

The Recommended Core Content for Sun Safety Messages in Canada

***Report on the 2014/15 National Consensus
Process – Expanded report***

*Integration of documents previously reviewed by the
National Steering Committee for Consensus on Content
for Sun Safety Messages*

Updated May 2018

Executive summary

Reducing ultraviolet radiation exposure decreases the risk of skin cancer and eye damage. Between 1996 and 2006, Canadians increased their time in the sun without improving protection. National consensus on sun protection information for the public was last achieved in 1994. Public messages have since been modified inconsistently. The Ontario Sun Safety Working Group initiated a review of messages and engaged a scientific panel to draft message content. Working Group members then delivered a national consensus process, engaging a National Steering Committee, a health communications expert and representatives from 28 organizations through a workshop with pre- and post-workshop surveys.

The result of the consensus process is the updated Recommended Core Content for Sun Safety Messages in Canada. Four groups of statements comprise the new content: Key Facts, Primary Recommended Protective Action Statements, Additional Recommended Protective Action Statements, and Tips for Implementing the Primary Protective Actions.

Highlights of updates compared to the 1994 consensus include the following:

- Peak times for when skin protection is required have been updated to 11 a.m. to 3 p.m.; previously they were 11 a.m. to 4 p.m.;
- Sunscreen with a minimum sun protection factor (SPF) of 30, rather than 15, is now recommended; and
- Eye protection messages have been integrated.

Organizations are encouraged to adopt, at minimum, the Primary Recommended Protective Action Statements as the basis for public messaging. The overall recommended core content establishes a common understanding of what is needed for effective sun protection. The underlying expectation is that, as a key next step, content will be tailored for different subpopulations and health promotion campaigns.

This report presents the resulting recommended core content from the consensus process, the evidence summaries supporting the consensus process, a detailed description of the consensus process, the rationale underlying the recommended content and a guide to the key points to communicate for UVR protection. It is a supplement to the report published in the *Canadian Journal of Public Health* and the briefing document issued following the completion of the consensus process.

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1. Introduction

Background

Exposure to the sun and other sources of ultraviolet radiation (UVR) without sufficient protection is a well-established cause of skin cancer.¹ UVR exposure is also known to harm the eyes.² National surveys found that in 2006, Canadians spent more time in the sun without improving their sun protection behaviours than in 1996.³ At the same time, the incidence rates of melanoma, the most fatal form of skin cancer, have been increasing in Canada and are projected to continue to rise. If current trends continue, there is expected to be a 72 percent increase in the number of new melanoma cases diagnosed between the periods of 2003 to 2007 and 2028 to 2032.⁴

Skin cancer can be largely prevented by reducing UVR exposure.⁵ Public education on the risks of UVR through consistent messaging is a key part of a prevention strategy. National consensus on sun safety messages was last achieved in Canada in 1994⁶ and messages have been updated inconsistently since then. Research suggests that adoption of cancer prevention behaviours among individuals decreases when they are presented with ambiguous information.⁷

The Ontario Sun Safety Working Group initiated the current work in consultation with a scientific panel (Appendix A) comprised of nine scientists, in the fields of UVR physics, optometry, dermatology, epidemiology, architectural science with a focus on shade, and endocrinology with a focus on vitamin D; and one health promotion specialist. The group aimed to renew stakeholder consensus on sun safety information for public education across Canada.

About this document

This document presents the final Recommended Core Content and describes the 2014/15 National Consensus Process on Recommended Core Content for Sun Safety Messages in Canada.

There are four groups of statements in the recommended core content (Table 1):

- 1. Key Facts.** These statements highlight for the public the potential harms of solar and UVR. Additional information may be provided in health promotion materials, but these are the core and essential statements for describing why skin and eye protection are needed.
- 2. Primary Recommended Protective Action Statements.** These statements provide information on the specific actions that individuals should take to reduce UVR exposure to the skin and eyes. They focus on information that would be most relevant when protection is immediately required.
- 3. Additional Recommended Protective Action Statements.** These statements provide additional actions to consider when planning daily activities, prior to UVR exposure. They would be most relevant when the audience is receptive to recommendations for advanced planning.
- 4. Tips for Implementing Primary Protective Actions.** These statements provide more specific information on how to implement personal protective measures outlined in the primary protective action statements and are based on measured effectiveness in the research that is cited and found in the list of references at the end of this document. The tips are a secondary level of information to include in materials where space allows.

This document also integrates:

- The evidence summaries prepared by the Ontario Sun Safety Working Group in consultation with the scientific panel that supported the draft for discussion through the consensus process (Section 2)
- Information from the report previously published in the *Canadian Journal of Public Health*⁸ expanded upon throughout this document
- Further details of the consensus process including the proceedings of the workshop and pre- and post-workshop surveys (Section 3)
- Information provided in a briefing document to consensus participants, which included the final recommended core content, the underlying rationale for the protective actions (Section 4 in this document) and a description of the key points that they are intended to convey (Section 5 in this document); the Key Facts and Tips for Implementing Primary Protective Actions sections from the Recommended Core Content are not included in Sections 4 and 5 because they are a direct summary of the available science, as cited

Renewal of consensus serves to guide the development of communications materials for public education on the specific actions individuals need to take to protect themselves against skin cancer and other diseases linked to solar and ultraviolet radiation exposure. The aim is to help organizations with a role in promoting sun safety to form a common understanding of Canada's sun safety messages; however, the underlying expectation is that organizations will modify the wording of the recommended core content, the order in which they appear, and the amount of detail based on the format and the needs of their target audience.

Organizations across Canada with a role in promoting sun safety are encouraged to adopt, at minimum, the primary recommended protective action statements. By doing so, sun safety information will be communicated more consistently to the public, thereby increasing the likelihood that they will adopt these protective behaviours. Some audiences may require additional information not included within the core content and users of this document are encouraged to integrate further evidence-based information, as needed.

