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Evidence Check

Primary prevention of skin cancer in primary care settings

An Evidence Check review brokered by the Sax Institute
for Cancer Institute NSW —August 2022

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This report was prepared by Amelia Smit, Kate Dunlop, Nehal Singh, Diona Damian, Kylie Vuong and Anne Cust. The research team was led by the Daffodil Centre, a joint venture between Cancer Council NSW and the University of Sydney.

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Primary prevention of skin cancer in primary care settings

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Contents

Background

The work of the Cancer Institute NSW is guided by the NSW Cancer Plan, which aims to lessen the impact of cancers. Skin cancer—which comprises melanoma and the keratinocyte or non-melanoma skin cancers basal cell carcinoma (BCC) and squamous cell carcinoma (SCC)—is Australia's most costly cancer.[1] A new Cancer Plan was released recently for 2022–27 in which skin cancer prevention is a component and Primary Health Networks and primary care providers are seen as important stakeholders in cancer prevention. Skin cancer is highly amenable to primary prevention and early detection, and primary care plays an important role in the diagnosis, treatment and follow-up care for the majority of patients.[2]

An up-to-date review of the evidence on the effectiveness and feasibility of skin cancer prevention activities in primary care is needed to support the implementation of the new Cancer Plan, and to inform the development of the next NSW Skin Cancer Prevention Strategy.

This Evidence Check review aims to identify which skin cancer primary prevention activities can be effectively and feasibly delivered in primary care settings in NSW. The intended audience for the Evidence Check are senior program staff within the Cancer Institute NSW and Primary Health Networks and the NSW Skin Cancer Prevention Advisory Committee, comprising both governmental and non-governmental organisation representatives.

The Evidence Check was conducted between 11 May and 6 August 2022. A comprehensive search strategy was devised to identify the relevant peer-reviewed and grey literature published since 2014 from Australia and other relevant countries, pertinent to skin cancer primary prevention activities in primary care settings, including data on their effectiveness, key components and factors related to implementation.

Executive summary

Overview

Skin cancer prevention is a component of the new Cancer Plan 2022–27, which guides the work of the Cancer Institute NSW. To lessen the impact of skin cancer on the community, the Cancer Institute NSW works closely with the NSW Skin Cancer Prevention Advisory Committee, comprising governmental and non-governmental organisation representatives, to develop and implement the NSW Skin Cancer Prevention Strategy. Primary Health Networks and primary care providers are seen as important stakeholders in this work. To guide improvements in skin cancer prevention and inform the development of the next NSW Skin Cancer Prevention Strategy, an up-to-date review of the evidence on the effectiveness and feasibility of skin cancer prevention activities in primary care is required. A research team led by the Daffodil Centre, a joint venture between the University of Sydney and Cancer Council NSW, was contracted to undertake an Evidence Check review to address the questions below.

Evidence Check questions

This Evidence Check aimed to address the following questions:

Question 1: What skin cancer primary prevention activities can be effectively administered in primary care settings? As part of this, identify the key components of such messages, strategies, programs or initiatives that have been effectively implemented and their feasibility in the NSW/Australian context.

Question 2: What are the main barriers and enablers for primary care providers in delivering skin cancer primary prevention activities within their setting?

Summary of methods

The research team conducted a detailed analysis of the published and grey literature, based on a comprehensive search. We developed the search strategy in consultation with a medical librarian at the University of Sydney and the Cancer Institute NSW team, and implemented it across the databases Embase, MEDLINE, PsycInfo, Scopus, Cochrane Central and CINAHL. Results were exported and uploaded to Covidence for screening and further selection. The search strategy was designed according to the SPIDER tool for Qualitative and Mixed-Methods Evidence Synthesis, which

is a systematic strategy for searching qualitative and mixed-methods research studies. The SPIDER tool facilitates rigour in research by defining key elements of non-quantitative research questions. We included peer-reviewed and grey literature that included skin cancer primary prevention strategies/ interventions/ techniques/ programs within primary care settings, e.g. involving general practitioners and primary care nurses. The literature was limited to publications since 2014, and for studies or programs conducted in Australia, the UK, New Zealand, Canada, Ireland, Western Europe and Scandinavia. We also included relevant systematic reviews and evidence syntheses based on a range of international evidence where also relevant to the Australian context.

To address Question 1, about the effectiveness of skin cancer prevention activities in primary care settings, we summarised findings from the Evidence Check according to different skin cancer prevention activities.

To address Question 2, about the barriers and enablers of skin cancer prevention activities in primary care settings, we summarised findings according to the Consolidated Framework for Implementation Research (CFIR).

The CFIR is a framework for identifying important implementation considerations for novel interventions in healthcare settings and provides a practical guide for systematically assessing potential barriers and facilitators in preparation for implementing a new activity or program.

We assessed study quality using the National Health and Medical Research Council (NHMRC) levels of evidence.

Key findings

We identified 25 peer-reviewed journal articles that met the eligibility criteria and we included these in the Evidence Check. Eight of the studies were conducted in Australia, six in the UK, and the others elsewhere (mainly other European countries). In addition, the grey literature search identified four relevant guidelines, 12 education/training resources, two Cancer Care pathways, two position statements, three reports and five other resources that we included in the Evidence Check.

Question 1 (related to effectiveness)

We categorised the studies into different types of skin cancer prevention activities: behavioural counselling (n=3); risk assessment and delivering risk-tailored information (n=10); new technologies for early detection and accompanying prevention advice (n=4); and education and training programs for general practitioners (GPs) and primary care nurses regarding skin cancer prevention (n=3).

There was good evidence that behavioural counselling interventions can result in a small improvement in sun protection behaviours among adults with fair skin types (defined as ivory or pale skin, light hair and eye colour, freckles, or those who sunburn easily), which would include the majority of Australians. It was found that clinicians play an important role in counselling patients about

sun-protective behaviours, and recommended tailoring messages to the age and demographics of target groups (e.g. high-risk groups) to have maximal influence on behaviours.

Several web-based melanoma risk prediction tools are now available in Australia, mainly designed for health professionals to identify patients' risk of a new or subsequent primary melanoma and guide discussions with patients about primary prevention and early detection. Intervention studies have demonstrated that use of these melanoma risk prediction tools is feasible and acceptable to participants in primary care settings, and there is some evidence, including from Australian studies, that using these risk prediction tools to tailor primary prevention and early detection messages can improve sun-related behaviours.

Some studies examined novel technologies, such as apps, to support early detection through skin examinations, including a very limited focus on the provision of preventive advice. These novel technologies are still largely in the research domain rather than recommended for routine use but provide a potential future opportunity to incorporate more primary prevention tailored advice.

There are a number of online short courses available for primary healthcare professionals specifically focusing on skin cancer prevention. Most education and training programs for GPs and primary care nurses in the field of skin cancer focus on treatment and early detection, though some programs have specifically incorporated primary prevention education and training. A notable example is the Dermoscopy for Victorian General Practice Program, in which 93% of participating GPs reported that they had increased preventive information provided to high-risk patients and during skin examinations.

Question 2 (related to barriers and enablers)

Key enablers of performing skin cancer prevention activities in primary care settings included:

- Easy access and availability of guidelines and point-of-care tools and resources
- A fit with existing workflows and systems, so there is minimal disruption to flow of care
- Easy-to-understand patient information
- Using the waiting room for collection of risk assessment information on an electronic device such as an iPad/tablet where possible
- Pairing with early detection activities
- Sharing of successful programs across jurisdictions.

Key barriers to performing skin cancer prevention activities in primary care settings included:

- Unclear requirements and lack of confidence (self-efficacy) about prevention counselling
- Limited availability of GP services especially in regional and remote areas
- Competing demands, low priority, lack of time
- Lack of incentives.

Methods

Aims and scope of the study

We conducted a detailed review of the peer-reviewed and grey literature to answer the following research questions:

- **Question 1:** What skin cancer primary prevention activities can be effectively administered in primary care settings? As part of this, identify the key components of such messages, strategies, programs or initiatives that have been effectively implemented and their feasibility in the NSW/Australian context.
- **Question 2:** What are the main barriers and enablers for primary care providers in delivering skin cancer primary prevention activities within their setting?

Search strategy

After discussions between the research team, Cancer Institute NSW and a medical librarian at the University of Sydney, we developed strategies using the key terms in the research questions to search different databases (Appendix 1). The strategy was designed according to the SPIDER tool for Qualitative and Mixed-Methods Evidence Synthesis[3], which is a systematic strategy for searching qualitative and mixed-methods studies. The SPIDER tool facilitates rigour in research by defining key elements of non-quantitative research questions. We conducted searches across databases on Embase, MEDLINE, PsycInfo, Scopus, Cochrane Central and CINAHL. All results from the multiple databases were exported and uploaded to Covidence for screening and further selection.

Screening eligibility criteria

When screening the search results, we used the following inclusion and exclusion criteria to maintain consistency and consensus among different authors.

Inclusion criteria for the literature search:

1. Must include primary prevention strategies/ interventions/ techniques/ programs
2. Must be based in primary care settings, e.g. involving general practitioners and/or primary care nurses
3. Must include skin cancer (melanoma and/or non-melanoma skin cancer)
4. Must be conducted in (or include studies conducted in) Australia, UK, New Zealand, Canada, Ireland, Western Europe, Scandinavia
5. Must be conducted from 2014 onwards (articles from the past eight years).

Exclusion criteria for the literature search:

1. The article is not in English

2. Its sole focus is on countries outside of inclusion scope (e.g. the US or African countries)
3. It is dated prior to 2014
4. It does not include all three key aspects of the Evidence Check's aim (primary prevention strategies, primary care settings and skin cancer)

Data screening

A total of 1300 texts were uploaded to Covidence from the search results across the different databases. Duplicate search results were removed, either automatically by Covidence or manually by the screeners. Two authors (NS and AS) independently screened articles during the abstract and title screening phase according to the eligibility criteria and identified 83 articles for the next stage of full-text screening. Any conflicts between the two authorswere independently resolved by a third author (KD) to reach a consensus on eligibility decisions. The full-text screening stage was also completed by NS and AS, who identified the 25 final texts that met the eligibility criteria for inclusion in the Evidence Check.

Grey literature search

We conducted a grey literature search that included a targeted website search of cancer and skin cancer peak bodies and primary care organisations*; a Google search (first 10 pages); and Google Scholar search (first 100 articles). Relevant guidelines, clinical trials, primary health networks, health pathways and key conference programs (Skin Cancer College Australasia; RACGP) were explored where accessible.

*Organisations searched:

- Cancer Australia
- Melanoma Institute Australia
- Cancer Council Australia; Cancer Council NSW; Cancer Council Victoria
- Cancer Institute NSW
- Skin Cancer College Australasia (a peak body for skin cancer in primary care)
- Royal Australian College of General Practitioners (RACGP)
- Australian College of Rural & Remote Medicine (ACRRM)
- The Australasian College of Dermatologists (ACD)
- Australian Primary Health Care Nurses Association (APNA)
- General Practice Registrars Australia/Regional Training Organisations (RTOs)
- Australian Government Department of Health
- National Aboriginal Community Controlled Health Organisation (NACCHO)
- Primary Care Collaborative Cancer Clinical Trials Group
- Primary Health Networks
- HealthPathways (N=5/10 in NSW).

The grey literature search identified a limited number of publications specifically related to skin cancer prevention activities and primary care. The website search of peak bodies/organisations identified 16 potentially relevant publications (plans, resources, pathways, position statements, guidelines) with updates since 2014. A Google Scholar search identified five additional journal articles for full-text review, focusing on the evaluation of an intervention. A Google search using the terms 'skin cancer prevention' and 'primary care' with additional terms (e.g. Primary Health Network, guidelines,

education/training, aboriginal health, GPs, Practice Nurse) identified seven publications and 10 education/training programs for full-text review. A significant number of the publications identified were guidelines, education resources and reports.

One author (KD) independently screened all grey literature texts, after which they were reviewed together by the research team (AKS, KD, NS, AEC) to come up with the final texts to be included in the Evidence Check.

Data extraction

Data from the final texts to be included in the Evidence Check were extracted and catalogued in Appendix 3 independently by an author from the research team (NS). The table was split into different columns to capture all relevant information, such as:

1. Author, year
2. Study setting
3. Study design
4. Intervention/ activities/ strategies measured in primary care
5. Outcomes measured in the study
6. Effectiveness and description of outcomes
7. Any barriers and/or enablers of the intervention/ activities/ strategies.

Data were synthesised from the data extraction table to appropriately address the research questions in the findings section of this Evidence Check.

The grey literature is summarised in Appendix 4.

Quality assessment

We evaluated included articles according to the levels of evidence hierarchy set up by the National Health and Medical Research Council (NHMRC) (see Table 1 below). The levels of evidence for each article were included in the 'author/year' column in Appendix 3. The frequency of studies in each level was further catalogued in a separate table for an overall estimate and range of study designs. A separate category was created in the table to capture articles with study designs that did not fit into the existing hierarchy and relevant details about the studies were added to the table for reference.

Table 1—NHMRC Levels of Evidence

Levels of evidence	Intervention
I	Systematic review of relevant RCTs
II	A randomised controlled trial
III-1	A pseudo-randomised controlled study

III-2	A comparative study with concurrent controls: - Nonrandomised experimental trial - Cohort study - Case-control study - Interrupted time series with a control group
III-3*	A comparative study without concurrent controls: - Historical control study - Two or more single-arm studies - Interrupted time series without a parallel control group
IV	Case series with either post-test or pre-test/post-test outcomes
Other	Studies that did not fall into the levels above: - Evaluations of knowledge/ attitude/ behaviours - Systematic, scoping or literature reviews

*Qualitative studies were assessed as III-3

Findings

Included studies and evidence grading

A flow chart of the literature screening and selection process for the peer-reviewed literature is found in Appendix 2. We found 25 peer-reviewed journal articles that met the eligibility criteria and these are included in the Evidence Check: 23 publications were selected through the literature searching and two were identified through the grey literature searches. Eight of the studies were conducted in Australia, six in the UK, and the others elsewhere (mainly other European countries). In addition, the grey literature identified four relevant guidelines, 10 education/training resources (available via multiple platforms), two Cancer Care Pathways, two position statements, three reports and five other resources that were included in the Evidence Check. The NHMRC levels of evidence for the included studies are summarised in Table 2 below.

