where the opportunity arises [[35](#_ENREF_35)]. Rather than the contact time being centred around the management of presenting problems and/or the management of continuing problems, more of a focus should be on promoting healthy lifestyles. Given some of the major causes of mortality worldwide can be prevented through appropriate lifestyle modifications, the health promotion aspect of the model is central to informing primary care consultations. Stott and Davis argue that doctors may be reluctant to address lifestyle behaviour change in the absence of disease or illness; whereas advice may be offered about diet and exercise if these can be attributed to a diagnosed illness. This also supports the call for moving towards a secondary prevention approach to managing risk factors associated with CVD including the management of high blood pressure or smoking cessation [[36](#_ENREF_36)]. The key question being addressed in the consultation is whether it is appropriate to support the patient in achieving lifestyle behaviour change in the context of long-term health. This model widens the scope of every consultation and encourages the clinician to consider the patient in a broader, practical and time efficient way. Techniques for supporting lifestyle behaviour change are well established for example, and can be successfully implemented with patients [[37-39](#_ENREF_37)].

**Strengths and limitations**

This study allowed for an in-depth examination of how primary care professionals communicate CVD risk within the context of risk assessment consultations for people with psoriasis. Important insights have been given into current communication techniques used by practitioners. Where previous studies have been conducted in the context of ‘healthy’ individuals often involving hypothetical risk scenarios [[40](#_ENREF_40), [41](#_ENREF_41)], our study has been conducted with participants whereby the risk information holds personal relevance.

There are several limitations. We present an analysis of a sub-sample of the total number of audio-recorded consultations (44 out of 130). However, our sampling strategy aimed to deliberately capture the widest variation of consultations across all practitioners who took part in the study, where an audio-recording of the consultation was available. We were able to examine differences in methods of risk communication and provide insights into current practice in order to advance current understanding of risk communication.

Whilst we briefed healthcare professionals to conduct the consultations as a routine CVD risk assessment consultation, it may have been possible that healthcare professionals believed the primary aim of the study was to collect risk factor information only. This may be the case particularly for the two nurses who also had an additional role as a research nurse.

Future studies should examine whether attending CVD risk assessments and engaging in discussions with healthcare professionals about CVD risk can increases the likelihood of lifestyle behavioural changes in patients. This is of particular importance given the current uncertainty of the effectiveness of health checks suggested in the literature in terms of improving CVD mortality rates [[42](#_ENREF_42)]. Research also suggests that the number of health checks conducted in the UK is not representative of people identified as being at high risk of CVD [[43](#_ENREF_43)]. Therefore, the acceptability and feasibility of conducting such checks should be further examined, as health checks may represent an opportunity to engage in discussions about reducing health risk factors associated with CVD and other long-term conditions. The number of discussions about lifestyle modification is not reflected in the patients’ risk profiles; increased BMI (77% of patients were overweight or obese) and waist measurements (77% of patients were categorised as high or high risk) suggest a discussion about risk reduction would be highly relevant, and we would have expected more of these discussions; physical activity was discussed in 15 and diet was discussed in 11 of the 44 consultations.

**Implications and conclusions**

New guidelines for communicating CVD risk information to patients [[33](#_ENREF_33)] state that healthcare professionals should be able to effectively communicate this information to patients. This is particularly important in the context of psoriasis, which is known to be associated with a number of behavioural risk factors linked to increased CVD risk. This study has identified the techniques that healthcare professionals use when talking to patients about CVD, and has provided insights into how this is done in the context of ‘real’ consultations. Further research should identify the optimal methods of communicating complex health information in such a way that patients with psoriasis (and patients generally) are empowered to make long-term lifestyle modifications to reduce CVD risk. Additionally, research should ensure that practitioners are adopting such techniques, as is often the case opportunities to address CVD risk are not taken [[25](#_ENREF_25)]. Consultations about CVD risk provide the ideal opportunity to discuss health risks with patients, and equipping practitioners with effective communication techniques will allow them to support patients in making positive behavioural changes.

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**References**

1. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364(9438):937-52.

2. Department of Health. Putting prevention first. Vascular Checks: risk assessment and management. London, England: HMSO; 2008.