Table 1: The Recommended Core Content for Sun Safety Messages in Canada

Key Facts

- Sources of ultraviolet radiation (UVR) are the sun and UVR-emitting devices, e.g., tanning beds. UVR causes skin cancer and other forms of skin damage (e.g., wrinkling and photoaging of the skin) and causes harm to the eyes.^{1,2}
- Skin cancer is the most common cancer in Canada, and incidence rates for melanoma, the most fatal form of the disease, continue to increase.⁴ Skin cancer is also one of the most preventable cancers.⁵
- While UVR that is harmful to the skin is primarily present in the sun's rays from 11 a.m. to 3 p.m. between April and September in Canada,^{9,10} UVR that is harmful to the eyes is present in the sun's rays all year round and throughout the day.¹¹ In both cases, UVR can be harmful, even when it's cloudy.⁹⁻¹¹

Primary Recommended Protective Action Statements

Enjoy the sun safely: Protect your skin, protect your eyes.

Protect your skin

- When the UV Index is 3 or higher, protect your skin as much as possible. In general, the UV Index in Canada can be 3 or higher from 11 a.m. to 3 p.m. between April and September, even when it's cloudy.
 - Seek shade or bring your own (e.g., an umbrella).
 - Wear clothing and a wide-brimmed hat that cover as much skin as possible, as appropriate to the activity and weather.
 - Use sunscreen labelled "broad spectrum" and "water-resistant" with a sun protection factor (SPF) of at least 30 on skin not covered by clothing. Apply sunscreen generously and reapply when required.
- Don't use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.

Protect your eyes

- Wear sunglasses or prescription eyeglasses with UV-protective lenses.
- Wear a wide-brimmed hat for added eye protection.

Additional Recommended Protective Action Statements

- Check the daily forecast for the UV Index and protect your skin accordingly.
- Between April and September, whenever possible, plan outdoor activities for before 11 a.m. or after 3 p.m.
- Use sources of vitamin D that are safer than UVR exposure, e.g., dietary sources, including fortified foods, and vitamin D supplements. Intentional UVR exposure to meet vitamin D requirements is not recommended.

Tips for Implementing the Primary Protective Actions

Shade

- Good-quality shade includes dense vegetation and covered structures that offer shade from the side, and not just overhead, to protect against scattered UVR.¹²⁻¹⁴
- As a general guide, wider and denser sources of shade provide increased SPF.¹³
- Cloth sources of shade, such as canopies and umbrellas, should have tightly woven fabric.¹⁴
- Additional personal protection (clothes, sunglasses and sunscreen) is recommended even when in the shade to protect against scattered UVR, especially on high UV Index days.¹⁴

Clothing

- Hats should shade the head, face, ears and back of the neck with a wide brim.¹⁵
- In general, clothing provides better protection than sunscreen.^{16,17}
- Tightly woven or UV-protective labelled clothing is recommended.^{16,18}

Sunscreen

- Sunscreen should be used on exposed skin not covered by protective clothing. Consider using sunscreen for the lips (e.g., sunscreen lip balm), as well.
- Use a generous amount of sunscreen¹⁹ (e.g., the average adult requires approximately two to three tablespoons of lotion-formulated sunscreen to cover the whole body, and a teaspoon to cover the face and neck).
- Reapply after swimming, strenuous exercise or towelling off.²⁰
- Use sunscreen that says on the label:
 - “Broad spectrum”
 - “SPF 30” or higher
 - “Water resistant”
- Sunscreen comes in a variety of formulations. Find one that suits you best and apply it properly with thorough coverage. Sunscreen formulations that you find easier to apply thoroughly will be more effective.

Eye protection

- Because UVR that is harmful to the eyes is present in the sun’s rays all year round and throughout the day, eye protection may be required even when skin protection is not.²¹
- Eye protection is required around highly reflective environments, such as snow, sand and water.
- The best UV protection for eyes is offered by close-fitting wraparound sunglasses.
- Look for sunglasses or prescription lenses with full UVA and UVB protection. Examples of appropriate labels are “UV400” or “100% UV protection.”
- Contact lenses, even those with UV protection, do not provide full coverage for the eye and the skin around the eye.

2. Evidence summaries

This section presents the evidence summaries prepared by the Ontario Sun Safety Working Group in consultation with a scientific panel.* The scientific panel (Appendix A) was comprised of nine scientists, in the fields of UVR physics, optometry, dermatology, epidemiology, architectural science with a focus on shade, and endocrinology with a focus on vitamin D; and one health promotion specialist. The scientific panel summarized their knowledge of the best available evidence in their fields. Major evidence reviews were identified where applicable, such as the International Agency for Research on Cancer's review establishing UVR as a cause of skin cancer.¹ Evidence in the field of UVR is otherwise primarily found in studies describing the UVR-protective properties of shade, clothing, eyewear and sunscreen, measured in controlled conditions, and through the measurements of UVR in Canada throughout the day and year and under different conditions, such as cloud, by Environment Canada.

Based on these summary, the panel prepared a draft to develop the recommended core content, which served as a starting point for broader discussions, including a review by external experts and focus testing among public health stakeholders in Ontario, prior to bringing it forward for the national consensus process.

Ultraviolet radiation physics

Ultraviolet radiation (UVR) is a portion of the electromagnetic spectrum, and it is further divided into the UVC (shortest), UVB and UVA (longest) wavelengths. Sunlight is made up of the UVR, infrared and visible light portions of the electromagnetic spectrum.

The Ultraviolet (UV) Index is a measure of sunburn response to levels of UVR intensity.²² The UV Index ranges from 0 (low intensity, usually at night) to 11 or higher (extreme intensity, usually at solar noon on a clear summer day at the Earth's northern mid-latitudes). The UV Index very rarely exceeds 10 in Canada.¹⁰ When the UV Index is 3, it takes about an hour to get the first perceptible sign of reddening (i.e., erythema) for skin type II (i.e., skin that burns easily, but can develop a tan). When the UV Index is 10, it takes just 17 minutes to get the same UV dose.²² For people with fairer skin, the time to sunburn is even shorter.