Table 2—Evidence grading for included studies

Levels of evidence	Intervention	Number of studies
I	Systematic review of relevant RCTs	0
II	A randomised controlled trial	5
III-1	A pseudo-randomised controlled study	0
III-2	A comparative study with concurrent controls: - Nonrandomised experimental trial - Cohort study - Case-control study - Interrupted time series with a control group	7
III-3	A comparative study without concurrent controls: - Historical control study - Two or more single-arm studies - Interrupted time series without a parallel control group	5
IV	Case series with either post-test or pre-test/post-test outcomes	3
Other	Studies that did not fall into the levels above: - Evaluations of knowledge/ attitude/ behaviours - Systematic, scoping or literature reviews	5
Total		25

We identified wide variation in the study designs, interventions and outcomes across the selected studies. In Question 1, our findings are summarised according to the skin cancer prevention activities that were identified in the literature and grey literature searches. Findings related to Question 2 on the barriers and enablers of skin cancer prevention activities in primary care settings have been summarised according to the Consolidated Framework for Implementation Research (CFIR). The CFIR is a framework for identifying important implementation considerations for novel interventions in healthcare settings.

Question 1: What skin cancer primary prevention activities can be effectively administered in primary care settings? As part of this, identify the key components of such messages, strategies, programs or initiatives that have been effectively implemented and their feasibility in the NSW/Australian context.

Question 1 focuses on the evaluation of skin cancer prevention activities in primary care settings. The identified studies had a range of study designs and outcomes, and varied activities, strategies, programs and initiatives related to skin cancer prevention that had been administered in primary care settings; 20 of the eligible studies had sufficient information to enable discussion below. The following section classifies the literature according to four skin cancer prevention categories that we identified in the relevant literature: behavioural counselling (n=3); risk assessment and delivering risk-tailored information (n=10); new technologies for early detection and accompanying prevention advice (n=4); education and training programs for GPs and primary care nurses regarding skin cancer prevention (n=3). The key components and results for each study are presented in Appendix 3.

Primary prevention activities identified in the literature searches

i. Behavioural counselling

Summary of relevant studies:

There were three publications that focused on behavioural counselling by GPs. Of these, one was a randomised controlled trial (RCT; Level II evidence)[4], one was a comprehensive systematic literature review on the benefits and harms of behavioural counselling for skin cancer prevention to inform the US Preventive Services Task Force (USPSTF) recommendations[5], and one was a literature scoping review of strategies to ensure that patients receive an early diagnosis through interventions including better use of primary care clinics.[6]

The RCT was conducted among 309 primary healthcare patients in Sweden, with three study arms.[4] Over a three-week period, all patients aged >18 years who attended a primary healthcare centre (independent of the purpose of their visit) were invited to participate in the study via an invitation letter provided at reception. Group 1 received generic information on skin type, sun exposure habits and summarised risk assessment ‘with personally-adjusted advice’; groups 2 and 3 received the same

information through a ~20 minute GP consultation and whole-body skin check. Group 3 also had a photo-test for assessment of individual UV sensitivity and they received written sun protection advice based on their UV sensitivity. Participants completed questionnaires at baseline and three follow-up time points: six months, three years and 10 years.

In the USPSTF review[5], the included interventions were aimed at improving sun protection behaviours or teaching skin self-examination in a primary care or primary care-linked setting. Twenty-one trials were identified, and 13 were conducted in adult populations with a focus on improving sun protection behaviours (five of these also included messages promoting skin self-examinations). Of these, one study was rated as good quality and 12 were fair quality because of limitations such as a lack of reporting on handling of missing data and incomplete reporting of blinding methods, randomisation, allocation concealment or follow-up rates (based on the USPSTF design-specific quality criteria). The key intervention component was general skin cancer education and strategies for reducing sun exposure (sun protection or sun avoidance behaviours) and this was delivered via:

- Mail (n=7)
- Direct counselling by GP or health educators (n=5)
- Text messages (n=1)
- Online programs (n=2)
- Appearance-based images (n=1).

Most studies included feedback that was tailored to participants' level of risk, barriers to change or both. Follow-up across the studies ranged from 3–24 months.

Summary of results:

In the Swedish RCT, the participants in the two groups who received sun protection advice verbally from their GP had significantly increased their sun protection behaviours compared with the generic information group at all follow-up time points, with >70% of participants completing each follow-up questionnaire.[4]

The USPSTF systematic review found adequate evidence that behavioural counselling interventions can result in a small improvement in sun protection behaviours among adults >24 years who have fair skin types.[7]

The scoping review identified that clinicians play an important role in counselling patients about sun-protective behaviours, and recommended tailoring messages to the age and demographics of target groups (e.g. high-risk groups) to have maximal influence on behaviours.[6]

Summary of relevant grey literature:

Based on the systematic review reported above, the USPSTF recommends that health professionals selectively offer behavioural counselling about minimising UV exposure to adults with fair skin types, defined as ivory or pale skin, light hair and eye colour, freckles, or those who sunburn easily[7], but the net benefit of counselling all adults >24 years is limited. The recommendations suggest that to determine whether behavioural counselling is appropriate, patients and clinicians should consider the presence of risk factors for skin cancer.

Clinical practice guidelines in Australia recommend that all patients, particularly children, be 'sun smart' by adopting protective measures when UV levels are 3 or above.[8] Cancer Council Australia's clinical guidelines for keratinocyte cancers suggest wall charts and patient education material in GP waiting rooms[9] and for clinicians to strongly encourage patients to protect themselves from exposure to sunlight when the UV index is 3 or above, including by wearing hats, protective clothing and SPF30+ sunscreen. These recommendations also align with the Cancer Care Pathway: Optimal care pathway for people with melanoma (Appendix 4).

The 2022 State of the Nation—A Report into Melanoma, A National Health Priority, developed with national input from melanoma patients, carers, clinicians (including GPs and skin cancer GPs), researchers and policy leaders, proposes a roadmap to zero deaths from melanoma by 2030.[10] The report, based on stakeholder consultation and consumer forums, identified a national priority for a sustained and ongoing modern prevention and awareness campaign and strategy that is acceptable, equitable and directed towards individuals. This report demonstrated that in the Australian community, there is poor understanding of melanoma risk, what it means to be 'sun smart' and of the UV Index, which is widely used in health promotion messaging.[11]

There is confusion about the amount of sun exposure needed to make vitamin D, which can lead to both over and under-exposure to the sun, increasing risks of both skin cancer and vitamin D deficiency at a population level. Indeed, guidance documents have wide variations in advice for sun exposure and vitamin D production.[12] In 2021 the Sun Exposure Summit, hosted by the Australian Skin and Skin Cancer Research Centre, was held to discuss the harms and benefits of sun exposure, with the overall aim of considering whether current advice has the balance right and is able to be implemented in public health and clinical practice.[13, 14] There was consensus at the summit that because the available evidence suggests vitamin D production through sun exposure varies according to individual skin type and personal skin cancer risk, more risk-tailored recommendations should be communicated to the Australian community. The summit included a session on Clinical and Consumer Perspectives with presentations from GP researchers. A position statement is currently being drafted by the Summit Working Group members. As GPs are often the first port of call for skin cancer concerns in the community, and as key stakeholders in skin cancer prevention and early detection, communicating this more nuanced prevention information may be most appropriate through primary care.

ii. Risk assessment and delivering risk-tailored information

Summary of relevant studies:

Ten publications examined melanoma risk assessment in the context of primary care. Two of these were qualitative interview studies with Australian GPs examining melanoma risk assessment including the role of assessment tools[15] and the role of genomic risk information[16] in guiding prevention and early detection recommendations. There were three intervention studies that assessed the impact of generic education on prevention and early detection compared with risk-tailored information using a risk assessment tool in primary care—a pilot RCT[17], a pre–post controlled trial[18] and a pragmatic RCT.[19] Three publications described the development and validation of risk assessment questionnaires and/or tools to identify groups at high risk of melanoma in the Australian community[20, 21] or in the UK.[22] One study included melanoma along with other cancers in assessing the development of a cancer risk prediction tool for use in UK primary care and community settings.[23]

We also identified a literature review of risk prediction tools for cancer, including melanoma, in primary care.[24]

Summary of results:

The qualitative interview study by Anandasivam et al. demonstrated that Australian GPs were largely receptive towards the role of melanoma risk prediction tools to guide prevention and early detection advice.[15] But there was high variability among GPs in the identification of melanoma risk factors, melanoma risk estimation, management and patient education because of the intuitive and analytical processes guiding risk assessment and the influence of patient factors.

The use of genomic risk information to guide risk assessment is anticipated to move into mainstream medicine and GPs are increasingly facing decision-making regarding clinical genomic testing and responding to consumer-driven (personal and/or online) DNA testing.[25, 26] A study identified in this Evidence Check showed Australian GPs viewed genomics-based personal risk as one of many disease risk factors and felt this type of information could be applied in practice in the context of overall risk assessment for diseases for which primary prevention and early detection strategies are available, including melanoma.[16]

Taken together, the intervention studies demonstrated that model-generated melanoma risk prediction and corresponding risk-tailored prevention advice was associated with improved sun protection behaviours, and that these interventions were feasible and acceptable to participants in primary care settings.[17-19] Undergoing melanoma risk assessment in a GP clinic, for example, using an iPad/tablet in the clinic waiting room, was found to be feasible and acceptable in Australia[20, 21] and in the UK.[22, 23]

Summary of relevant grey literature:

Recommendations to conduct a risk assessment for skin cancer are incorporated into current skin cancer prevention clinical practice guidelines but are related more to the identification of high-risk individuals who might benefit from a clinical skin examination, rather than to tailor primary prevention messages, which are considered to be widely applicable to the Australian population. Nevertheless, risk prediction tools can be used to identify people at high risk who might benefit from targeted behavioural counselling as described above.[17-19] Several web-based melanoma risk prediction tools are now available in Australia, mainly designed for health professionals to identify patients' risk of a new or subsequent primary melanoma and to guide discussions with patients about primary prevention and early detection (for example: https://melanomarisk.org.au/ and https://www.scanyourskin.org/risk-prediction-tool/). They do incorporate primary prevention messages into their output, so provide a good opportunity to deliver primary prevention advice alongside discussion about personal risk and when to get a skin check. The risk prediction tools for estimating risk of a new or subsequent primary melanoma are not currently routinely and widely used in clinical practice, although they are being used routinely at the Melanoma Institute Australia and anecdotally we know of some other clinicians (including skin cancer GPs and dermatologists) who use them routinely to guide prevention advice and follow-up schedules. They are also being evaluated in ongoing research studies led by Professor Anne Cust (the Daffodil Centre) and Associate Professor Linda Martin (Melanoma Institute Australia).

iii. New technologies for early detection and accompanying prevention advice

Summary of relevant studies:

We identified four publications that aim to examine novel technologies to support early detection through skin examinations, with some (very limited) focus on the provision of preventive advice.[27-30] One of these described a protocol for the 'melatools' skin self-monitoring RCT, which is a skin self-monitoring smartphone application (app) used to improve symptom appraisal and encourage help-seeking in primary care.[28] Patients at high risk of melanoma identified using a real-time risk assessment tool are invited via a primary care nurse consultation to take part in the trial.[28] A UK-based primary care RCT (Level II evidence)[30] examined whether a smartphone app that prompted monthly skin self-examinations increased the frequency of GP consultations for skin changes. Standard written advice on sun protection and early detection was provided to all participants in this study. The third paper reported a skin cancer prevention and early detection intervention implementing teledermatology in primary care centres in southern Spain.[27] This study had two key phases: (1) a training course and practical skills development in skin cancer and teledermatology for the participating GPs, and (2) GPs then conducted patient interviews, clinical skin examination, dermatoscopic skin examination, teleconsultation with the Dermatology Department for suspected skin cancer/melanoma cases, personalised advice, provision of information pamphlets and provision of sunscreen.

Summary of results:

The UK-based RCT found recruitment, retention and initial delivery of the intervention was feasible, and there was no evidence of harm from use of the skin self-monitoring smartphone app.[30] But they also reported no evidence of benefit from skin self-examination and concluded there is no reason at this stage to recommend its implementation among people at increased risk of melanoma. The Spanish teledermatology in primary care study[27] found patient and GP satisfaction with the teledermatology process in the study, particularly for those patients with benign lesions who did not need to travel for a clinical examination from a dermatologist.

Summary of relevant grey literature:

The Australian College of Rural & Remote Medicine (ACRRM) hosts Tele-Derm, a program providing dermatology resources for regional and remote primary care and access to expert advice from dermatologists on difficult cases. This is currently funded by Department of Health Rural Health Outreach Fund and while its key focus is not skin cancer prevention, it aims to assist with timely access to services and reduce the need for travel.

iv. Education and training programs for GPs and primary care nurses

Summary of relevant studies:

We identified three training courses or programs for health professionals through the literature searches. Particularly relevant to the Australian context was the Dermoscopy for Victorian General Practice Program, a model of upskilling GPs in dermoscopy that could be replicated in other jurisdictions.[31] Cancer Council Victoria's SunSmart developed the program with the aim of facilitating more accurate diagnosis of skin cancer by Victorian GPs, particularly in regional areas. The program involved access to an initial optional six-hour online skin cancer training module, and to the

Australasian College of Dermatologists' Practical Dermoscopy course, which consisted of an online training program of a further six education modules (8–15 hours), a virtual clinic (10–20 hours) and webinars that were completed before attendance at a one-day face-to-face training workshop (eight hours), where participants received a fully funded dermatoscope.

Summary of results:

Since participating in the Dermoscopy for Victorian General Practice Program[31], GPs (n=130) reported that they were more confident in using a dermatoscope (97.5%), diagnosing melanoma (89.9%) and diagnosing non-melanoma skin cancers (88.6%). Most (93%) reported that they had increased preventive information provided to high-risk patients and during skin examinations. Overall, GPs reported the program had improved their quality of patient care regarding early detection of skin cancer (98.7%) and their assessment and decision-making in referring patients to dermatologists (91.1%).

Summary of relevant grey literature:

There has been an expansion in skin cancer training and education for nurses in Australia, as highlighted by the melanoma nurse programs that have been established by the Melanoma Institute Australia (MIA) in Sydney, Wagga Wagga, Hobart and Perth. In April 2022, the Australian Labor Party committed a further $14.8 million to expand this service nationwide, including accessible telehealth support to provide personalised and accessible patient services.[32] In June 2022 an online education course, *Skin cancer prevention and risk reduction: Empowering your patients*, was hosted as part of the MIA Nurse Webinar Series. The course covered the importance of prevention in skin cancer, advice on prevention strategies and other measures to reduce risk, and practical ways to empower patients and the community. This webinar was promoted widely, particularly on primary health networks to target primary care nurses. Two national educational online short courses for GPs and primary care nurses have been developed by Cancer Council Victoria: *The prevention and early detection of skin cancer in general practice—Advanced course for GPs* and *Biopsy techniques, skin cancer prevention and vitamin D* are available via ThinkGP, an online continuous professional development (CPD) education platform. These programs are easily accessed via a Google search and on various websites including ACRRM. The educational objectives of these programs include "educating patients about skin cancer prevention" and "advising patients about sun protection recommendations".