3. Edwards A, Elwyn G, Mulley A. Explaining risks: turning numerical data into meaningful pictures. BMJ. 2002;324(7341):827.

4. Waldron C-A, van der Weijden T, Ludt S, Gallacher J, Elwyn G. What are effective strategies to communicate cardiovascular risk information to patients? A systematic review. Patient Educ Couns. 2011;82(2):169-81.

5. Alaszewski A, Horlick-Jones T. How can doctors communicate information about risk more effectively? BMJ (Clinical research ed). 2003;327(7417):728-31.

6. Gigerenzer G, Edwards A. Simple tools for understanding risks: from innumeracy to insight. BMJ. 2003;327(7417):741-4.

7. Ahmed H, Naik G, Willoughby H, Edwards AGK. Communicating risk. 2012.

8. Saver BG, Mazor KM, Hargraves JL, Hayes M. Inaccurate Risk Perceptions and Individualized Risk Estimates by Patients with Type 2 Diabetes. J AM Board Fam Med. 2014;27(4):510-9.

9. Perk J, De Backer G, Gohlke H, Graham I, Reiner Z, Verschuren WMM et al. European Guidelines on Cardiovascular Disease Prevention in Clinical Practice (Version 2012). Int J Behav Med. 2012;19(4):403-88.

10. Gurmankin AD, Baron J, Armstrong K. The Effect of Numerical Statements of Risk on Trust and Comfort with Hypothetical Physician Risk Communication. Med Decis Making. 2004;24(3):265-71. doi:10.1177/0272989x04265482.

11. Lipkus IM, Samsa G, Rimer BK. General Performance on a Numeracy Scale among Highly Educated Samples. med Decis Making. 2001;21(1):37-44.

12. Knapp P, Gardner PH, Carrigan N, Raynor DK, Woolf E. Perceived risk of medicine side effects in users of a patient information website: A study of the use of verbal descriptors, percentages and natural frequencies. Brit J Health Psych. 2009;14(3):579-94.

13. Neuner-Jehle S, Senn O, Wegwarth O, Rosemann T, Steurer J. How do family physicians communicate about cardiovascular risk? Frequencies and determinants of different communication formats. BMC Fam Pract. 2011;12(1):15.

14. Parisi R, Symmons DPM, Griffiths CEM, Ashcroft DM. Global Epidemiology of Psoriasis: A Systematic Review of Incidence and Prevalence. J Invest Dermatol. 2013;133(2):377-85.

15. Samarasekera EJ, Neilson JM, Warren RB, Parnham J, Smith CH. Incidence of cardiovascular disease in people with psoriasis: a systematic review and meta-analysis. J Invest Dermatol. 2013;133(10):2340-6.

16. Hercogova J, Ricceri F, Tripo L, Lotti T, Prignano F. Psoriasis and body mass index. Dermatol Ther. 2010;23(2):152-4.

17. Naldi L, Chatenoud L, Linder D, Belloni FA, Peserico A, Virgili AR et al. Cigarette Smoking, Body Mass Index, and Stressful Life Events as Risk Factors for Psoriasis: Results from an Italian Case-Control Study. J Invest Dermatol. 2005;125(1):61-7.

18. National Health Service (NHS) Yorkshire and the Humber. Prevention and Lifestyle Behaviour Change: A Competence Framework. Yorkshire and the Humber: NHS; 2010.

19. Nelson PA, Keyworth C, Chisholm A, Pearce CJ, Griffiths CE, Cordingley L et al. 'In someone's clinic but not in mine' - clinicians' views of supporting lifestyle behaviour change in patients with psoriasis: a qualitative interview study. Br J Dermatol. 2014;171(5):1116-22.

20. National Institute for Health and Care Excellence. Psoriasis: the assessment

and management of psoriasis (CG153). London: NICE; 2012.

21. Wolk K, Mallbris L, Larsson P, Rosenblad A, Vingard E, Stahle M. Excessive body weight and smoking associates with a high risk of onset of plaque psoriasis. Acta dermato-venereol. 2009;89(5):492-7.

22. Gerdes S, Zahl V, Weichenthal M, Mrowietz U. Smoking and alcohol intake in severely affected patients with psoriasis in Germany. Dermatology. 2010;220(1):38-43.