Environment Canada developed the UV Index and issued the first forecasts in 1992.²³ In 1994, the World Meteorological Organization and the World Health Organization adopted the index as an international standard and updated it to the current 11-point scale.²²

The UV Index changes with the time of day and season, specifically with changes in the local solar zenith angle; in other words, UVR is greater when the sun is closer to being directly overhead. The daily peak UV Index is therefore related to solar noon. In Canada, the UV Index is typically below 3 before 9:00 a.m. and after 5:00 p.m. It is typically below 3 from October to March on any type of day. The UV Index is particularly high (above 5 on average) from May to August between 10:00 a.m. and 2:00 p.m. (solar time; 11:00 a.m. to 3:00 p.m. daylight savings time).⁹ As expected, the daily peak UV Index is also higher in the summer and lower in the winter.¹⁰

* Much of the content was drafted by Maegan Mazereeuw, Prevention and Cancer Control, Cancer Care Ontario.

While UVR declines with increasing northern latitude, the differences between Toronto (44 N) and Edmonton (54 N) are not very large.⁹ One message should work for most of the country.

UV Index mediating factors include ozone levels, cloud cover and reflective environments, such as fresh white snow. Depletion of the ozone layer is associated with increased average UV Index levels. Local, ground-level ozone from pollution absorbs UVR, and therefore on days when the air is very polluted, the UV Index will be lower.^{9,10} Partly cloudy skies will either magnify or mitigate UVR depending on the pattern of cloud cover and the sun's relative position;²⁴ uniform cloud cover reduces UVR in relation to its thickness.²⁵ Snow- and ice-covered surfaces can increase UVR.⁹

UVR also increases with altitude, so sites at higher elevations receive more UVR than those closer to sea level.¹⁰ In clear still water, shorter UV wavelengths (UVB 280 nm to 315 nm) responsible for most skin burning and tanning can penetrate to a depth of at least 30 m, and longer UV wavelengths (UVA 315 nm to 400 nm) can penetrate to a depth of at least 60 m.²⁶

Detailed scientific evidence on personal protection and degree of effectiveness against UVR are found in the sections that follow, but as a general rule, as the UV Index increases more protection is required (e.g., shade plus protective clothing).

Some specific populations need to exercise increased caution. Epidemiological studies suggest that children are more susceptible to increasing their risk of skin cancer through UVR exposure.^{27,28} People with certain phenotypic characteristics—fair skin, light eyes, blond or red hair, and a tendency to burn rather than tan when exposed to sunlight—have higher susceptibility to UVR damage and subsequent risk of all types of skin cancer.^{1,5}

Shade

Shade can be an effective means for reducing exposure to solar UVR. A cross-sectional study showed that seeking shade may be more effective than sunscreens in preventing sunburns and reducing UVR exposure.²⁹

The ultraviolet protection factor (UPF) provides a measurement describing the effectiveness of a source of shade and other physical sources of UVR protection, such as clothing. A UPF of 15 reduces UVR by about 93 percent.¹⁴

One factor determining a shade structure's UPF is the amount of UVR that the structure's material lets through. For example, how tightly woven a cloth shade structure is will determine its UPF, more so than the type of fabric used.¹⁴ Similarly, the UPF of tree cover varies based on the density of its canopy.¹⁴ Tall deciduous trees with dense, wide canopies and low foliage create the most shade and offer the highest UPF among natural sources of shade.¹² A canopy with a heavy density, that blocks 90 percent of the sky, has a UPF of 10.³⁰

Examples of effective built shade structures include gazebos, verandas, sails and awnings.¹⁴ Portable shade is often less effective, but is a necessary solution for places where other shade options are not available, such as at a beach. Examples of portable shade include umbrellas, beach cabanas, tents and shelters that can be dismantled.¹²

Shade primarily reduces sun and UVR exposure by blocking radiation directly from the sun. However, nearby surfaces, objects and atmospheric particles will scatter and reflect some radiation into shaded areas, so the need for personal protection in shaded areas may not be eliminated, particularly for those

with sensitive skin. The level of reflection varies depending on the different physical properties of objects and surfaces.¹⁴ For example, particles in the atmosphere will create diffuse reflection, or scattering,¹⁴ while fresh white snow produces a significant amount of direct reflection.⁹

The UPF of a shade structure is therefore also determined by the amount of reflected UVR that is blocked. Structures with an expansive roof or that have side panels offer greater protection.¹⁴ Portable shade devices often provide limited protection against reflected UVR due to their limited area of coverage.¹² A shade structure that has a broad expanse can also provide protection from the sun's direct radiation as the angle of the sun changes.³¹

For more information on the level of UVR protection offered by different types of shade, the Toronto Cancer Prevention Coalition's Shade Guidelines offer detailed guidance on selecting good quality shade.¹²

Clothing

Clothing is a simple, practical and reliable means of photoprotection and may be more effective than sunscreen.^{18,29} A common measure of the total UVA and UVB blocked by textiles is the UPF. The UPF is calculated by taking the ratio of amount of UVR emitted by the source and the amount transmitted through a sample fabric.¹⁵ Many reports have made recommendations for labelling UPF on photoprotective clothing;³²⁻³⁵ however there are no set guidelines in Canada. According to recommendations from Australia, to make the claim of good protective properties, clothing must have a UPF of 15 or greater;³⁴ more recent recommendations from the European Committee for Standardization require fabrics to have a UPF of 40 or greater in order to be labelled as offering UV protection.³⁵

Many factors affect transmission of UVR through fabrics. In vitro studies have shown greater UV protection is provided by clothing made with tightly woven fibres, including synthetic fabrics, darker colours and polyester blends; denim or wool will also provide protection, but may not be practical in warm weather.^{16,18} Loosely woven and light-coloured fabrics offer lower levels of protection.¹⁸ With wear and use of a garment, additional factors can decrease the UPF including stretchiness, wetness (depending on the fabric, wetness can also increase UPF) and degradation by washing,^{15,32} but many UPF-rated fabrics can withstand repeated washings.