Formal skin cancer education programs for primary care professionals focus more on early detection, diagnosis and management than on skin cancer primary prevention, for example the Master of Medicine (skin cancer) from the University of Queensland; the Advanced Certificate in Skin Cancer from the Australasian College of Dermatologists (ACD); the Certificate of Skin Cancer Medicine from the Skin Cancer College Australasia; and the Certificate of Primary Care Dermatology from the RACGP. The ACD provides dermoscopy training across a number of the courses. Program details are included in Appendix 4: Table of grey literature findings.

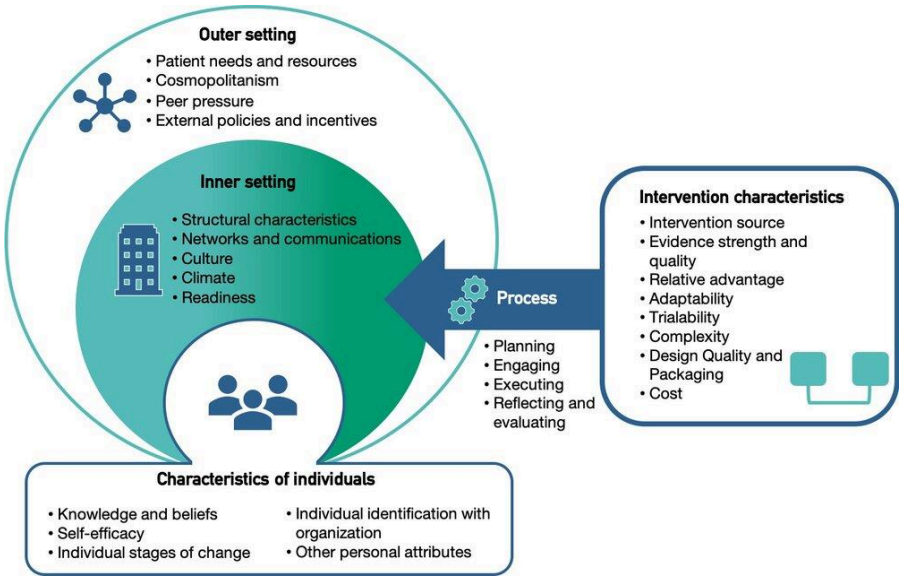
Question 2: What are the main barriers and enablers for primary care providers in delivering skin cancer primary prevention activities within their setting?

Question 2 focuses on the main barriers and enablers for primary care providers in delivering skin cancer primary prevention. Nineteen of the 25 papers reported an activity and included barriers and enablers in delivering skin cancer prevention. The remaining six papers did not report enablers or barriers so were not relevant to the question.

To address Question 2, we have summarised the barriers and enablers that were either explicitly identified within the articles or identified by the Evidence Check team at data extraction. Barriers and enablers for primary care providers in delivering skin cancer primary prevention activities were coded into the Consolidated Framework for Implementation Research (CFIR) to determine their frequency and provide a framework for reporting (Appendix 5). We chose CFIR to guide our reporting as the diversity in types of studies was challenging to synthesise and CFIR is recognised as a pragmatic structure for identifying potential influences on the implementation of interventions in health systems(33) CFIR's five major domains include:

1. Intervention characteristics
2. Outer setting
3. Inner setting
4. Characteristics of individuals
5. Implementation process including multiple constructs.

Figure 1: Consolidated Framework for Implementation Research with major domains (five) and key constructs



Reference: The Center for Implementation. [*https://thecenterforimplementation.com/about-us* accessed 8/7/2022]

Appendix 5 consists of:

1. A list of the CFIR domains with constructs relevant to this report
2. Barriers and enablers with the reference and corresponding count of articles that reported the related barriers and enablers.

Barriers and enablers are reported under the five major domains with only relevant constructs included as follows:

1. Characteristics of skin cancer primary prevention activities (intervention characteristics):

Evidence and strength and quality: Barriers related to evidence, strength and quality of the skin cancer primary prevention activity included inconsistencies between guidelines and research, such as when the guidelines become outdated; one example is the current RACGP guidelines (published in 2016) that state there are no sufficiently well validated risk models; however, these are now widely available and research studies report value in their use. Easy access and availability of guidelines in Australia and the evidence of the effectiveness of multifaceted interventions may be considered enablers. Three studies reported high satisfaction with activities that included multifaceted interventions likely to influence sun protection behaviours.[5, 15, 27] In addition, the recent State of the Nation in Melanoma report identified evidence that clinics for managing skin surveillance for people at very high risk of developing melanoma are cost-effective and can be delivered in a range of care settings, including in primary care, provided the health professional has sufficient training.

Complexity factors: Complexity factors related to skin cancer prevention activities were reported frequently. These included complexity and unclear requirements about behavioural counselling (a barrier) and less complex activities where patients did not require additional assistance to participate (an enabler), such as a self-completed risk assessment tool for patients, where one study noted that 90% of patients completed it without help.[21]

Cost: The perceived cost of delivering skin cancer prevention in primary care settings in conjunction with external activities was also cited as a barrier for implementation; for example, the cost of a public campaign combined with primary care training and counselling[34] was seen as barrier despite reported successful outcomes. A related enabler was the requirement for only minimal resources to deliver an activity, such as interventions that are brief[17], that require no other resources[4], or that are delivered opportunistically at a single attendance and with minimal disruption to workflow.[18]

Design and packaging: The timing of the activity may also be an enabler (a design quality and packaging factor) where a program in primary care delivered shortly before the Australian summer reported a successful outcome.[18]

2. External context (outer setting)

Patient needs and resources: Lack of availability of primary care services was reported as a barrier related to patient needs and resources; an example is an Aboriginal Medical Service (primary care) providing prevention education and services that is available only two days a week.[35] The State of the Nation in Melanoma report[10] identified significant challenges for patients in accessing primary care in regional and remote areas and the effect of waiting times.

Enablers related to patient needs and resources included ease of access to expertise via teledermatology[27] and easy-to-understand patient information[16] for delivery in primary care settings. In addition, we found numerous comprehensive patient and community information and resources

through grey literature searching in Australia, in particular the SunSmart website [https://www.sunsmart.com.au/] and the SunSmart app developed by the Victorian Cancer Council and funded by the Victorian Government.

External policy and incentives: Factors related to external policy and incentives, including prioritising settings with limited access to services for primary care education may be considered enablers. This strategy was adopted to recruit GPs to the Dermoscopy for Victorian General Practice Program, which reported high levels of participation and which provided the incentive of a fully funded dermatoscope to participants.[31] Enablers also include the availability of online risk assessment tools and peak body recommendations and support for skin cancer prevention education (grey literature, Appendix 4). Additionally, support from peak bodies and government was an enabler of skin cancer prevention practice. For example, the State of Nation in Melanoma report[10] states that the wider rollout of high-risk clinic models of care nationally is feasible in dermatology and in primary care settings and the Victorian Government provides funding for the SunSmart website and program, a highly accessed sun protection education resource recommended in GP and nurse training programs.

3. Primary care setting (inner setting)

Compatibility: Compatibility factors that refer to how the activity fits with existing workflows and systems within the primary care setting were key enablers for the delivery of skin cancer prevention activities. These include close integration with routine clinical services and activities designed to be compatible with primary care. Risk assessment tools compatible with the pace of primary care[17, 20], interventions delivered opportunistically with minimal disruption to routine[18] and activities that make the most of the 'waiting room wait' (collecting information in in waiting rooms was highly acceptable)[24] are all examples of compatibility factors. In addition, activities that provide opportunities for giving prevention advice, such as skin examinations, may also be enablers.[31]

Access to knowledge and information: Broader primary care setting enablers that were commonly reported included access to knowledge and information in settings where education and training for practising primary care professionals was a priority both for primary care nurses and GPs.[27, 36] Education as a priority was also recommended in reports by peak bodies including Cancer Council Australia and Melanoma Institute Australia. A number of online short courses focusing on skin cancer prevention and developed by recognised experts can be easily located online and are available for practice nurses and GPs, increasing access and support for upskilling. For example, the recent Melanoma Institute Australia's Nurse Webinar *Skin Cancer Prevention and Risk Reduction: Empowering your patients*, which targets practice nurses, is promoted on a number of Primary Health Networks sites as well as the Australian Dermatology Nurses' Association website. Similarly, *The prevention and early detection of skin cancer in general practice—Advanced course for GPs*, developed in partnership with the Cancer Council Victoria and hosted by online CPD education platform ThinkGP, is included on key websites such as ACRRM and SunSmart.

Point-of care information for primary care is available via the SunSmart program (Cancer Councils) and guidelines (RACGP and Cancer Council Australia); however, we were unable to locate any specific skin cancer prevention pathways in HealthPathways (NSW), a web-based portal designed to provide localised clinical support for primary care.

Relative priority and available resources: Factors related to the relative priority of skin cancer activities and available resources were also seen as barriers and included the challenges of competing demands in primary care practice[17] and available time in the consultation[4], respectively.

4. Characteristics of primary care professionals (characteristics of individuals)

Self-efficacy was considered a barrier in one study in France[17], where GPs did not feel qualified to educate patients and conduct skin examinations, and additionally in an Australian study where GPs reported limited confidence in discussing genomic risk and explaining complex risk information.[16]

5. The implementation process of skin cancer prevention activities within primary care (process)

Planning: Enablers reported for the process of delivery and implementation included planning factors such as the generalisability and replication of activities. For example, the Victorian Dermoscopy GP training program successfully upskilled GPs in Victoria and has the potential to be replicated in other jurisdictions.[31]

To facilitate the links between Question 1 and Question 2 in this Evidence Check, Appendix 6 shows the identified barriers and enablers mapped to the key skin cancer prevention activities outlined in Question 1.

Gaps analysis

Firstly, the use of risk assessment tools to guide prevention recommendations has expanded in recent years, but evidence suggests most GPs are not using available validated online tools. It is possible they will become more widely used as awareness increases and if their use becomes recommended in updated clinical practice guidelines. Currently, however, there is no standardisation for risk assessment, which instead is often guided by GPs' intuitive and analytical processes and patient factors.[15] The focus on the implementation and impact of skin cancer risk assessment is relatively recent. There remains uncertainty about clinical utility and how to implement risk assessment in a way that is streamlined and that maximises benefits and minimises potential harms such as anxiety. Further validation of the risk models and evidence about the acceptability, clinical impact and economic implications of incorporating them into practice is needed.[24]

Secondly, we identified no 'skin cancer prevention' pathways in the NSW HealthPathways we accessed (n=5/10).HealthPathways is a web-based portal designed to provide localised clinical support to primary care in Australasia, including access to clinical management pathways and referral advice into local health services. It offers locally agreed information enabling primary care practitioners to respond to relevant health issues in the consulting room with the patient.[37] Primary Health Networks support HealthPathways as part of co-ordinated local care. One HealthPathway did include both a non-melanoma pathway and a melanoma pathway that focused on early detection and management; in those pathways skin cancer prevention advice targeting patients with a previous skin cancer was briefly included late in the pathway. Our searching suggests the gap in skin cancer prevention information available via HealthPathways offers an opportunity to develop and incorporate point-of-care resources for primary care practitioners on this portal.

Thirdly, there is a gap in research into the use of new technologies to support primary prevention activities.New technologies such as smartphone apps to support early detection are increasingly being investigated. These may help facilitate more equitable access to early detection and prevention advice, particularly for people in remote or regional areas. This research excludes people without a smartphone or those with physical disorders that would hamper their use of a smartphone. The studies examining the feasibility, acceptability and impact of new smartphone apps to support skin self-examinations are providing only generic educational information on prevention. Evidence suggests it is feasible for the wider rollout of high-risk clinic models of care (and prevention advice) nationally in dermatology and in trained primary care settings.[10] There is a need, therefore, for research to inform the implementation of this strategy.

Lastly, no skin cancer prevention activities specifically targeting Aboriginal and/or Torres Strait Islander peoples were identified. People who are Aboriginal and/or Torres Strait Islander have a range of different skin types. Overall, however, they have a much lower incidence of melanoma compared with the non-Aboriginal population because of a higher level of skin pigment. An evaluation of a cancer care team based at the Illawarra Aboriginal Medical Service (Wollongong, Dharawal country) found it was highly regarded.[35] Its work supported Aboriginal patients with cancer prevention (coordinating preventive programs and health promotion activities to promote prevention and early detection of cancers, including skin cancer), diagnosis and treatment through to palliative care. No specific enablers were identified for skin cancer prevention activities but, in general, enablers in cancer care included consulting with Aboriginal Australians about their desire for cancer care, basing

services in the Aboriginal Medical Service (more recently known as the Aboriginal Community Controlled Health Organisation) as it is considered culturally safe and its centres include an Aboriginal health worker team (Aboriginal health worker, a nurse and counsellor supported by a GP). The main barrier reported was that the service was available only two days a week. While this was not specific to skin cancer prevention, it has relevance for the effective delivery of prevention activities in Aboriginal Community Controlled Health Centres. The Australasian College of Dermatologists provides a free online education course for Aboriginal health workers, titled *Taking care of skin: How to recognise and respond to skin health issues in Aboriginal and Torres Strait Islander people*. While the program focuses on skin conditions generally, it is a potential vehicle for relevant skin cancer prevention education for Aboriginal health workers. Although Aboriginal and Torres Strait Islander peoples have a much lower risk of skin cancer than people with European ancestry, melanomas can still develop in people with dark skin—these melanomas tend to be an acral histological subtype, which occurs more commonly on the hands or feet and is considered unrelated to sun exposure, unlike the vast majority of skin cancers that occur in fair-skinned people. There is a gap in sun cancer prevention information relevant for people with different subtypes of dark skin, both for the community and primary care providers.

Strength of the evidence base

Most studies identified in this Evidence Check were observational and descriptive, corresponding to III-2 and III-3 levels of evidence. We found a few randomised controlled trials (level II evidence). The studies encompassed a wide variety of study designs and outcomes focused on skin cancer prevention activities in primary care settings. We currently have limited information on how skin cancer preventive activities are routinely delivered in primary care in Australia. The studies included in this Evidence Check have largely focused on novel activities, most of which have not been implemented or translated into practice at scale.

Implications of the findings for skin cancer primary prevention in primary care in NSW

Risk assessment tools to identify high-risk groups and provide targeted prevention in the community show great promise for primary prevention activities, but there is a need for further research to standardise the use of these tools, and to standardise skin cancer risk assessment generally, for example the classification of ‘high risk’. The collection of risk factors via questionnaires or iPads/tablets in clinics has been shown to be feasible and acceptable. There has been a variety of approaches to delivering risk-tailored skin cancer prevention advice, and although research evidence suggests risk-tailored information is more effective at encouraging the uptake of some preventive behaviours, more investigation is needed into how the delivery of risk-based prevention and early detection advice could fit into models of care in primary care.

The cancer control continuum begins with prevention, but skin cancer prevention messages continue to be relevant throughout a lifetime and after diagnosis of skin cancer. It is not clear from the studies we identified how skin cancer primary prevention fits into everyday practice in primary care settings.