23. Setty AR, Curhan G, Hyon KC. Smoking and the risk of psoriasis in women: Nurses' Health Study II Am J Med. 2007;120(11):953-9.

24. Keyworth C, Nelson PA, Chisholm A, Griffiths CE, Cordingley L, Bundy C. Providing lifestyle behaviour change support for patients with psoriasis: an assessment of the existing training competencies across medical and nursing health professionals. Br J Dermatol. 2014;171(3):602-8.

25. Nelson PA, Kane K, Chisholm A, Pearce CJ, Keyworth C, Rutter MK et al. 'I should have taken that further' - missed opportunities during cardiovascular risk assessment in patients with psoriasis in UK primary care settings: a mixed-methods study. Submitted. 2015.

26. Rutter MK, Kane K, Lunt M, Littlewood A, Cordingley L, Hilton R et al. Primary care screening for cardiovascular risk factors in patients with psoriasis. 7th International Congress of Psoriasis From Gene to Clinic; 11-13 December; London, UK.2014, December.

27. Whitlock EP, Orleans CT, Pender N, Allan J. Evaluating primary care behavioral counseling interventions: An evidence-based approach. Am J Prev Med. 2002;22(4):267-84.

28. Hsieh H-F, Shannon SE. Three Approaches to Qualitative Content Analysis. Qual Health Res. 2005;15(9):1277-88.

29. National Institute for Health and Care Excellence. Behaviour change: individual approaches (PH49). London: NICE; 2014.

30. National Institute for Health and Care Excellence. Prevention of cardiovascular disease (PH25). London: NICE; 2010.

31. D’Agostino RB, Vasan RS, Pencina MJ, Wolf PA, Cobain M, Massaro JM et al. General Cardiovascular Risk Profile for Use in Primary Care: The Framingham Heart Study. Circulation. 2008;117(6):743-53.

32. Hippisley-Cox J, Coupland C, Vinogradova Y, Robson J, Minhas R, Sheikh A et al. Predicting cardiovascular risk in England and Wales: prospective derivation and validation of QRISK2. BMJ. 2008;336(7659):1475-82.

33. Boon N, Boyle R, Bradbury K, Buckley J, Connolly S, Craig S et al. Joint British Societies’ consensus recommendations for the prevention of cardiovascular disease (JBS3). Heart. 2014;100(Suppl 2):ii1-ii67.

34. Bonner C, Jansen J, McKinn S, Irwig L, Doust J, Glasziou P et al. Communicating cardiovascular disease risk: an interview study of General Practitioners' use of absolute risk within tailored communication strategies. BMC Fam Pract. 2014;15(1):106.

35. Stott NC, Davis RH. The exceptional potential in each primary care consultation. J Roy Coll Gen Pract. 1979;29(201):201-5.

36. Mant D. Health checks and screening: what works in general practice? J Roy Coll Gen Pract. 2014;64(627):493-4.

37. Michie S, Rumsey N, Fussell A, Hardeman W, Johnston M, Newman S et al. Improving health: changing behaviour. NHS health trainer handbook. Manual. Department of Health Publications (Best Practice Guidance: Gateway Ref 9721); 2008.

38. Michie S, Ashford S, Sniehotta FF, Dombrowski SU, Bishop A, French DP. A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: the CALO-RE taxonomy. Psychol Health. 2011;26(11):1479-98.

39. Taylor CA, Shaw RL, Dale J, French DP. Enhancing delivery of health behaviour change interventions in primary care: A meta-synthesis of views and experiences of primary care nurses. Patient Educ Couns. 2011;85(2):315-22.

40. Fagerlin A, Zikmund-Fisher BJ, Ubel PA. "If I'm better than average, then I'm ok?": Comparative information influences beliefs about risk and benefits. Patient Educ Couns. 2007;69(1-3):140-4.

41. Price M, Cameron R, Butow P. Communicating risk information: The influence of graphical display format on quantitative information perception—Accuracy, comprehension and preferences. Patient Educ Couns. 2007;69(1–3):121-8.