Hats provide additional yet variable sun protection. There are many factors that affect the amount of protection provided by hats. In general, tightly woven fabric, presence of a large brim, good coverage of the ears and back of the neck are factors that enhance photoprotection.¹⁵ Brims should extend around the whole hat and be at least seven centimetres wide.³⁶

Eye protection

Chronic UVR exposure is a risk factor for several eye-related disorders, including ocular melanoma, cortical cataracts, pterygium, and some corneal and conjunctival neoplasms.^{1,37,38} Acute exposure to UVR can also cause photokeratitis, photoconjunctivitis and retinal burns (e.g., from looking directly at the sun).³⁹ Age-related macular degeneration (AMD) is more likely related to exposure to visible light in sunlight, specifically the blue light range.²

For eye protection in most situations, including driving, Health Canada recommends using general purpose sunglasses, which block 60 to 92 percent of UVA rays and visible light and 95 to 99 percent of

UVB rays.⁴⁰ The percentage of UVA rays and visible light that is blocked is related to the density of the tint.⁴¹ While most sunglasses protect the eyes from the sun's direct radiation, neither sunglasses nor hats generally provide adequate protection from indirect sunlight or sunlight reflected from nearby surfaces and objects. The greatest protection for eyes against sunlight is provided by ski goggles and wrap-around sunglasses. UVR-absorbing soft contact lenses can protect the inner eye structures from UVR; however, the lids and conjunctiva remain unprotected from UVR, and the lenses do not offer protection in the visible light spectrum.³⁹

Among the range of tints that minimally affect colour perception, brown-tinted lenses generally offer the best protection, protecting against both UVR and the blue light portion of the sun's visible spectrum.⁴¹

Sunglasses available for sale in Canada follow voluntary industry standards and labels are governed by Canada's Competition Act that prohibits manufacturers from making false claims. Standards may include those detailed by the American National Standards Institute (ANSI Z80.3), the Australian/New Zealand Standard (AS 1067) or ISO, the International Organization for Standardization (ISO 12312-1). Labels should indicate absorption of 400 nanometres of UVR ("UV400") or 100% UV protection.

The UV Index is a measure of the shorter wavelengths of the UVR spectrum that cause sunburns, primarily within the UVB spectrum. Since the longer wavelengths of UVR, primarily within the UVA spectrum, are more directly associated with eye health and can be strong throughout day, eye protection may be needed on days even when the UV Index is low. The cornea fully absorbs UVB, but UVA penetrates surface layers and reaches the lens of the eye.²¹ The importance of UVA is also why eye protection is of concern even in the winter months.

Sunscreen

Sunscreens reduce the amount of UVR absorbed by the skin, preventing sunburn and other UVR-induced changes in the skin.⁴² The SPF is a ratio of the least amount of solar-simulated UVR required to produce a minimum amount of redness (i.e., erythema) in sunscreen-protected skin compared to unprotected skin, 24 hours after exposure.⁴³ As with UPF, the SPF of a sunscreen can also be calculated as the ratio between UVR transmitted without protection to the amount of UVR transmitted with sunscreen-protected skin.⁴⁴ SPF 15 allows 7 percent of UVB through or filters 93 percent, while an SPF of 30 allows 3 percent of UVB through, filtering 97 percent. SPFs higher than 30 offer a smaller increase in filtration capacity (e.g., SPF 60 filters 98 percent of UVB). Because UVB is many times more erythemogenic (able to cause redness of the skin) than UVA, the SPF is primarily an indicator of UVB protection.

For a sunscreen to be labelled as broad spectrum, protecting against UVB and UVA, Health Canada's Sunscreen Monograph requires that they have a critical wavelength protection of at least 370 nm.¹⁹ The critical wavelength is a measure of the breadth of absorbance. A critical wavelength of 370 nm extends protection into the longer wavelength portion of the UVA spectrum.

Sunscreens have been shown to also protect against the development of squamous cell carcinoma (SCC) of the skin and its precursor, actinic keratosis (AK).⁴⁵⁻⁴⁷ Strong evidence of protection against basal cell carcinoma is lacking. Randomized studies in British Columbia and Australia provided some evidence that sunscreens may protect against melanoma. The British Columbia study noted that children who regularly used broad-spectrum, high SPF sunscreen developed significantly fewer nevi during the study

than those in the control (“as usual” use) group.⁴⁸ In Queensland, Australia, long-term follow-up of participants in a randomized study of sunscreen use (only SPF17 was available at the time) found a significantly reduced risk of melanoma in the sunscreen arm of the trial.⁴⁹

There are likely several reasons for the limited evidence about sunscreen use and reduced risk of melanoma and basal cell carcinoma. In particular, it may be that the UVA part of the spectrum is more important in the development of these cancers compared to squamous cell carcinoma, but good UVA absorbers are relatively new. In addition, the recommended application density set by the United States Food and Drug Administration for standardized SPF testing is 2 mg/cm² (or 35 ml of sunscreen per body application), when in reality, the actual amount of sunscreen used by consumers is well below that, to the point where there may be often no to minimal protection on hairy skin and areas of the body that are hard to reach.^{50,51} Studies have found that the amount of sunscreen used in real life situations ranges from 0.5 to 1.3 mg/cm².

Since sunscreen is generally not used appropriately, the protection achieved is typically about one third of the labelled SPF.⁵² Proper use and reapplication are likely primary considerations to promote.⁵⁰ Although current sun protection messages may recommend SPF 15 sunscreens, SPF 30 products do provide greater protection particularly in situations where application density is low.^{53,54} The appropriate SPF values for other endpoints such as DNA damage, immunosuppression and carcinogenesis are not known, again suggesting that the use of higher SPF sunscreens may be worthwhile.

While it is clear that swimming and sweating heavily will result in the need for reapplication, it is less clear whether reapplication of sunscreen is required every two hours. Previous research suggested that reapplication every two hours may be beneficial; however, more recent research found that the particular sunscreen that was studied still had about 43 percent of its initial protective effect after eight hours on a day with physical activity and bathing²⁰ and measured only a 25 percent reduction in SPF after a day without physical activity or UV exposure (e.g., with indoor sedentary work).⁵⁵

In terms of the safety of sunscreen ingredients, the European Union Scientific Committee on Cosmetic and Non-Food Products (EU SCCNFP) has published a number of comprehensive reviews on common sunscreen ingredients, including oxybenzone (benzophenone-3) and homosalate. For these two ingredients, the committee concluded that up to recommended concentration limits, they do not pose a hazard to human health.⁵⁶⁻⁵⁸ Additional committee reviews of sunscreen ingredients may be located through the European Union CosIng database (<http://ec.europa.eu/consumers/cosmetics/cosing/>).