The education and training programs included in this report targeted: a) GPs with early detection education; b) GPs combined with primary care nurses, alongside early detection education; and c) primary care and dermatology nurses with skin cancer prevention education. This indicates both a mix of roles and teamwork in different settings.

The perceived clinical relevance of education is a key factor in recruitment and participation by GPs in skin cancer prevention education and related activities, and was recognised as an enabler. Including GP prevention education as a part of skin cancer early detection training programs may increase engagement and skin prevention practice from GPs. The State of the Nation in Melanoma Report[10] also highlighted a need for more nuanced primary prevention messages that better incorporate the diversity of the Australian population, which highlights an area for future research.

The integration of skin cancer prevention activities within routine clinical services was seen as of key importance in the delivery of skin cancer prevention activities. Skin cancer prevention education to patients was not seen as additional to clinical work and preference was given to interventions delivered opportunistically at a single consultation with minimal disruption, and to risk assessment tools that were integrated and designed to be compatible with the pace of primary care practice.

In the design of activities, factors that may enable effective delivery are those that require minimal resources in primary care, support and cost. Patient self-completion tools, for example for risk-assessment, were seen as highly acceptable if they were simple and easy for patients to complete without assistance.

Conclusion

This Evidence Check review has identified four key skin cancer prevention activities that have been evaluated in primary care settings since 2014: 1) behavioural counselling, 2) risk assessment and the provision of risk-tailored recommendations, 3) new technologies for early detection and accompanying prevention advice, and 4) training and education for GPs and primary care nurses.

Our findings with implications for skin cancer primary prevention in primary care in NSW include:

1. Tailoring skin cancer prevention advice according to individual characteristics, including skin cancer risk, has the potential to better motivate sustained behaviour change than generic educational information alone. There is a need to investigate prevention messages that incorporate multiple risk factors and take into account factors such as health literacy.

2. Risk assessment tools to guide primary prevention and early detection recommendations are viewed as acceptable by GPs and the community. There is a need for standardisation of these tools and implementation research into their integration into routine clinical practice.

3. The use of smartphone apps to support skin self-examination is being investigated and provides potential opportunities to incorporate primary prevention messages. Currently there is insufficient evidence to support their routine use.

4. Training and education for health professionals in skin cancer often focuses on treatment and early detection, but there are several good examples of benefits to be gained from including more primary prevention activities in these training and education packages. Point-of-care resources and information to support conversations with patients about risk-based prevention advice would be beneficial.

We identified several enablers and barriers to performing skin cancer prevention activities in primary care settings.

Key enablers included:

- Easy access and availability of guidelines and point-of-care tools and resources
- A fit with existing workflows and systems, so there is minimal disruption to flow of care
- Easy-to-understand patient information
- Using the waiting room for collection of risk assessment information on an electronic device such as an iPad/tablet where possible
- Pairing with early detection activities
- Sharing of successful programs across jurisdictions.

Key barriers included:

- Unclear requirements and lack of confidence (self-efficacy) about prevention counselling
- Limited availability of GP services especially in regional and remote areas
- Competing demands, low priority, lack of time

- Lack of incentives.

Addressing these enablers and barriers will facilitate the implementation and sustainment of skin cancer prevention activities in primary care.

Appendices

Appendix 1—Search strategies

EMBASE

Database: Embase Classic+Embase <1947 to 2022 May 23>

Search strategy:

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1. General Practice/ or general pract*.mp. or pract*, general.mp. (227119)
2. Primary health care/ or primary care.mp. or primary health care.mp. or primary healthcare.mp. (240773)
3. Community Health Services/ or Community Health Nursing/ or Health Services, Indigenous/ or Preventive Health Services/ or Community Health Service*.mp. or Community Health Nurs*.mp. or Health Service*, Indigenous.mp. or Preventive Health Service*.mp. or community health care*.mp. or community healthcare*.mp. (116111)
4. General Practitioners/ or general practice physician*.mp. or general practitioner*.mp. (145433)
5. Nursing/ or Community Health Nursing/ or Public Health Nursing/ or Rural Nursing/ or practice nurs*.mp. or community health nurs*.mp. or public health nurs*.mp. or rural nurs*.mp. or family doctor*.mp. (275991)
6. aboriginal community controlled health service*.mp. (230)
7. skin cancer clinic*.mp. (159)
   1 or 2 or 3 or 4 or 5 or 6 or 7 (748118)
8. Skin Neoplasms/ or cancer of skin.mp. or cancer of the skin.mp. or skin cancer*.mp. or skin neoplasm*.mp. (79270)
9. Melanoma/ or malignant melanoma*.mp. or melanoma*.mp. (239722)
10. 9 or 10 (290949)
11. Primary Prevention/ or primary disease prevention*.mp. or primary prevention*.mp. or primordial prevention*.mp. (60010)
12. Health Knowledge, Attitudes, Practice/ or Health Knowledge, Attitudes, Practice.mp. (104110)
13. Health Promotion/ or Health Promotion.mp. (121896)
14. Risk Reduction Behavior/ or risk reduction behavior*.mp. or Risk Assessment/ or Risk Assessment*.mp. or Risk Factors/ or Risk Factor*.mp. or high risk.mp. (2626028)
15. skin cancer prevent*.mp. or Sunscreening Agents/ or sunscreen*.mp. or sunscreening agents.mp. or Eye Protective Devices/ or Eye Protective Device*.mp. or nonprescription sun glasses.mp. or shade.mp. or sunburn.mp. or UV exposure.mp. or UV cloth*.mp. or Sun cloth*.mp. (33771)

16. Ultraviolet Rays/ or uv radiation.mp. or ultraviolet radiation.mp. or ultraviolet ray*.mp. (122343)
17. UV Index.mp. (424)
18. UV overexposure.mp. (16)
19. Medicare/ (90844)
20. family hist*.mp. (168756)
21. health assessment.mp. (21232)
22. tanning.mp. (4161)
23. fitzpatrick.mp. (2886)
24. skin type.mp. (3395)
25. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 (3191283)
26. 8 and 11 and 26 (927)
27. limit 27 to (english language and yr="2014 -Current") (446)

MEDLINE

Database: Ovid MEDLINE(R) ALL <1946 to May 23, 2022>

Search strategy:

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1 General Practice/ or general pract*.mp. or pract*, general.mp. (99202)
2 Primary health care/ or primary care.mp. or primary health care.mp. or primary healthcare.mp. (186034)
3 Community Health Services/ or Community Health Nursing/ or Health Services, Indigenous/ or Preventive Health Services/ or Community Health Service*.mp. or Community Health Nurs*.mp. or Health Service*, Indigenous.mp. or Preventive Health Service*.mp. or community health care*.mp. or community healthcare*.mp. (72581)
4 General Practitioners/ or general practice physician*.mp. or general practitioner*.mp. (57420)
5 Nursing/ or Community Health Nursing/ or Public Health Nursing/ or Rural Nursing/ or practice nurs*.mp. or community health nurs*.mp. or public health nurs*.mp. or rural nurs*.mp. or family doctor*.mp. (96394)
6 aboriginal community controlled health service*.mp. (212)
7 skin cancer clinic*.mp. (93)
8 1 or 2 or 3 or 4 or 5 or 6 or 7 (396447)
9 Skin Neoplasms/ or cancer of skin.mp. or cancer of the skin.mp. or skin cancer*.mp. or skin neoplasm*.mp. (143646)
10 Melanoma/ or malignant melanoma*.mp. or melanoma*.mp. (149083)
11 9 or 10 (243100)
12 Primary Prevention/ or primary disease prevention*.mp. or primary prevention*.mp. or primordial prevention*.mp. (36382)
13 Health Knowledge, Attitudes, Practice/ or Health Knowledge, Attitudes, Practice.mp. (123612)
14 Health Promotion/ or Health Promotion.mp. (100588)

15 Risk Reduction Behavior/ or risk reduction behavior*.mp. or Risk Assessment/ or Risk Assessment*.mp. or Risk Factors/ or Risk Factor*.mp. or high risk.mp. (1750953)
16 skin cancer prevent*.mp. or Sunscreening Agents/ or sunscreen*.mp. or sunscreening agents.mp. or Eye Protective Devices/ or Eye Protective Device*.mp. or nonprescription sun glasses.mp. or shade.mp. or sunburn.mp. or UV exposure.mp. or UV cloth*.mp. or Sun cloth*.mp. (24722)
17 Ultraviolet Rays/ or uv radiation.mp. or ultraviolet radiation.mp. or ultraviolet ray*.mp. (89883)
18 UV Index.mp. (313)
19 UV overexposure.mp. (15)
20 Medicare/ (44194)
21 family hist*.mp. (67690)
22 health assessment.mp. (10186)
23 tanning.mp. (3766)
24 fitzpatrick.mp. (1666)
25 skin type.mp. (2150)
26 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 (2143774)
27 8 and 11 and 26 (493)
28 limit 27 to (english language and yr="2014 -Current") (203)

COCHRANE CENTRAL

Database: EBM Reviews: Cochrane Central Register of Controlled Trials <April 2022>

Search strategy:

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1 General Practice/ or general pract*.mp. or pract*, general.mp. (13027)
2 Primary health care/ or primary care.mp. or primary health care.mp. or primary healthcare.mp. (23906)
3 Community Health Services/ or Community Health Nursing/ or Health Services, Indigenous/ or Preventive Health Services/ or Community Health Service*.mp. or Community Health Nurs*.mp. or Health Service*, Indigenous.mp. or Preventive Health Service*.mp. or community health care*.mp. or community healthcare*.mp. (3111)
4 General Practitioners/ or general practice physician*.mp. or general practitioner*.mp. (8096)
5 Nursing/ or Community Health Nursing/ or Public Health Nursing/ or Rural Nursing/ or practice nurs*.mp. or community health nurs*.mp. or public health nurs*.mp. or rural nurs*.mp. or family doctor*.mp. (2198)
6 aboriginal community controlled health service*.mp. (29)
7 skin cancer clinic*.mp. (14)
8 1 or 2 or 3 or 4 or 5 or 6 or 7 (35835)
9 Skin Neoplasms/ or cancer of skin.mp. or cancer of the skin.mp. or skin cancer*.mp. or skin neoplasm*.mp. (3419)
10 Melanoma/ or malignant melanoma*.mp. or melanoma*.mp. (6594)

11 9 or 10 (8395)
12 Primary Prevention/ or primary disease prevention*.mp. or primary prevention*.mp. or primordial prevention*.mp. (4744)
13 Health Knowledge, Attitudes, Practice/ or Health Knowledge, Attitudes, Practice.mp. (6401)
14 Health Promotion/ or Health Promotion.mp. (11072)
15 Risk Reduction Behavior/ or risk reduction behavior*.mp. or Risk Assessment/ or Risk Assessment*.mp. or Risk Factors/ or Risk Factor*.mp. or high risk.mp. (139908)
16 skin cancer prevent*.mp. or Sunscreening Agents/ or sunscreen*.mp. or sunscreening agents.mp. or Eye Protective Devices/ or Eye Protective Device*.mp. or nonprescription sun glasses.mp. or shade.mp. or sunburn.mp. or UV exposure.mp. or UV cloth*.mp. or Sun cloth*.mp. (2228)
17 Ultraviolet Rays/ or uv radiation.mp. or ultraviolet radiation.mp. or ultraviolet ray*.mp. (1546)
18 UV Index.mp. (21)
19 UV overexposure.mp. (0)
20 Medicare/ (286)
21 family hist*.mp. (4478)
22 health assessment.mp. (3513)
23 tanning.mp. (205)
24 fitzpatrick.mp. (658)
25 skin type.mp. (526)
26 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 (165527)
27 8 and 11 and 26 (67)
28 limit 27 to (english language and yr="2014 -Current") (35)

PSYCINFO

Database: APA PsycInfo <1806 to May Week 3 2022>

Search strategy:

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1 General Practice/ or general pract*.mp. or pract*, general.mp. (16295)
2 Primary health care/ or primary care.mp. or primary health care.mp. or primary healthcare.mp. (43111)
3 Community Health Services/ or Community Health Nursing/ or Health Services, Indigenous/ or Preventive Health Services/ or Community Health Service*.mp. or Community Health Nurs*.mp. or Health Service*, Indigenous.mp. or Preventive Health Service*.mp. or community health care*.mp. or community healthcare*.mp. (10238)
4 General Practitioners/ or general practice physician*.mp. or general practitioner*.mp. (12451)
5 Nursing/ or Community Health Nursing/ or Public Health Nursing/ or Rural Nursing/ or practice nurs*.mp. or community health nurs*.mp. or public health nurs*.mp. or rural nurs*.mp. or family doctor*.mp. (29759)
6 aboriginal community controlled health service*.mp. (19)
7 skin cancer clinic*.mp. (3)
8 1 or 2 or 3 or 4 or 5 or 6 or 7 (89724)

9 Skin Neoplasms/ or cancer of skin.mp. or cancer of the skin.mp. or skin cancer*.mp. or skin neoplasm*.mp. (1271)
10 Melanoma/ or malignant melanoma*.mp. or melanoma*.mp. (1158)
11 9 or 10 (2044)
12 Primary Prevention/ or primary disease prevention*.mp. or primary prevention*.mp. or primordial prevention*.mp. (5611)
13 Health Knowledge, Attitudes, Practice/ or Health Knowledge, Attitudes, Practice.mp. (27563)
14 Health Promotion/ or Health Promotion.mp. (42734)
15 Risk Reduction Behavior/ or risk reduction behavior*.mp. or Risk Assessment/ or Risk Assessment*.mp. or Risk Factors/ or Risk Factor*.mp. or high risk.mp. (242534)
16 skin cancer prevent*.mp. or Sunscreening Agents/ or sunscreen*.mp. or sunscreening agents.mp. or Eye Protective Devices/ or Eye Protective Device*.mp. or nonprescription sun glasses.mp. or shade.mp. or sunburn.mp. or UV exposure.mp. or UV cloth*.mp. or Sun cloth*.mp. (1420)
17 Ultraviolet Rays/ or uv radiation.mp. or ultraviolet radiation.mp. or ultraviolet ray*.mp. (541)
18 UV Index.mp. (13)
19 UV overexposure.mp. (0)
20 Medicare/ (2306)
21 family hist*.mp. (15955)
22 health assessment.mp. (3424)
23 tanning.mp. (489)
24 fitzpatrick.mp. (339)
25 skin type.mp. (73)
26 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 (319443)
27 8 and 11 and 26 (66)
28 limit 27 to (english language and yr="2014 -Current") (33)