42. Krogsbøll LT, Jørgensen KJ, Grønhøj Larsen C, Gøtzsche PC. General health checks in adults for reducing morbidity and mortality from disease: Cochrane systematic review and meta-analysis. BMJ. 2012: 345:e7191 doi: 10.1136/bmj.e7191

43. Artac M, Dalton ARH, Babu H, Bates S, Millett C, Majeed A. Primary care and population factors associated with NHS Health Check coverage: a national cross-sectional study. J Public Health. 2013;35(3):431-9.

44. Observatory PHENO. Measures of central adiposity as an indicator of obesity. London: Public Health England; 2009.

**Table 1.** Patient and practitioner demographics

|  |  |
| --- | --- |
| **Patient and practitioner characteristics** | **Number (%)** |
| **Patient characteristics (n=44)** |  |
| Age, Mean (SD), Range | 52.4 (13.92) 23-77 |
| Sex |  |
| Male | 18 (40.9) |
| Female | 26 (59.1) |
| Ethnicity, White British | 42 (95.4) |
| Smokers |  |
| Ever | 27 (61.4) |
| Current | 6 (13.6) |
| BMI category |  |
| Healthy (BMI <25) | 10 (22.7) |
| Overweight (BMI 25-30) | 14 (31.8) |
| Obese BMI>30 | 20 (45.5) |
| Waist category1 |  |
| Low | 10 (22.7) |
| High | 11 (25) |
| Very high | 23 (52.3) |
| Raised blood pressure2 | 10 (22.7) |
| Alcohol risk |  |
| None or low risk | 36 (81.8) |
| At risk | 6 (13.6) |
| International Physical Activity Questionnaire |  |
| High | 16 (36.4) |
| Moderate | 13 (29.5) |
| Low | 10 (22.7) |
|  |  |
| **Practitioner characteristics (n=13)** |  |
| Practitioner type |  |
| General Practitioner | 4 (30.8) |
| Practice Nurse | 9 (69.2) |
| Sex |  |
| Male | 2 (15.4) |
| Female | 11 (84.6) |
| Number of risk assessments conducted |  |
| General Practitioners | 14 (31.8) |
| Practice Nurses | 30 (68.2) |
| Consultation length (minutes: seconds) – Mean (Range) | 18.05 (07.24s – 39.57) |

1 Categorised according public health guidelines [[44](#_ENREF_44)] Low; males<94cm, females<80cm, High risk; males 94-102cm, females 80-88cm, Very high risk; males>102cm, females>88cm)

2 High blood pressure categorised according to public health guidelines; systolic blood pressure>140 or diastolic blood pressure >90 [[30](#_ENREF_30)]

**Table 2.** Examples of methods of risk communication used by practitioners

|  |  |
| --- | --- |
| **Method of risk communication** | **Verbatim examples** |
| Individualised CVD risk information | *'your blood pressure is perfectly normal, everything seems fine' (Patient ID: 35)* |
| Generic CVD risk information | *‘A lot of these cardiovascular things are related to obesity and lack of exercise and things like smoking.' (Patient ID: 41)* |
| Combined individualised and generic information | *'The older you get the risk goes up, you're young and healthy…Your blood pressure is very very good’ (Patient ID: 8)* |

**Table 3.** Examples of types of risk communication used by practitioners

|  |  |
| --- | --- |
| **Type of risk communication** | **Verbatim examples** |
| Verbal descriptor | *‘They’re emphasising these days the importance of exercise as well as diet in terms of reducing your heart disease risk.’ (Patient ID: 2)* |
| Combined numerical and verbal descriptor | *‘Cholesterol is excellent, really, really good. Total cholesterol is 2.5 Anything less than 4/4.5 is really healthy to prevent heart attacks and strokes. (shows patient LDL cholesterol) They're low, at really good level. Whatever you're doing is right - it’s a very healthy cholesterol reading.’ (Patient ID: 43)* |

**Figure 1.** Use of individualised versus generic risk information by practitioners during CVD risk assessments (n=44)

**Figure 2.** Use of verbal versus numerical information by practitioners during CVD risk assessments

**Figure 3.** Discussion of biomedical measurements related to CVD risk

**Figure 4.** Discussion of behavioural factors related to CVD risk