The American Academy of Pediatrics recommends limiting sunscreen use on infants younger than six months to small areas of the skin when adequate protective clothing and shade are not available, due to the increased likelihood of irritation on their not-yet-fully-developed skin.⁵⁹

Tanning equipment

The International Agency for Cancer Research (IARC) has classified UV-emitting tanning devices as carcinogenic to humans (Group 1). It has identified sufficient evidence that UV-emitting tanning devices cause cutaneous and ocular melanoma.¹

People who use tanning beds before age 35 are 75 percent more likely than never-users to be diagnosed with melanoma.^{5,60} They are also at higher risk of being diagnosed with melanoma at a young age.⁶⁰ The studies that have examined ocular melanoma risk have measured 30 percent to as much as three times

the risk compared with non-users for the highest exposure categories.¹ There is also some indication of a positive dose-response relationship for ocular melanoma.¹

Evidence also indicates that indoor tanning increases the risk of squamous cell carcinoma and basal cell carcinoma of the skin, with risk increasing with exposure at younger age.⁶¹ There is also an increased risk of diagnosis of basal cell carcinoma at younger than 40 years of age.⁶²

The World Health Organization has issued a recommendation against the use of tanning equipment, especially by people under the age of 18.⁶³ As of January 1, 2018, all provinces in Canada do not allow tanning services to be provided to youth under 18.⁶⁴

Vitamin D

Vitamin D supports musculoskeletal health. A 2010 review by the Institute of Medicine concluded that the available research did not support associations between vitamin D and other diseases.⁶⁵ The review also noted that Canadians and Americans are receiving adequate levels of vitamin D.⁶⁵

Dietary intake, supplements or synthesis in the skin with exposure to UVR are the means in which vitamin D may be obtained. However, a safe level of UVR exposure for the purpose of increasing vitamin D levels has not been established. Because exposure to UVR is a well-established risk factor for cancer, dietary intake and supplements are safer ways to maintain recommended vitamin D levels.

Recommended nutrition intakes from the Institute of Medicine and adopted by Health Canada suggest that a total dietary intake of 600 IU/day of vitamin D should meet the needs of most people in the United States and Canada. Adults over the age of 70 may need 800 IU/day.⁶⁵ These values are based on the assumption of minimal sun exposure.

3. The consensus process

The national consensus process to update content for public education in Canada was undertaken in 2014/2015 and was led by the National Steering Committee for Consensus on Content for Sun Safety Messages (Appendix B).

Participants from 28 organizations across Canada (Appendix C) with a role in promoting sun safety took part in the process, which comprised a workshop held in Toronto on March 12, 2015, and pre- and post-workshop surveys regarding message content that was drafted in consultation with the scientific panel (Appendix A). This process was completed in May 2015.

Pre-workshop survey

The pre-workshop survey took place from December 2014 to January 2015. It provided the opportunity to identify and prioritize issues for discussion at the one-day workshop. It also served to assess the preferences of representatives regarding the best process to take for achieving consensus.

The main part of the survey asked for feedback on the draft statements. Respondents were asked to indicate their organization's position among one of four for each statement or group of statements. The four possible positions were:

1. **Is in complete agreement and full support with the statement** — indicates that the organization has no suggested changes for the statement provided and can support its use as content in public communication materials
2. **Has some issues but can accept and support the statement** — indicates that the organization would prefer the statement presented with minor changes, but is willing to accept and support it in communication materials in the interest of increasing message consistency
3. **Will not accept but will not oppose the statement** — indicates that on the whole, the organization does not agree with the statement or that the statement significantly conflicts with a key opinion of the organization, but that the organization will not actively communicate diverging opinions from this statement in materials for the public
4. **Will not accept and will actively oppose the statement** — indicates that on the whole, the organization does not agree with the statement or that the statement significantly conflicts with a key opinion of the organization, and in the view of the organization, the public would be better served by information that diverges with the content of this statement.

Below is the tally from the responses to the pre-workshop survey.

Statement	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
Enjoy the sun safely: Protect your skin, protect your eyes.	21		1		22
If outdoors for more than 15 minutes when the UV Index is 3 or higher (in general, from 11:00 a.m. to 3:00 p.m. between March and October), cover up as much as possible:	8	12		1	21

Statement	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
Seek shade or bring your own. Protection is better the further under a source of shade you are.	14	6	1		21
Wear protective clothing: a hat with a wide brim all around it and long-sleeved shirts and pants or long skirts made of tightly woven fabric.	14	6	1		21
Use broad spectrum, water-resistant sunscreen with an SPF of at least 30 on skin not covered by clothing. Apply sunscreen generously.	8	10	3		21
The UV Index can be 3 or higher even when it's cloudy.	16	5			21
If you can, check the daily forecast for the UV Index before heading outside and protect accordingly.	17	4			21
Whenever possible, plan outdoor activities for before 11:00 a.m. or after 3:00 p.m., between March and October.	9	11		1	21
Don't use tanning beds or deliberately try to get a suntan, and avoid getting a sunburn.	14	6	1		21
Use sources of vitamin D that are safer than UVR exposure. Health Canada recommends dietary sources of vitamin D, particularly fortified foods, and vitamin D supplements.	12	6	3		21
Wear sunglasses whenever it is bright outside all year round. This will also improve visual comfort.	14	6		1	21
Sources of ultraviolet radiation (UVR) are the sun and UVR-emitting devices, such as tanning beds. Overexposure to UVR causes skin cancer and other forms of skin damage—such as wrinkling or premature aging of the skin (note to consensus participants: choice of wording will depend on audience)—and likely causes harm to the eyes and immune system.	16	4		1	21
Skin cancer is the most common cancer in Canada, and incidence rates for melanoma, the most fatal form of the disease, continue to increase.	18	3			21
Skin cancer is one of the most preventable cancers.	21				21

Statement	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
While science has established UVR as the main risk factor for skin cancer, it is currently unclear whether there is a safe level of sun exposure to maintain vitamin D levels while not materially increasing the risk of skin cancer.	8	10	3		21
Additional details for Seek shade	14	6		1	21
Additional details for Wear protective clothing	18	3			21
Additional details for Use sunscreen	7	10	4		21
Additional details for Wear sunglasses	18	2		1	21

Consensus workshop proceedings[†]

The discussion at the workshop held in Toronto on March 12, 2015 was prioritized according to areas with the greatest range of opinions among consensus participants found through the pre-workshop survey. Workshop materials, including a summary of the feedback provided by consensus participants was circulated two weeks ahead of the workshop.