CINAHL

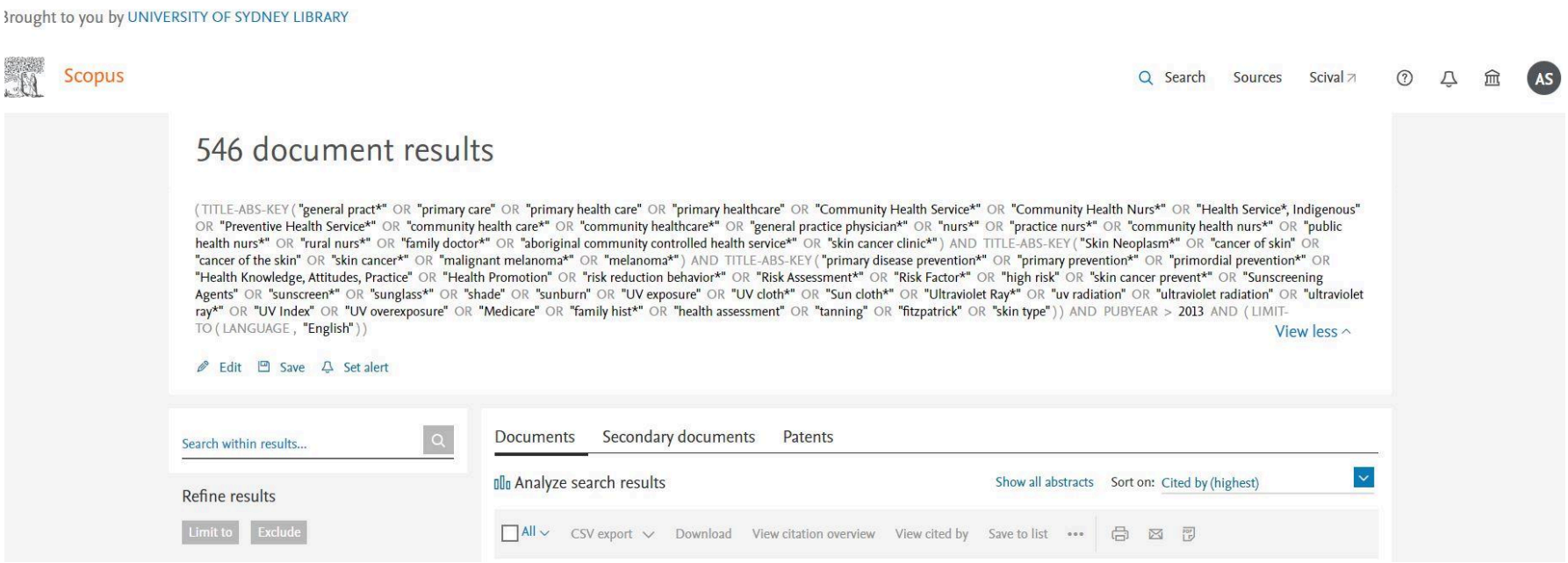
EBSCOhost

Wednesday, May 25, 2022 1:00:44 AM

#	Query	Limiters/Expanders	Last Run Via	Results
S6	S1 AND S2 AND S5	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	36
S5	S3 OR S4	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	137,499
S4	(MH "Health Promotion") OR (MH "Risk Assessment") OR "uv Index OR UV overexposure OR uv exposure OR sunburn OR shade OR uv cloth* OR sun cloth* OR health promotion OR medicare OR family history OR health assessment OR (tanning or fitzpatrick or skin type)"	Limiters - Published Date: 20140101-20231231; English Language Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	108,390
S3	primary prevention OR early intervention OR preventive health services OR primary prevention health promotion OR health knowledge, attitudes, practice OR risk reduction behaviors OR risk reduction strategies OR risk reduction education OR skin cancer prevention OR skin cancer prevention education OR	Limiters - Published Date: 20140101-20231231; English Language Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	32,283

	sunscreen OR sunglasses OR uv radiation OR uv rays			
S2	(MH "Skin Neoplasms") OR "(skin neoplasm or skin cancer or cutaneous squamous cell carcinoma or cscc) OR melanoma OR melanoma skin cancer"	Limiters - Published Date: 20140101-20231231; English Language Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	7,515
S1	(MH "Primary Health Care") OR "(general practice or gp or primary care or primary healthcare or primary health care) OR community health services OR preventive health care OR aboriginal community controlled health services OR skin cancer clinic" OR (MH "Preventive Health Care")	Limiters - Published Date: 20140101-20231231; English Language Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	38,790

SCOPUS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AS
546 document results
(TITLE-ABS-KEY ("general pract*" OR "primary care" OR "primary health care" OR "primary healthcare" OR "Community Health Service*" OR "Community Health Nurs*" OR "Health Service*, Indigenous" OR "Preventive Health Service*" OR "community health care*" OR "community healthcare*" OR "general practice physician*" OR "nurs*" OR "practice nurs*" OR "community health nurs*" OR "public health nurs*" OR "rural nurs*" OR "family doctor*" OR "aboriginal community controlled health service*" OR "skin cancer clinic*") AND TITLE-ABS-KEY ("Skin Neoplasm*" OR "cancer of skin" OR "cancer of the skin" OR "skin cancer*" OR "malignant melanoma*" OR "melanoma*") AND TITLE-ABS-KEY ("primary disease prevention*" OR "primary prevention*" OR "primordial prevention*" OR "Health Knowledge, Attitudes, Practice" OR "Health Promotion" OR "risk reduction behavior*" OR "Risk Assessment*" OR "Risk Factor*" OR "high risk" OR "skin cancer prevent*" OR "Sunscreening Agents" OR "sunscreen*" OR "sunglass*" OR "shade" OR "sunburn" OR "UV exposure" OR "UV cloth*" OR "Sun cloth*" OR "Ultraviolet Ray*" OR "uv radiation" OR "ultraviolet radiation" OR "ultraviolet ray*" OR "UV Index" OR "UV overexposure" OR "Medicare" OR "family hist*" OR "health assessment" OR "tanning" OR "fitzpatrick" OR "skin type")) AND PUBYEAR > 2013 AND (LIMIT-TO (LANGUAGE , "English"))
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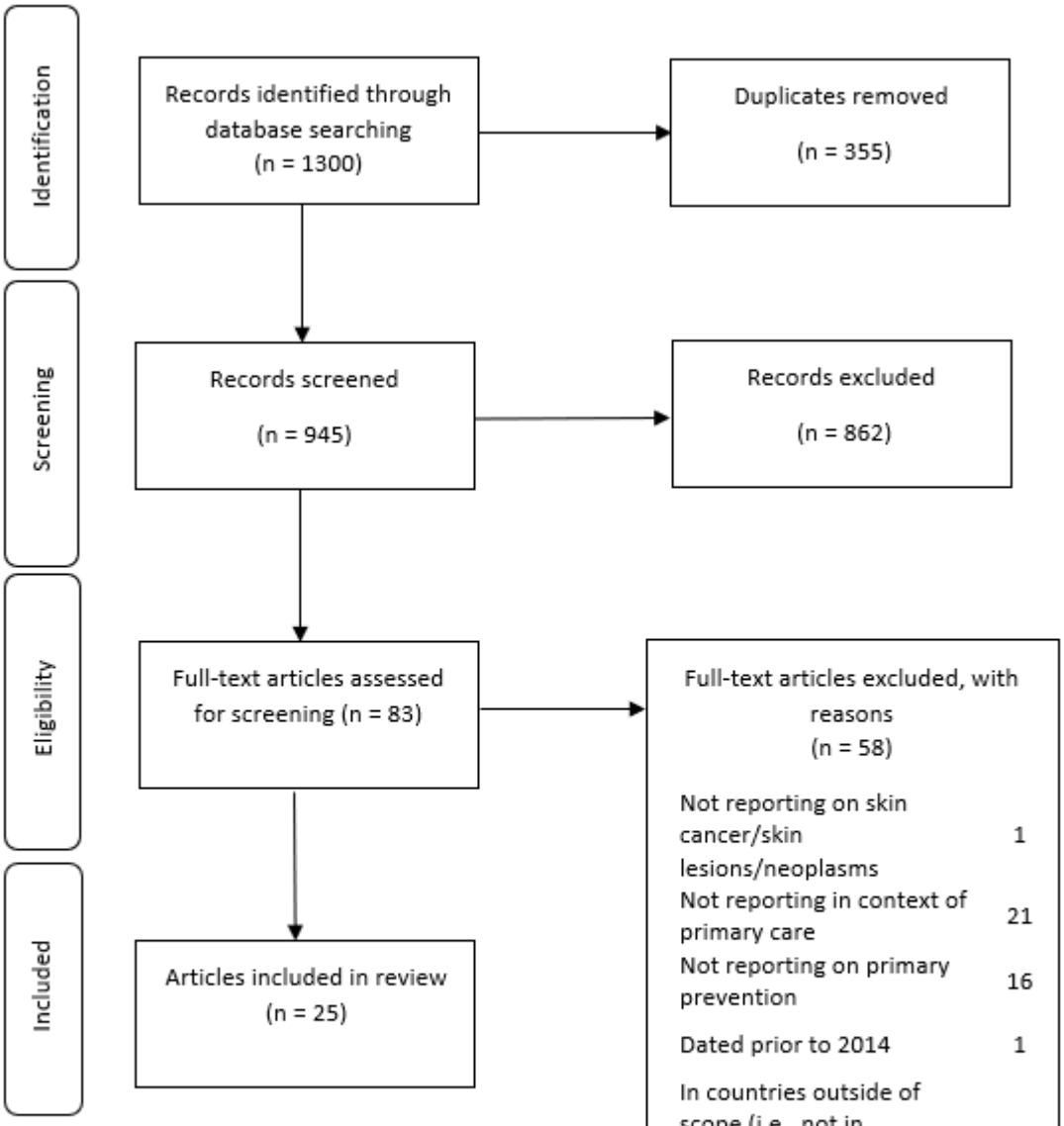
Appendix 2—PRISMA diagram



Appendix 3—Table of included studies from literature searches

Author, year, evidence level	Study design	Setting, population	Description of intervention/activities/strategies	Main outcomes measured	Main findings (including key components)	
					Effectiveness or descriptive outcomes	**Enablers, barriers, and/or feasibility**
Anandasivam et al. 2022 Level III-3	**Qualitative interview study**	Primary care, participating GPs Australia N=20	Risk management of melanoma by GPs and use of melanoma risk prediction models in primary care	GPs' assessment and management of melanoma risk and use of melanoma risk prediction models in primary care	Observed clinician diversity such as in identification of risk factors, risk estimation, management (such as sun-safe education, skin surveillance, lesion excision and specialist referral) and patient education. GPs were largely receptive to melanoma risk prediction models	Barrier: Lack of standard procedures. Shortcomings of risk prediction models on workflow including accessibility issues and documentation time, being less useful for more experienced doctors, and not significantly changing management recommendations Enabler: Integration into electronic health records for easy access is self-

						assessable, presents risk estimates in both numerical and visual forms, pairs risk estimates with evidence-based management guidelines, and incorporates patient factors and motivates behavioural changes in patients
Anders et al. 2015 Level III-2	**Cross-sectional study**	General practice, general population Germany N=600	Communication intervention that included both social marketing SCREEN (Skin Cancer Research to provide Evidence for Effectiveness in Northern Germany) campaign for the population and a training course for physicians and primary care nurses	(1) Participants' knowledge of skin cancer. (2) Perception of physicians' performance. (3) Skin cancer screening in general Training focused on communication aspects (counselling) for all health professionals. Plus physicians handed out preventive information in consultations	Participants had increased knowledge about sunburn in childhood, skin cancer risk factors such as high UV exposure as well as increased awareness of screening for early detection of skin cancer. High patient satisfaction with counselling also reported Patient sun habits and protective behaviour were not reported	Barrier: Massive financial costs (greater than €1 million), no calculation of future cost-effectiveness Enabler: collaboration between staff members improved patient outcomes

Emery et al. 2014 Level III-3	**Validation study**	General practice, patients for early detection of familial disease risk Australia N=526	Family history screening questionnaires (FHSQ) to assess risk of multiple common diseases in Australian primary care (melanoma included)	Diagnostic accuracy of FHSQ against a reference standard of a three-generation pedigree	Set of nine simple questions demonstrate diagnostic accuracy for risk of seven serious but preventable conditions (melanoma included). Tool can be applied across populations in primary care for detailed assessments, risk factor analysis and disease management. They were also tested in two clinical trials with a 41% improvement in identification of individuals at risk	Enabler: FHSQ as a broad risk assessment tool integrated may increase acceptability and completion
Falk, 2014 Level III-2	**Cross-sectional study**	General practice, patients going to GPs for skin tumour inspections Sweden N=166	Likert-style questionnaires to measure attitudes, sensitivity and propensity to use sun protection, and photo test for skin sensitivity (to inform risk assessment in general practice)	(1) Self-estimated and actual UV sensitivity (as measured by photo test). (2) Attitudes towards sunbathing and the propensity to increase sun protection. (3) Correlation	Discrepancies in self-estimated sensitivity and actual measured sensitivity which influences sun protection perceptions/behaviours (reduced for people who perceive lower self-sensitivity). No	N/A

				between self-estimated and actual UV sensitivity	correlation between sensitivity and Fitzpatrick skin types	
Hedevik et al. 2019 Level II	**Randomized controlled trial**	General practice, patients visiting clinics Sweden N=309	Questionnaires to measure participant attitudes and behaviours. Personalised intervention delivered to patients via GP either with a letter, with full body inspection and consult with GP or full body inspection, consult with GP and a photo test	Long-term effect, across 10 years at different intervals, of personalised sun protection advice, mediated by the GP, on sun exposure habits and sun protection behaviour	Patients with more increased consult times with GP and personalised advice had better sun exposure and protection scores over 10 years	Barrier: GP consultation time (20 mins) Enabler: Uses relatively limited resources (other than GP) so can be repeated
Henricksen et al. 2018 Other	**Evidence report**	General practice, children and adult population Multiple N=21 trials	Primary care relevant behavioural interventions focused on improving skin cancer outcomes, intermediate outcomes, or skin cancer prevention/ examination behaviours	Benefits and harms of behavioural counselling for skin cancer prevention to inform US Preventive Services Task Force	Behavioural interventions can increase sun protection but there is no consistent evidence that interventions reduce frequency of sunburn in children or adults and minimal evidence on skin cancer outcomes	Enabler: High-intensity interventions that reinforced messages over time, or with multiple intervention components, were most likely to find an effect

					(sunburn, lesions, cancer). Small to moderate effect of behavioural interventions	
Hobgood et al. 2020 Level III-2	**Cross-sectional study**	General practice, patients in waiting rooms Australia N=1535	Melanoma risk assessment tool (MelatoolsQ) ●	(1) Acceptability and feasibility of tool to identify patients in Australian primary care at increased risk of melanoma. (2) Prevalence of population at risk of melanoma	The tool was acceptable and feasible as measured with a high response rate and small number of patients requiring help to complete survey. Implementation of risk stratification tools for use in primary care by patients for tailored melanoma screening and prevention	Feasibility: Feasible measurement tool as measured by survey results Barrier: Generalisability across diverse population groups Enabler: Acceptable and feasible for patients at high risk of melanoma
Ivers et al. 2019 Level III-3	**Qualitative interview study**	Australian Aboriginal community-controlled health service, patients at the clinic via cancer care clinic Australia N=79	Cancer care team (CCT)	Acceptability and accessibility of cancer care systems	Improved access to healthcare, emotional and social support, and cultural safety	Barriers: The service was available only two days a week

Jones et al. 2020 Other	**Systematic review**	General practice, patients with either melanoma or keratinocyte carcinomas UK	Reviewed as part of the lit search: National Institute for Health and Care Excellence (NICE) guidelines, SunSmart campaigns, dermoscopy, teledermatology, artificial intelligence systems and MoleMate	(1) Risk factors and prevention advice in primary care. (2) Key guidance about symptoms and signs of skin cancers and their management (including initial assessment and referral). (3) Emerging technologies and diagnostic aids	Weak evidence to support the use of technology or diagnostic aids in primary care. Diagnosis otherwise should be in line with the major guidelines and is an effective method	Barrier: Lack of evidence for diagnostic aids to be implemented in primary care
Jones et al. 2022 Level IV	**Pre–post study**	Victorian general practice/GPs Australia N=130	Six-hour online skin cancer training module plus one-day face-to-face training workshop	Usefulness of training components Self-reported confidence Provision of preventive information Improvements in skin cancer-related practice	Since participating, GPs agreed they were more confident in using a dermatoscope (97.5%); diagnosing melanoma (89.9%) and non-melanoma skin cancers (88.6%); and they increased preventive information provided to high-risk patients (93%)	Enablers: The selection process used a scoring system that prioritised general practices with no or limited access to a dermatoscope and those from regional areas Easily replicated elsewhere

					Program is feasible and has impact on practice.	
Lophatananon et al. 2017 Other	**Validation study**	General practice, high-risk patients UK N= 273,467	The YourDiseaseRisk model aims to predict the risks to individuals (aged 40 and above) of developing 12 cancers relative to the general population	Steps taken to adapt the YourDiseaseRisk models focused on cancer (includes skin) in the UK population for use in primary care. Utility of the model by scoring suggested risk factors in UK biobank cohort	The model is an educational tool and can be used for cancer prevention in clinics, community settings, or by individuals simply seeking information on their own, and is valid for the UK population	N/A
Millán-Cayetano et al. 2019 Level III-2	**Cross-sectional study**	General practice, at-risk patients Spain N=706	One-day intervention program giving patients medical exams, information about risk factors and advice about photoprotection	Patient knowledge about photoprotection; intention-to-change sun protection behaviour; clinician diagnosis of skin cancers	Patients highly valued the experience and opportunity to learn about photoprotection; high percentage reported intention-to-change sun protection behaviours	Enabler: Primary care setting ideal for skin cancer prevention campaigns because of accessibility to high-risk patients and ease of recruitment
Millán-Cayetano et al. 2020 Level IV	**Pre–post mixed-methods study**	General practice, at-risk patients in practice Spain	Two phases of the intervention: (1) training course and practical skill development in	Sun exposure, protection habits, intention to change and	Intervention was a success measured by high patient satisfaction, improved clinical	Enabler: Ease of access to teledermatology tools

		N=393	skin cancer and teledermatology for primary care practitioners (2) workshops by PCPs for patients, which included personal interviews, skin exams, dermatoscopic skin exam and teleconsult with dermatology department for suspected skin cancer, personal advice, pamphlets and provision of sun protection creams ●	satisfaction of patients	diagnosis and participation rates	
Mills et al, 2017 Level II	**Randomised controlled trial protocol**	General practice, patients at risk of melanoma [UK} N=200	Mela Tools skin self-monitoring system (SSM) ●	Feasibility and acceptability of SSM among patients at high risk of melanoma.	N/A (Protocol paper)	N/A
Nittas et al. 2020 Level III-3	**Discrete choice experiment protocol**	Travelling GP clinic, patients in waiting room Switzerland N=200	Two alternative skin self-monitoring apps ●	Preferences of healthcare consumers for sun protection via app-based self-monitoring	N/A (protocol paper) Results will target developers, healthcare providers and	N/A

					policy makers to provide guidance to maximise consumer engagement	
Rat et al. 2014 Level II	**Randomised controlled trial**	General practice, patients at risk of melanoma France N=173	Self-Assessment Melanoma Risk Score (SAMScore), skin examinations and counselling (or just posters in the control group)	Effect of intervention in two groups on patient prevention behaviour	The combination of SAM score and GP examination and counselling was efficient and had a greater influence on patients than conventional information-based campaign	Enabler: Intervention based on SAMScore risk tool designed to be compatible with pace of primary care
Rat et al. 2017 Level III-2	**Cross-sectional observational study**	General practice, GPs France N=128	Medical encounters classified with International Classification of Primary Care (ICPC) codes	Counselling, clinical examinations, referral to specialist — GPs' management of skin cancer prevention and treatment	Results demonstrate low rate of medical encounters that address skin cancer problems in general practice. GPs mainly investigate lesions, not full examinations or education to patients	Barrier: GPs (France) may not feel qualified to educate and conduct skin exam
Smit et al. 2019 Level III-3	**Qualitative interview study**	General practice, GPs Australia	GP patients' personal genomic risk of melanoma booklet	Role of genetics and genomics in current practice, GPs' thoughts on the risk booklet,	GPs demonstrate a strong focus on patient-centred approach to communicate	Barrier: GPs are not always confident in providing patients with genomic risk information (gaps in

		N=22		and their attitudes and expectations about providing patients with personal genomic risk information, additional resources to support the process	genomic risk information, prevention and early detection. GPs would also prefer clinical practice guidelines for appropriate disease management	knowledge, communication barriers with patients) Enabler: GPs recommend easy-to-understand educational information for patients
Usher-smith et al. 2015 Other	**Review**	Primary care, patients with and without melanoma UK	Melanoma risk assessment tools (RAT) for symptomatic populations in primary care and QCancer series for both symptomatic and asymptomatic populations ●	Assessing the validity and reliability of different tools in primary care for the risk assessment of different cancers including melanoma	RATs are valid and reliable models for cancer risk assessment. Stratification of population into different risk levels can allow for tailored cancer screening, behaviour change programs, preventive treatment and resource allocation by age and gender	Barriers: Variability in risk models makes it harder to choose the right one (e.g. some target general pop, some target specific pops). Accessibility of such tools to clinicians and ease of understanding and application for both patients and clinicians. Deciding where to set thresholds for intervention
Usher-Smith et al. 2016 Level III-2	**Cross-sectional study**	General practice, patients in waiting rooms of 22 practices UK	Williams self-assessed clinical risk estimation model using tablets ●	Calculation of mean melanoma risk score using model and feasibility of identifying people at higher risk of	Collecting melanoma risk profiles was considered both feasible and acceptable for patients in GP	Enabler: Feasible and acceptable as found by high rates of completion in waiting rooms by patients using tablets

		N=7742		melanoma using model	setting. The tools also allow for identifying different groups at risk	
van Rijsingen et al. 2014 Level III-2	**Cross-sectional study**	General practice, GPs Netherlands N=268	Questionnaires to measure current GP knowledge, attitudes and skills in skin cancer care and treatment	Knowledge and opinions of GPs in skin cancer care	Identified need for better training and education systems for GPs (e.g. guidelines, treatment plans, performance of diagnostic biopsies) but not for skin cancer prevention. Reported that most Dutch GPs give prevention advice	N/A
Voss et al. 2015 Other	**Literature review**	N/A	Sunscreen use in adults and children, educational messages in communities, clinician counselling, tailored messages for targeted groups ●	Review of primary prevention recommendations in primary care (increase sunscreen use, reduce indoor tanning etc.)	Good primary prevention techniques include physician counselling and skin-protection behaviours that reduce UV exposure. Governments also have a role in introducing policies that encourage and promote skin protection, such as	Enabler: Government policy (though solariums banned in Australia)

					sunscreen regulation and bans on tanning devices	
Vuong et al. 2014 Level IV	**Pre–post study**	General practice, patients in general practice Australia N=100	GP-delivered sun protection advice, completion of risk assessment tool and sun protection pamphlet ●	Feasibility and acceptability of the intervention in general practice using follow-up questionnaires	Intervention was found to be acceptable and feasible for both GPs and patients. Sun-related knowledge increased in both groups, greater short-term knowledge increased in intervention group but no evidence of a favourable change in sun-related attitudes or behavior from the intervention	Feasibility: Feasibility was evaluated by rates of attrition and acceptability was evaluated by follow-up questionaries using simple Likert style questions
Vuong et al. 2018 Level II	**Randomised controlled trial**	General practice patients Australia N=272	Real-time model-generated personalised melanoma risk assessment and tailored melanoma prevention advice ●	Effect on sun protection behaviours, sun exposure, full body clinical and self-skin examinations, behavioural intentions, risk perception and feasibility, and clinical acceptability of	The intervention was feasible and acceptable. Modest increases in sun protection behaviours in intervention patients compared with control patients (who	Feasibility: Feasibility was evaluated by time taken to review risk assessments (faster than control groups) and clinical acceptability was measured by short questionnaire sent to GPs

				model-generated personalised melanoma risk information and tailored prevention advice	received generic advice)	Enabler: Easy to use, short risk assessment
Walter at al. 2020 Level II	**Randomised controlled trial**	Family practice, patients at risk of melanoma in waiting rooms in 12 practices UK N=238	Skin self-monitoring smartphone app along with brief discussion with a nurse and standard written advice on sun protection and skin cancer detection. The app gave participant monthly prompts to look for skin changes 🟡	Outcomes measured via skin consultation rates, patient intervals, skin exam benefits and barriers, self-efficacy for consulting without delay, perceived melanoma risk, sun protection habits and potential harms	No benefits observed from using the app on skin self-examination, sun protection knowledge or health consults. However, initial delivery of intervention was feasible, and no psychological harm occurred as a result of using the app	Barrier: The intervention didn't have any impact on outcomes measured

Table legend

Skin cancer prevention activities:

- Behavioural counselling provided by a GP or primary care nurse: 🟢
- Risk assessment and delivering personalised risk information: 🟣
- New technologies for early detection and accompanying prevention advice: 🟡
- Education and training programs for GPs and practice nurses: 🟡

Appendix 4—Table of grey literature findings

Author, year	Publication type, title	Population, country	Description of activities	Enablers, barriers and or feasibility
Guidelines (N=4)				
Royal Australian College of General Practitioners, 2016	Guidelines: Guidelines for Preventive Activities in General Practice [Internet]. 9th ed. East Melbourne (AUST): RACGP; 2016 Available from: https://www.racgp.org.au/download/Documents/Guidelines/Redbook9/17048-Red-Book-9th-Edition.pdf	GPs, Australia	Includes a summary of standard sun protection advice and mentions resources such as websites and an apps guide for GPs, Section 9.4, page 113	Provides age-specific information to advise (enabler): Children: especially <=10 years to be SunSmart Adults: In northern Australia and some parts of southern Australia, UV exposure is sufficiently high to require daily use of sunscreen High risk: Screen increased-risk and high-risk patients States: There are no sufficiently well-validated risk models to assess the combined effects of all these risk factors (for melanoma)
Cancer Council Australia 2019, 2020	Guidelines: Clinical practice guidelines for keratinocyte cancer:	Primary care, Australia	Chapter 2. Prevention of keratinocyte cancer—includes a summary of	CCA does not distinguish between melanoma and keratinocyte for sun

	Cancer Council Australia Keratinocyte Cancers Guideline Working Party. Clinical practice guidelines for keratinocyte cancer. Sydney: Cancer Council Australia. [Version URL: https://wiki.cancer.org.au/australiawiki/index.php?oldid=213931, cited 2022 Jun 15]. Available from: https://wiki.cancer.org.au/australia/Guidelines:Keratinocyte_carcinoma		standard sun protection advice Chapter 14. Role of primary care in prevention: The role of primary care in the prevention and management of keratinocyte cancer—mentions wall charts and standard sun protection advice	protection/prevention (feasibility) Recommends GP education (enabler) Strategy for prevention education—wall charts and patient education materials Encourages regular application of sunscreen
World Health Organisation, 2022	News Release: SunSmart Global UV App helps protect you from the dangers of the sun and promotes public health https://www.who.int/news/item/21-06-2022-sunsmart-global-uv-app-helps-protect-you-from-the-dangers-of-the-sun-and-promotes-public-health	Global	Describes the SunSmart Global UV app (developed by Cancer Council Victoria), which provides local information on UV levels, based on the Global Solar UV Index. The index was developed jointly by the World Health Organisation (WHO), the World Meteorological Organisation (WMO), the United Nations Environment Program (UNEP), the International Commission on Non-Ionising Radiation Protection (ICNIRP) and the German Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS)	WHO endorsed

National Institute for Health and Care Excellence (NICE), 2016	Guideline: Sunlight exposure: risks and benefits NICE guideline Published: 9 February 2016 www.nice.org.uk/guidance/ng34	Primary care, health promotion, UK	Includes standard prevention advice and resources for information on the UV Index, advice for sun protection and vitamin D in relation to skin colour	Guidelines focus on how to communicate the risk and benefits of sunlight exposure to reduce the risk of skin cancer and vit D deficiency in the UK. There is a greater focus on vit D than in Australia because of climate
Education and training (N=10)				
ThinkGP—online CPD education platform, 2022 Developed by Cancer Council Victoria	Online education course: *The prevention and early detection of skin cancer in general practice*, an advanced course for GPs (six hours) https://www.thinkgp.com.au/education/prevention-and-early-detection-skin-cancer-general-practice-0 Also available via: ACRRM: https://mycollege.acrrm.org.au/search/find-college-event/details?id=18608 Online education course: Biopsy techniques, skin cancer prevention and vitamin D (two hours) https://www.thinkgp.com.au/education/biopsy-	GPs, primary care nurses, Australia	Education objectives include maintaining sufficient vitamin D, and skin examination and biopsy techniques	ThinkGP is listed online and is also accessible through a number of sites including ACRRM; Both short course are: 1. free 2. provide CPD points 3. available on a number of sites.