The objective of the workshop was to discuss, develop and agree on message content. In particular, the focus was on scientific accuracy, clarity and public acceptability of the message content. Human behaviour was also named as an important consideration.

Five groups of statements were included in the agenda for discussion at the workshop:

- The UV Index and time in the sun
- Eye protection
- Sunscreen
- Vitamin D
- Shade, clothes and tanning

Ranking and clustering of statements was also included in the agenda.

Three statements were identified by the facilitators as having a high level of agreement in the pre-workshop consultation survey and were therefore not included on workshop agenda for discussion. The statements were:

- Enjoy the sun safely: Protect your skin, protect your eyes.
- Skin cancer is the most common cancer in Canada, and incidence rates for melanoma, the most fatal form of the disease, continue to increase.
- Skin cancer is one of the most preventable cancers.

[†] Proceedings recorded by Sehar Jemal, Prevention and Cancer Control, Cancer Care Ontario

The facilitators then outlined the process for the workshop discussions and voting. The day was divided according to the five groups of message content, with each of the sessions for discussion consisting of:

1. A presentation on the science
2. Review of the draft items of message content and the results of the initial consultation survey
3. Discussions to amend the draft content, with the discussions for eye protection, sunscreen and vitamin D taking place with the group as a whole, and the discussions for UV Index and time in the sun, shade, clothing and tanning in small groups, with reporting back to the larger group
4. Presentation of the proposed amended wording for the items of message content
5. Voting using “dotmocracy,” with coloured dot stickers, whereby amended text on large sheets of paper was posted on the walls of the meeting room and participants were asked to vote on their level of agreement with the revision of the message. A green sticker denoted “in complete agreement and full support,” a yellow sticker denoted “have some issues but can accept and support,” a blue sticker denoted “will not accept but will not oppose,” and a red sticker denoted “will not accept and will actively oppose.”

Each section in this report, follows the format at the workshop with a summary of the presentation, presentation of the draft content reviewed as part of the initial consultation with the amended text from the workshop, a summary of the discussion and the voting results from the workshop. The last session of the day served to discuss rankings, clustering and priorities for the message content.

UV Index and time in the sun

Presentation by: Vitali Fioletov, PhD, Research Scientist, Ozone and Ultraviolet Studies, Air Quality Research Division, Environment Canada

Dr. Fioletov provided the presentation for the UV Index and time in the sun section on the agenda. His presentation provided a brief overview on the basics of ultraviolet radiation (UVR) and the UV Index.

Dr. Fioletov described how UVR accounts for one percent of solar radiation and stratospheric ozone plays an important role in absorbing much of the UVR from the sun. Regulations on ozone-depleting substances have helped to avoid a large increase of UVR reaching the earth’s surface—without current regulations, the UV Index in the summer would have risen to a projected value of 30 by 2016. Although natural variability makes it challenging to identify the projected return of the northern mid-latitude ozone levels to pre-1980s level, the expectation is that emissions contributing to climate change will hasten the return of ozone levels before the middle of the twenty-first century.

The UV Index is a unitless measure of UVR, developed in the early 90s, for the public. The UV Index can be calculated by using the Brewer Spectrophotometer, broadband UV instruments, satellite, and prediction models. The UV Index typically ranges from 0–10 in Canada. There are many factors affecting the UV Index: ozone, clouds, and snow have the largest impacts. Ozone and UVR are closely related.

A forecast for the summer is determined by the amount of ozone in the late spring.

The measurement of the UV Index is based on a flat surface; therefore, values are adjusted when considering human exposure.

Dr. Fioletov reviewed the erythemal (sunburn) and vitamin D production action spectra, two methods for measuring UVR intensity. The UV Index is based on the erythemal action spectrum. Dr. Fioletov reviewed the minimal erythema dose (MED), an actinic dose using the erythema action spectrum, which

is the measure of the minimum dose of UVR to produce a just noticeable erythema on previously unexposed skin. The MED varies by skin type, sensitivity to UVR, and time. When the UV Index is 3, 1 MED is about 56 minutes of exposure for skin type II and 44.4 minutes for skin type I. At a UV Index of 10, 1 MED is about 16.7 minutes of exposure for skin type II and 13.3 minutes for skin type I.

Dr. Fioletov concluded his presentation stating that in 95 percent of cases, hourly UV Index is below 3 in Canada between November and February. From March to October, hourly mean UV Index is less than 3 before 10:00 a.m. and after 4:00 p.m.

Discussion

The messages for UV Index and time in the sun were discussed in small groups.

Pre-workshop	Workshop revisions
If outdoors for more than 15 minutes when the UV Index is 3 or higher (in general, from 11:00 a.m. to 3:00 p.m. between March and October), cover up as much as possible.	When the UV Index is 3 or higher protect your skin as much as possible. In general, in Canada the UV Index is 3 or higher from 11:00 a.m. to 3:00 p.m. between April and September.
Discussion for this item of message content focused on whether the mean UV Index value being above 3 should be communicated as between April and September, as opposed to March and October. Since 1 MED at a UV Index of 3 is 44.4 minutes of exposure for skin type I, the most at risk skin type, April was seen as a reasonable month for focusing on the summer and sun, compared to March.	
In addition, the original text that included “cover up” was seen as unrealistic to expect of the general public during the heat of the summer months; therefore, focusing on protecting the skin (with further expansion on methods and meaning) was more acceptable.	