	techniques-skin-cancer-prevention-and-vitamin-d			
SunSmart— Cancer Council Victoria and the Victorian State Government, 2019–22	This education program combines the six-hour ThinkGP online advanced course (see above) with the Australasian College of Dermatology Certificate of Practical Dermoscopy Course (further online modules and a one-day F2F dermoscopy training workshop) (see below) https://www.sunsmart.com.au/skin-cancer/health-professionals/dermoscopy-victorian-general-practice-program	One GP or primary care nurse per practice in Victoria	A six-hour online skin cancer training module (SunSmart) plus access to the Australasian College of Dermatology Certificate of Practical Dermoscopy Course (further online modules and a one-day F2F dermoscopy training workshop) Educational objective: to improve skin cancer prevention and detection	Program evaluation found GPs were more confident in using a dermatoscope (97.5%); diagnosing melanoma (89.9%) and non-melanoma skin cancers (88.6%); and they increased preventive information provided to high-risk patients (93%) (evaluated in Jones et al. 2020) Funded by the Victorian Department of Health for Victorian GPs
Australasian College of Dermatology, 2019–2022	Online education course (six online topics) and a F2F workshop: Certificate of Practical Dermoscopy https://dermatologyaustralasia.com.au/certificate-of-practical-dermoscopy/ Online education course (five courses) with F2F workshop/ Advanced Certificate in Skin Cancer https://store.dermcoll.edu.au/home/49-acd-advanced-	GPs and GP registrars (nurse practitioners welcome) GPs and GP registrars Aboriginal health workers	Covers: Dermoscopy theory and practice, morphology of skin lesions, histopathology correlations and biopsy Focuses on detection, diagnosis and management (skin cancer prevention is not included in objectives)	Enabler: National program, online with F2F workshops in capital cities (though infrequent) RACGP 40 CPD points Currently registration is not available It is not clear how much, if any, skin cancer prevention education is included but it does outline when to refer to primary care

	certificate-of-skin-cancer.html Online education course (free): Taking care of skin: How to recognise and respond to skin health issues in Aboriginal and Torres Strait Islander people https://dermatologyaustralasia.com.au/aboriginal-health-workers-course/			
Royal Australian College of General Practitioners (RACGP), 2022 via GPLearning	Certificate of Primary Care Dermatology: consists of 25 online courses delivered through GPLearning and a two-day dermatological survey workshop Supported by Sonic Healthcare		Aims to help GPs better understand and treat a broader range of common skin conditions (including skin cancer), as well as recognise the conditions that need urgent referral	Comprehensive program but doesn't mention skin cancer prevention in topics covered
Australian College of Rural and Remote Medicine (ACRRM), 2020- 2022	Online resource Tele-Derm (more than 1000 education cases, plus guides, videos and webinars) and access to expert advice on difficult cases. Hosted by ACRRM. Funded by Department of Health Rural Health Outreach Fund https://mycollege.acrrm.org.au/search/find-online-	Rural and regional doctors	Tele-Derm provides education and individual patient advice in all aspects of skin disease	Enabler: Can be accessed by regional and rural primary care—improves timely access to services and reduces the need for rural and remote patients to travel

	learning/details?id=13725&title=Tele-Derm			
University of Queensland, 2022	Master of Medicine (Skin Cancer) https://my.uq.edu.au/programs-courses/program.html?acad_prog=5398	Primary care practitioners	Online coursework degree: Education objective: “to provide comprehensive training in the diagnosis and management of skin cancer in both the primary care and specialist settings”	
Skin Cancer College Australasia, 2022	Australasian Skin Cancer Congress https://www.skincancercollege.org/congress-2022/ Certificate of skin cancer medicine: two-day workshop https://www.skincancercollege.org/certificate-skin-cancer-medicine/	All skin cancer health professionals, Australia	Largest primary care skin cancer medicine event in the Australasian region Education objective: to provide “the latest cutting-edge practical and research knowledge in primary care skin cancer medicine” Website also provides workshops, webinars, blogs, a range of skin cancer courses. There is a minimal focus on prevention	N/A
Melanoma Institute Australia, 2022	Online education course, part of the MIA Nurse Webinar series: Skin cancer prevention and risk reduction: Empowering your patients https://us02web.zoom.us/webinar/register/4716541501	Primary care nurses, Australia	Includes: importance of prevention in skin cancer, giving advice on prevention strategies and other measures to reduce risk, practical ways to empower your patients and the community’	Promoted and accessed through: Primary Health Networks and Australian Dermatology Nurses Association

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European Society of Skin Cancer Prevention (Euroskin), 2021	Conference: 5th International UV and Skin Cancer Prevention Conference (virtual) http://uvandskincancer2020.org/	Health professionals, Europe	Aims to foster discussions and summarise knowledge into shared recommendations, which will help to improve future skin cancer prevention	Many Australian presentations— abstracts only
Cancer care pathways (N=2)				
Cancer Council Victoria and Department of Health Victoria endorsed by Cancer Australia, Australian Government, 2021	Care Pathway: Optimal care pathway for people with melanoma, 2nd edn https://www.cancer.org.au/assets/pdf/melanoma-optimal-cancer-care-pathway#_ga=2.99688090.527849574.1630318054-1727980524.1630318054	Health professionals, Australia	Provides standard sun protection advice, including recommendations about skin examinations for high-risk patients	Provides a checklist on prevention and early detection (summary page 1), which includes: 'Education on being sun smart considered'
Cancer Australia, Australian Government and Cancer Council, 2018	Optimal care pathway for Aboriginal and Torres Strait Islander people with cancer (all cancer types) https://www.canceraustralia.gov.au/sites/default/files/publications/optimal-care-pathway-aboriginal-and-torres-strait-islander-people-cancer/pdf/optimal-care-pathway-for-aboriginal-and-torres-strait-	Health professionals, policy makers	Cancer risk reduction advice includes: 'reducing ultraviolet exposure' (page 29)	Barrier: This is the only reference to skin cancer prevention in the document

	islander-people-with-cancer.pdf. page			
Position statements (N=2)				
Public Health Association of Australia (PHAA), 2021	Position statement: Skin Cancer Prevention: Policy Position Statement 2021 https://www.phaa.net.au/documents/item/2832	Public health, Australia	Policy position: 1. Appropriate funding to develop, implement, maintain and evaluate comprehensive skin cancer prevention and early detection programs throughout Australia is required 2. A coordinated national approach to prevention and early detection of skin cancer should be developed, including ongoing and frequent national behavioural data collection 3. A national framework for Skin Cancer Health Promotion should be developed for action at all levels of government	Funding Consultation with stakeholders National prevention framework Health promotion focus
National Aboriginal Community Controlled Health Organisation (NACCHO), 2016	Information/guide online: NACCHO Aboriginal #healthyfutures and skin #cancer: Sun protection and dark skin: what you need to know	Health workers, Australia	Position: 'more research is needed on the role of sun exposure and vitamin D for Aboriginal and Torres Strait Islander people'	Notes the dearth of research on skin cancer in darkly pigmented people

	https://nacchocommunique.com/2016/12/19/naccho-aboriginal-healthyfutures-and-skin-cancer-sun-protection-and-dark-skin-what-you-need-to-know/			Vitamin C deficiency reported in Aboriginal and TST, 2014 Message not clear about sun protection
Reports (N=3)				
Melanoma Institute of Australasia and Melanoma Patients Australia, 2022	Report: State of the Nation in Melanoma: (2022) Melanoma Institute of Australasia and Melanoma Patients Australia https://melanoma.org.au/wp-content/uploads/2022/03/MIA-and-MPA_SoN-Report_Final-Report_28-March-2022.pdf		Position: Implement a modernised national strategy for melanoma prevention and awareness. Including patient education through GPs and high-risk models of care	Report notes under investment in messaging and prevention; on page 26: “At a state level, the Victoria Government is a relative outlier, having committed $15.1 million towards skin cancer prevention over the period spanning 2019 to 2023” Calls for GP education and training
Commonwealth of Australia, 2015	Report: House of Representatives Standing Committee on Health, 2015, Skin Cancer in Australia: Our National Cancer—Report on the Inquiry into Skin Cancer in Australia, chapter 2, accessed at page 18		Includes key actions for primary prevention, i.e. it requires: 1. Encouraging personal responsibility for adopting behaviours that minimise skin cancer risk 2. Creating policies for providing an appropriate	RACGP presented concern for balance between UR exposure and deficiency in vitamin D (2015)

	https://www.aph.gov.au/Parliamentary_Business/Committees/House/Health/Skin_Cancer/Report		physical and/or working environment (page 18) Australasian College of Dermatologists support the adoption of telehealth etc to support primary care doctors—great potential for health education, prevention and rapid access to specialist (page 74)	
Cancer Institute NSW, 2018	An Evidence Check rapid review: Makin J, Shaw K, Winzenberg T, 2018, Targeted programs for skin cancer prevention: Brokered by the Sax Institute (www.saxinstitute.org.au) for the Cancer Institute NSW available: https://www.cancer.nsw.gov.au/getattachment/876cc720-2e57-4b1a-8348-58634508224a/targeted-programs-for-skin-cancerprevention.pdf		Primary care is a priority setting. Concluded that behavioural interventions targeting primary care patients can increase sun protection behaviour, but found no consistent evidence for a reduction in the frequency of sunburn and only minimal evidence for an effect on skin cancer outcomes (page 28)	
Resources (N=5)				

Cancer Council Victoria, 2015	SunSmart website: Leading website in information for health professionals and community on being SunSmart https://www.cancer.org.au/cancer-information/causes-and-prevention/sun-safety/be-sunsmart In 2004 CC Victoria became a designated WHO Collaborative Centre for UV	Australia, community	Includes all five SunSmart steps	Funded by Vic Government since 2019 (feasibility, facilitator)
Cancer Council Victoria, 2015	SunSmart App https://www.cancer.org.au/cancer-information/causes-and-prevention/sun-safety/be-sunsmart/sunsmart-app	Australia, community	Sun protection times; seven-day weather forecast, alert function, sunscreen calculator	Impact reported on website: skin cancer prevention behaviour improvements at population level
Cancer Australia Melanoma Institute Australia Melnet	Cancer risk tool https://lifestylerisk.canceraustralia.gov.au/#!/ Skin cancer risk assessment tool https://www.melanomarisk.org.au/ Melanoma Risk Calculators NZ, MIA	Australia and New Zealand	Provides online risk assessment tools	N/A

	https://www.melnet.org.nz/index.php?p=resources/melanoma-risk-calculator-clinical-decision-support-tool			
Primary Care Collaborative Cancer Clinical Trials Group	Research (current): The use of mobile apps for melanoma or skin cancer (systematic review)	Primary care, Australia	N/A	N/A
Health Pathways	Point-of-care information/pathways: a web-based portal designed to provide localised clinical support for primary care. https://www.health.nsw.gov.au/integratedcare/Pages/health-pathways.aspx https://clinicalexcellence.qld.gov.au/resources/clinical-prioritisation-criteria/healthpathways	Australia and New Zealand	Health Pathways promote local solutions and will likely vary by geographical region	Barrier: No 'skin cancer prevention' pathways located on HealthPathways

*Organisations searched

1. Cancer Australia
2. Melanoma Institute Australia
3. Cancer Council Australia; Cancer Council NSW; Cancer Council Victoria
4. Cancer Institute NSW
5. Skin Cancer College Australasia
6. RACGP
7. ACRRM
8. The Australasian College of Dermatologists
9. Australian Primary Health Care Nurses Association (APNA)
10. General Practice Registrars Australia/Regional Training Organisations (RTOs)
11. Australian Government Department of Health

12. National Aboriginal Community Controlled Health Organisation (NACCHO)
13. Primary Care Collaborative Cancer Clinical Trials Group
14. Primary Health Networks
15. Health Pathways

Appendix 5—Barriers and enablers according to the Consolidated Framework for Implementation Research (CFIR)

Barriers and enablers for primary care providers to deliver skin cancer primary prevention activities within their setting by CFIR domains and relevant constructs

CFIR domains and constructs	Barriers	Count	Enablers	Count
I. Characteristics of skin cancer primary prevention activities (intervention characteristics)				
Evidence strength and quality	Lack of evidence to support use of technology and diagnostic aids for skin cancer in primary care[38]	1	Evidence of effectiveness of multifaceted intervention: 1. (PCP education, patient prevention education workshop plus personal consultation, teledermatology if needed) lead to high satisfaction[27] 2. Multiple intervention components most likely to have an effect (or high intensity that reinforced message over time)[5]	2
			Easy access and availability in Australia of guidelines 1. RACGP [grey literature] 2. Cancer Council Australia [grey literature]	2

Complexity	Complexity/unclear requirements for counselling (internationally) 1. Informing people about their actual UV sensitivity and how it affects their constitutional risk profile (may motivate people to take better precautions in the sun)[21] 2. US Preventive Services Task Force: counselling recommended/ effective for those younger than 24 years. Identification of high-risk melanoma improve outcomes when education and surveillance guidelines are appropriately tailored[5,7]	2	Ease of the process for patients in self-completion tools: (risk assessment for high-risk) Introduce tools that are easy to complete by patients, i.e. they don't need help 1. Self-completion tool—90% patients didn't need assistance to complete (highly acceptable)[21] 2. Ease for patient/ easy to use/ short risk assessment process for personalised melanoma risk assessment[19]	2
Design quality and packaging			Timing of delivery: Intervention delivered shortly before the Australian summer holidays[19]	1
Cost	High financial cost associated with implementation 1. Effective public campaign + training ((1/2 focus on comm/counselling)[34]	1		
			Interventions that require minimal resources: 1. Personalised GP consult requires no other resources[4] 2. Family History Questionnaire value in covering a range of conditions in one consultation including melanoma (designed for primary care)[20] 3. Brief intervention requiring few resources makes it feasible[17]	4

			4. Intervention delivered opportunistically at a single attendance; minimal disruption to the general practice routine[18]	
II. External context (outer setting)				
Patient needs and resources	Lack of availability of services: Aboriginal Medical Service: Barrier to needs being was that it was only available 2 days per week[35]	1	Ease of access to expertise increases acceptability: teledermatology consultation increased acceptability for high-risk patients[27]	
			Easy-to-understand and accessible educational information for patients is available: 1a. SunSmart website provides information for health professionals and community on being SunSmart (developed by Cancer Council Victoria) 1b. SunSmart App https://www.cancer.org.au/cancer-information/causes-and-prevention/sun-safety/be-sunsmart/sunsmart-app 2.GPs recommend for genomic risk information[16]	2
External policy & incentives			Prioritising those settings with least access Selection process for participants used a scoring system that prioritised general practices with no or limited access to a dermatoscope and those from regional areas[31]	1

	Variability in risk models (lack of policy) makes it hard to choose the right one[24]	1	Risk assessment tools for patients are accessible and available for high-risk and general population https://lifestylerisk.canceraustralia.gov.au/#!/ Skin cancer risk assessment tool https://www.melanomarisk.org.au/ Melanoma Risk Calculators NZ, MIA https://www.melnet.org.nz/index.php?p=resources/melanoma-risk-calculator-clinical-decision-support-tool	3
			Leading national and state organisations provide recommendations and support 1.National reports, e.g. State of the Nation in Melanoma (2022), from Melanoma Institute of Australasia and Melanoma Patients Australia, notes it is feasible for the wider roll-out of high-risk models of care nationally in dermatology and in primary care p74 [grey literature] 2. Skin Cancer in Australia: Our National Cancer 2015 report supports primary prevention for skin cancer [grey literature] 3. Victorian Government has committed funding towards skin cancer prevention 2019–23[10]	3
III. Primary care setting (inner setting)				
			Close integration with routine clinical services in primary care:	3