Pre-workshop	Workshop revisions
The UV Index can be 3 or higher even when it’s cloudy.	The UV Index can be 3 or higher even when it’s cloudy.
Participants agreed with the original content. No changes were made.	

Pre-workshop	Workshop revisions
If you can, check the daily forecast for the UV Index before heading outside and protect accordingly.	Check the daily forecast for the UV Index and protect your skin accordingly.
Discussion for this item revolved around further encouraging the public to check the daily forecast for the UV Index, as done with the weather, and removing the text “if you can.”	

Pre-workshop	Workshop revisions
Whenever possible, plan outdoor activities for before 11:00 a.m. or after 3:00 p.m., between March and October.	Whenever possible, plan outdoor activities for before 11:00 a.m. or after 3:00 p.m., between April and September.
The participants approved this item of message content. Changes were made to the months based on the item above.	

Workshop dotmocracy voting results based on revisions

	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
When the UV Index is 3 or higher protect your skin as much as possible. In general, in Canada the UV Index is 3 or higher from 11:00 a.m. to 3:00 p.m. between April and September.	21	8			29
The UV Index can be 3 or higher even when it's cloudy.	27				27
Check the daily forecast for the UV Index and protect your skin accordingly.	28	1			29
Whenever possible, plan outdoor activities for before 11:00 a.m. or after 3:00 p.m., between April and September.	23	6		1	30

Eye protection

Presentation: B. Ralph Chou, MSc, OD, FAAO, Professor Emeritus, School of Optometry and Vision Science, University of Waterloo

Dr. Chou presented an overview of eye protection. He spoke about the two basic ways UVR affects the eye: waveband dependent (UVB: 280-315 nm and UVA: 315-400 nm) and time course (acute or chronic). The impact of UVR varies by age and his presentation focused on adult eyes, ages 20 to 60 years old.

Dr. Chou explained that although UVR is generally hazardous during midday for the skin, this time period may not make the eyes as vulnerable. Since the eyes are in the vertical plane, shielded from above by the eyebrows, when the sun is at the highest point it may not be as damaging for eyes. Instead, direct UVR exposure, before 10:00 a.m. and after 2:00 p.m., may be more of an issue.

He reviewed UVR protective lenses for sunglasses and eye glasses. The most optimal sunglass tint is grey, which preserves colour, followed by brown, which provides warmer tones and more absorption of short wavelengths. Tinted lenses have the potential to impair visual performance during driving (e.g., increased reaction time, colour confusion and decreased visual acuity).

The shape of the frame for eyewear is also important; the frames should wrap around the eye as scattered radiation may allow UVR to reach the eye through the sides or under the frame.

Dr. Chou stated that standards for sunglasses exist in a number of jurisdictions, but not in Canada with no enforcement of requirements to support labelling of UVR protection.

Dr. Chou informed the participants that tints and anti-reflective coatings do not protect against retro-reflections from the back surface of a lens; UVR from sources behind the person can reflect from the back lens surface and towards the eye. He stated that that it is important to protect not only the eye, but the skin around the eye as about 5 to 10 percent of all non-melanoma skin cancers occur on the eyelid.

Discussion after Dr. Chou’s presentation focused on labelling for sunglasses and development of a Canadian standard to enforce requirements for labels indicating UVA/UVB protection. As well, discussion considered the potential for encouraging wearing a hat for eye protection. Dr. Chou stated that that with hat and sunglasses there was a reduction of exposure to about 10 percent of ambient light.

Discussion

The items of message content for eye protection were discussed as a large group.

Pre-workshop	Workshop revisions
Wear sunglasses whenever it is bright outside all year round. This will also improve visual comfort.	Wear UV-blocking eyeglasses or sunglasses all year round to protect your eyes and the skin around them. Maximum direct UV exposure to the eye occurs between 8:00 and 10:00 a.m. and 2:00 and 4:00 p.m.
Discussion revolved around stricter terminology and information regarding eye protection. In particular, the focus was on ensuring the public understood that eye protection went beyond sunglasses and brightness outdoors. Ben Giddens wanted to emphasize that UVR is concentrated when it hits the outer edge of the cornea. His suggestions for messages included “wear sunglasses to protect the eye and skin all around, all year” and “maximum UVR exposure to eye occurs in the mid-morning and mid-afternoon; 50% of UVR that touches our skin is reflected.”	

Pre-workshop	Workshop revisions
Sources of ultraviolet radiation (UVR) are the sun and UVR-emitting devices, such as tanning beds. Overexposure to UVR causes skin cancer and other forms of skin damage—such as wrinkling or premature aging of the skin (note to consensus participants: choice of wording will depend on audience)—and likely causes harm to the eyes and immune system.	Sources of ultraviolet radiation (UVR) are the sun and UVR-emitting devices, example tanning beds. UVR causes skin cancer and other forms of skin damage (example wrinkling or photoaging of the skin) and causes harm to the eyes.
During earlier discussion of this message, many participants were conflicted with the use “overexposure” versus “exposure.” The concern with overexposure was that it relied on individual interpretation and threshold of excess exposure. The concern with exposure was that the public may find any exposure to UVR overwhelming and may discourage physical activity. There was also discussion about the impact of UVR on the immune system. In particular, there was concern that this association may not come naturally for the public and instead may cause confusion. Although premature aging of the skin seemed simpler for the public to understand, it was noted that premature aging is a disease and was not accurate within this context. The groups decided that terminology (e.g., photoaging) should vary by the target audience.	