Compatibility (how the intervention fits with existing workflows and systems)			1. FHQ as a broad integrated risk assessment tool may increase acceptability and completion[20] 2. Targeted screening and education based on SAMScore risk tool designed to be compatible with pace of primary care[17] 3. Intervention delivered opportunistically at a single attendance; minimal disruption to the general practice routine[18]	
			Designed to be compatible with primary care: 1. FHQ as a broad integrated risk assessment tool may increase acceptability and completion[20] 2. Targeted screening and education based on SAMScore risk tool designed to be compatible with pace of primary care[17] 3. Making the most of the 'waiting room wait'[24] (high acceptability of collecting risk info in waiting room; enable tailored appointments, provide educational material) 4. Integration into electronic health records for easy access	4
			Opportunities for giving prevention advice: Skin examinations also provide doctors with an opportunity to deliver important preventive advice to patients[31]	
Structural characteristics			Primary care setting ideal to recruit high-risk patients because of access[39]	

Relative priority	Competing demands[17]	1		
Available resources	Time in consultation (requires 20 min GP consultation)[4]	1		
Access to knowledge & Information	Point-of-care information not available via HealthPathways [grey literature]		Education for practising primary care professionals is a priority CCA (2020) recommends GP education [grey literature] State of the Nation in Melanoma (2022) MIA report calls for GP education and training [grey literature]	2
			Skin cancer prevention education is available and targeting primary care nurses and GPs: 1. MIA online education course: Skin cancer prevention and risk reduction: Empowering your patients. MIA Nurse Webinar series advertised in Primary Health Networks and the Australian Dermatology Nurses Association 2. Online CPD education program (ThinkGP) for GPs and primary care nurses: Developed by CCV. Skin cancer prevention and early detection: 3. Education for GPs focuses on early detection and management, e.g. UQ program; Skin Cancer College; Dermoscopy Training program for Victorian GPs to improve skin cancer prevention and detection	4

			4. Point-of-care information available in the SunSmart website	
IV. Characteristics of primary care professionals, i.e. GPs, practice nurses (characteristics of individuals)				
Self-efficacy	Limited confidence in discussing genomic risk Risk assessment (genomics): GPs report limited confidence in discussing genomic risk and explaining complex risk information (Australian)[16] GPs (France) may not feel qualified to educate and conduct skin exam[36]	2		
V. The implementation process of skin cancer prevention activities within primary care (process)				
Planning			Generalisability and replication Model of upskilling GPs could be replicated in other jurisdictions[31]	1
Opinion leaders			Peak bodies support	

Appendix 6—Key prevention activities according to barriers and enablers

Summary of key prevention activities according to barriers and enablers identified in the literature

	Description		Implementation	
Type of activity	**Target of activity**	**Design of activity**	**Barriers**	**Enablers**
Education / training programs	Practitioner	Short courses on screening and prevention for practitioners	NA	Acceptability of program among GPs and nurses[19, 40, 41]
Health promotion strategies	Patient	Campaigns for awareness, provision of information and/or invitations for skin screening	Financial costs to deliver program[34]	Easy to understand and accessible
Behavioural counselling	Practitioner	Short courses on counselling patients	Lack of standardisation[15]	Cost-friendly delivery[4]
	Patient	Direct communication with practitioner	Insufficient consultation times[4]	Better prevention knowledge and health[34]
Risk assessment and delivering risk-tailored information	Practitioner	Knowledge of risk assessment models/tools	Lack of standardisation[15]	Ease of access when used digitally[15]
	Patient	Provision of tailored risk assessment advice/materials	Lack of standardisation[15]	Highly compatible in primary care[20]

		Education about self-examination tools	Generalisability across populations[21]	Feasibility of tools
New technologies for early detection	Practitioner	Use of technology and delivery of prevention advice in consults	Lack of availability of services[35]	NA
	Patient	Use of apps for self-monitoring skin	NA	NA

References

1. Australian Institute of Health and Welfare. Health system expenditure on cancer and other neoplasms in Australia, 2015–16. Canberra: AIHW, 2021.
2. Smith AL, Watts CG, Robinson S, Schmid H, Chang C-H, Thompson JF, et al. GPs' involvement in diagnosing, treating, and referring patients with suspected or confirmed primary cutaneous melanoma: a qualitative study. BJGP Open. 2020;4(2). doi: 10.3399/bjgpopen20X101028
3. Cooke A, Smith D, Booth A. Beyond PICO: the SPIDER tool for qualitative evidence synthesis. Qual Health Res. 2012;22(10):1435-43. doi: 10.1177/1049732312452938
4. Hedevik H, Guorgis G, Anderson CD, Falk M. Sustainable effect of individualised sun protection advice on sun protection behaviour: a 10-year follow-up of a randomised controlled study in primary care. Bjgp Open. 2019;3(3). doi: https://dx.doi.org/10.3399/bjgpopen19X101653
5. Henrikson NB, Morrison CC, Blasi PR, Nguyen M, Shibuya KC, Patnode CD. Behavioral Counseling for Skin Cancer Prevention: Evidence Report and Systematic Review for the US Preventive Services Task Force. JAMA. 2018;319(11):1143-57. doi: https://dx.doi.org/10.1001/jama.2017.21630
6. Voss RK, Woods TN, Cromwell KD, Nelson KC, Cormier JN. Improving outcomes in patients with melanoma: strategies to ensure an early diagnosis. Patient Related Outcome Measures. 2015;6:229-42. doi: https://dx.doi.org/10.2147/PROM.S69351
7. Grossman DC, Curry SJ, Owens DK, Barry MJ, Caughey AB, Davidson KW, et al. Behavioral Counseling to Prevent Skin Cancer: US Preventive Services Task Force Recommendation Statement. Jama. 2018;319(11):1134-42. doi: 10.1001/jama.2018.1623
8. The Royal Australian College of General Practitioners. Guidelines for preventive activities in general practice. 9th edn. East Melbourne, Vic: RACGP, 2016.
9. Cancer Council Australia Keratinocyte Cancers Guideline Working Party. Clinical practice guidelines for keratinocyte cancer. Sydney: Cancer Council Australia. https://wiki.cancer.org.au/australia/Guidelines:Keratinocyte_carcinoma [Accessed 30/06/2022].
10. Insight Economics. State of the Nation – A Report into Melanoma, A National Health Priority. 2022.
11. Nicholson A, Murphy M, Walker H, Tinker R, Dobbinson S. Not part of my routine: a qualitative study of use and understanding of UV forecast information and the SunSmart app. BMC Public Health. 2019;19(1):1127. doi: 10.1186/s12889-019-7421-x
12. Verma C, Lehane J, Neale RE, Janda M. Review of sun exposure guidance documents in Australia and New Zealand. Public Health Res Pract. 2022;32(1). doi: 10.17061/phrp3212202
13. Cancer Council Australia. Position statement - Sun exposure and vitamin D - risks and benefit. https://wiki.cancer.org.au/policy/Position_statement_-_Risks_and_benefits_of_sun_exposure [Accessed 30/06/2022].
14. ASSC Sun Exposure Summit March 2021. http://www.assc.org.au/assc-sun-exposure-summit-march-2021/ [Accessed 30/06/2022].
15. Anandasivam B, Tam M, McGeechan K, Price K, Mclean K, Tracy M, et al. Melanoma risk assessment and management: a qualitative study among Australian general practitioners. British Journal of General Practice. 2022:BJGP.2021.0668. doi: 10.3399/bjgp.2021.0668
16. Smit AK, Newson AJ, Keogh L, Best M, Dunlop K, Vuong K, et al. GP attitudes to and expectations for providing personal genomic risk information to the public: a qualitative study. Bjgp Open. 2019;3(1):bjgpopen18X101633. doi: https://dx.doi.org/10.3399/bjgpopen18X101633
17. Rat C, Quereux G, Riviere C, Clouet S, Senand R, Volteau C, et al. Targeted melanoma prevention intervention: a cluster randomized controlled trial. Annals of Family Medicine. 2014;12(1):21-8. doi: https://dx.doi.org/10.1370/afm.1600

18. Vuong K, Trevena L, Bonevski B, Armstrong BK. Feasibility of a GP delivered skin cancer prevention intervention in Australia. BMC Family Practice. 2014;15:137. doi: https://dx.doi.org/10.1186/1471-2296-15-137
19. Vuong K, Armstrong BK, McGeechan K, Cust AE. Personalized melanoma risk assessments and tailored prevention advice: a pragmatic randomized controlled trial in Australian general practice. Family practice. 2019;Vol.36(2):237-46p. doi: https://doi.org/10.1093/fampra/cmy040
20. Emery JD, Reid G, Prevost AT, Ravine D, Walter FM. Development and validation of a family history screening questionnaire in Australian primary care. Annals of family medicine. 2014;12(3):241-9. doi: http://dx.doi.org/10.1370/afm.1617
21. Habgood E, Walter FM, O'Hare E, McIntosh J, McCormack C, Emery JD. Using an electronic self-completion tool to identify patients at increased risk of melanoma in Australian primary care. Australasian Journal of Dermatology. 2020;61(3):231-6. doi: https://dx.doi.org/10.1111/ajd.13244
22. Usher-Smith JA, Kassianos AP, Emery JD, Abel GA, Teoh Z, Hall S, et al. Identifying people at higher risk of melanoma across the U.K.: a primary-care-based electronic survey. British Journal of Dermatology. 2017;176(4):939-48. doi: https://dx.doi.org/10.1111/bjd.15181
23. Lophatananon A, Usher-Smith J, Campbell J, Warcaba J, Silarova B, Waters EA, et al. Development of a cancer risk prediction tool for use in the UK primary care and community settings. Cancer Prevention Research. 2017;10(7):421-30. doi: 10.1158/1940-6207.CAPR-16-0288
24. Usher-Smith J, Emery J, Hamilton W, Griffin SJ, Walter FM. Risk prediction tools for cancer in primary care. British Journal of Cancer. 2015;113(12):1645-50. doi: 10.1038/bjc.2015.409
25. The Royal Australian College of General Practitioners. Genomics in general practice. East Melbourne, Vic: RACGP, 2018.
26. Cusack MB, Hickerton C, Nisselle A, McClaren B, Terrill B, Gaff C, et al. General practitioners' views on genomics, practice and education: A qualitative interview study. Aust J Gen Pract. 2021;50(10):747-52. doi: 10.31128/AJGP-05-20-5448
27. Millan-Cayetano JF, Herrera-Ibarra R, Rivas-Ruiz F, Garcia-Serrato P, Garcia-Montero P, Blazquez-Sanchez N, et al. Impact of a Community Intervention for Early Skin Cancer Diagnosis Implementing Teledermatology. Acta Dermatovenerologica Croatica. 2020;28(2):75-9
28. Mills K, Emery J, Lantaff R, Radford M, Pannebakker M, Hall P, et al. Protocol for the melatools skin self-monitoring trial: a phase II randomised controlled trial of an intervention for primary care patients at higher risk of melanoma. BMJ Open. 2017;7(11):e017934. doi: https://dx.doi.org/10.1136/bmjopen-2017-017934
29. Nittas V, Mutsch M, Puhan MA. Preferences for Sun Protection With a Self-Monitoring App: Protocol of a Discrete Choice Experiment Study. JMIR Research Protocols. 2020;9(2):e16087. doi: https://dx.doi.org/10.2196/16087
30. Walter FM, Pannebakker MM, Barclay ME, Mills K, Saunders CL, Murchie P, et al. Effect of a Skin Self-monitoring Smartphone Application on Time to Physician Consultation among Patients with Possible Melanoma: A Phase 2 Randomized Clinical Trial. JAMA Network Open. 2020;3(2). doi: 10.1001/jamanetworkopen.2020.0001
31. Jones SM, Walker H, Maitland C. A dermoscopy training program for Victorian GPs to improve skin cancer prevention and detection. Public Health Res Pract. 2022;32(1). doi: 10.17061/phrp3212207
32. ALP, Authorised by P. Erickson, ALP, Canberra. https://www.alp.org.au/policies/national-melanoma-nurse-network [Accessed 30/06/2022].
33. Keith RE, Crosson JC, O'Malley AS, Cromp D, Taylor EF. Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: a rapid-cycle evaluation approach to improving implementation. Implementation Science. 2017;12(1):15. doi: 10.1186/s13012-017-0550-7
34. Anders MP, Nolte S, Waldmann A, Capellaro M, Volkmer B, Greinert R, et al. The German SCREEN project--design and evaluation of the communication strategy. European Journal of Public Health. 2015;25(1):150-5. doi: https://dx.doi.org/10.1093/eurpub/cku047
35. Ivers R, Jackson B, Levett T, Wallace K, Winch S. Home to health care to hospital: Evaluation of a cancer care team based in Australian Aboriginal primary care. The Australian journal of rural health. 2019;27(1):88-92. doi: http://dx.doi.org/10.1111/ajr.12484

36. Rat C, Houd S, Gaultier A, Grimault C, Quereux G, Mercier A, et al. General practitioner management related to skin cancer prevention and screening during standard medical encounters: a French cross-sectional study based on the International Classification of Primary Care. BMJ Open. 2017;7(1):e013033. doi: https://dx.doi.org/10.1136/bmjopen-2016-013033
37. Goddard-Nash A, Makate M, Varhol R, Quirk F, Larsen R, McGeoch G, et al. Evaluation of HealthPathways: an appraisal of usage, experiences and opinions of healthcare professionals in Australia and New Zealand. Aust Health Rev. 2020;44(4):590-600. doi: 10.1071/AH19214
38. Jones OT, Ranmuthu CKI, Hall PN, Funston G, Walter FM. Recognising Skin Cancer in Primary Care. Advances in Therapy. 2020;37(1):603-16. doi: http://dx.doi.org/10.1007/s12325-019-01130-1
39. Millán-Cayetano JF, Delgado-Sánchez N, Aguilar-Bernier M, Rivas-Ruiz F, Blázquez-Sánchez N, Fernández-Canedo I, et al. Skin Cancer Prevention: Evaluation of an Intervention Focused on Primary Care. New Rochelle, New York: Mary Ann Liebert, Inc.; 2019. p. 278-9.
40. Martin B, Wilkerson AH, Pham L, Nahar VK, Boyas JF, Black WH, et al. Indoor Tanning and Its Use among Patients with Skin Cancer: Implications for Nurses. Journal of the Dermatology Nurses' Association. 2017;9(6):303-5. doi: 10.1097/JDN.0000000000000354
41. Oulehri A, Baybay H, Filankembo Kava A, Douhi Z, Elloudi S, El Fakir S, et al. The role of general practitioners in the prevention and screening of skin cancer: A cross-sectional study in morocco. Our Dermatol Online. 2020;11(e):e134.1-e134.9