Pre-workshop	Workshop revisions
<p>Wear sunglasses:</p> <ul style="list-style-type: none"> Sunglasses should provide coverage from direct and indirect sunlight for effective protection. Close-fitting, wraparound sunglasses are recommended. Inexpensive sunglasses can be just as effective as more expensive ones. Look for a label that indicates UVA and UVB protection. 	<p>Wear UV protective eyewear</p> <ul style="list-style-type: none"> Sunglasses should provide coverage from direct and indirect sunlight for effective protection. Close-fitting, wraparound sunglasses with UVA and UVB protection are recommended. Prescription eyeglasses should also be close fitting with UVA and UVB protection.
<p>The focus here again was on all eyewear, instead of only sunglasses. As well, to ensure that the public was aware of recommended UVA and UVB labelling during purchase of risk reducing eyewear options. As discussion of this message went beyond the allotted time on the agenda; the revised text was created by a smaller group of workshop participants over lunch hour.</p>	

Workshop dotmocracy voting results based on revisions

	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
Wear UV-blocking eyeglasses or sunglasses all year round to protect your eyes and the skin around them. Maximum direct UV exposure to the eye occurs between 8:00 and 10:00 a.m. and 2:00 and 4:00 p.m.	18	8	1		27
Sources of ultraviolet radiation (UVR) are the sun and UVR-emitting devices, example tanning beds. UVR causes skin cancer and other forms of skin damage (example wrinkling or photoaging of the skin) and causes harm to the eyes.	21	2			23
<p>Wear UV protective eyewear</p> <ul style="list-style-type: none"> Sunglasses should provide coverage from direct and indirect sunlight for effective protection. Close-fitting, wraparound sunglasses with UVA and UVB protection are recommended. Prescription eyeglasses should also be close fitting with UVA and UVB protection. 	14	11	2		27

Agreement for the message on sources of UVR has improved post workshop. Agreement for two messages regarding eye protection had some concern post-workshop. In particular, although no one actively opposed either of the messages post workshop there were still a large number of participants who had some issues with the content. A small working group (Ben Giddens, Harmeet Gill, Ralph Chou) along with the steering committee was formed to further address these messages.

Sunscreen

Presentation: Martin A. Weinstock, MD, PhD, Professor of Dermatology, Brown University

Dr. Martin A. Weinstock provided his sunscreen and vitamin D presentations via teleconference.

Dr. Weinstock stated that sunscreen is effective for protection against actinic keratosis (AKs) and reducing nevi in children. It reduces squamous cell carcinomas by 40 percent and melanoma by 50 percent. Sunscreen also protects against medication-related reaction to the sun, photoaging, wrinkles and age spots.

UVB is key for causing sunburn and squamous cell carcinoma, while UVA can contribute to both. Broad spectrum sunscreen with SPF 30 is generally recommended; however, most people do not apply the correct amount required to achieve optimal protection (2 mg/cm²). Absorption of sunscreen may be a problem: sunscreen on the surface of skin absorbs the UV before it hits the living cells; however, it is not clear how sunscreen gets into the human body.

He stated that that people with medium to dark brown skin have very low or no risk for sun-induced type of skin cancer but can still get melanoma or sun-induced medication reaction. Dr. Weinstock is skeptical of providing a specific time to avoid the sun; instead he encourages the shadow rule (if your shadow is shorter than you are, protect yourself from the sun) as it is not dependent on season or latitude. Dr. Weinstock briefly stated that alternatives for sun protections: sun-protective clothing, hats, avoiding the sun/seeking shade. He stated that that none of those methods had very strong scientific basis. Dr. Weinstock thinks sunscreen and arguably protective clothing is the best form of protection.

Discussion around Dr. Weinstock's presentation on sunscreen revolved around the different formulations (spray, moisturizers etc.) and products. In particular, Dr. Weinstock stated that that there is no clear distinction in protection from various formulations; moisturizers with SPF are effective as long as the SPF advertised is correct. As well, some discussion revolved around the variability of UVA protection between brands even though the brands are advertised as broad spectrum. Dr. Weinstock stated that there are new regulations for the definition of broad spectrum sunscreen in the States; in the past companies were able to label their products broad spectrum even with the smallest measure of UVA.

Discussion

Pre-workshop	Workshop revisions
Use broad spectrum, water-resistant sunscreen with an SPF of at least 30 on skin not covered by clothing. Apply sunscreen generously.	Use broad spectrum, water-resistant sunscreen with an SPF of at least 30 on skin not covered by clothing. Apply sunscreen generously and reapply when required.
Participants recommended adding text "and reapply when required."	

Pre-workshop	Workshop revisions
<p>Use sunscreen</p> <ul style="list-style-type: none"> Sunscreens should be used on exposed skin not covered by protective clothing. Use a generous amount of sunscreen Use sunscreen that is labelled: <ul style="list-style-type: none"> Broad spectrum With an SPF of at least 30 Water resistant Sunscreen comes in a variety of formulations. Find one that suits you best and apply it properly with thorough coverage. Sunscreens that you find easier to apply thoroughly will be more effective. 	<p>Use sunscreen</p> <ul style="list-style-type: none"> Sunscreens should be used on exposed skin not covered by protective clothing. Use a generous amount of sunscreen (e.g. teaspoon rule) Reapply after swimming, strenuous exercise or towelling off. Use sunscreen that is labelled: <ul style="list-style-type: none"> Broad spectrum With an SPF of at least 30 Water resistant Sunscreen comes in a variety of formulations. Find one that suits you best and apply it properly with thorough coverage. Sunscreens that you find easier to apply thoroughly will be more effective.
<p>The participants thought that sunscreen was the most utilized option for sun protection. Specifically, various public health unit professionals stated that that they received the most questions on sunscreen. Therefore, they advised to be very detailed in sunscreen messaging to address questions and concerns from the public.</p> <p>Much of the discussion revolved around clarification of the term “generously” and how much sunscreen should be applied, including the thickness. The group had some discussion about the various analogies currently used (e.g., teaspoon rule, golf ball rule, shot glass rule). The shot glass analogy was refuted because of its connotation with promoting alcohol; the teaspoon rule was chosen as the group believed it would be most relatable for the public.</p> <p>There was also some controversy regarding the importance of re-application. In particular, some participants were not convinced with the scientific proof regarding the reapplication recommendation. One recommendation was to educate the public about the instantaneous protection of sunscreen upon application and resolve the myth of the 20 minute rule which may discourage people who may have missed the 20 minute mark before heading outdoors. Many of these discussion points were attempted to be addressed in the more detailed message about sunscreen.</p>	

Workshop dotmocracy voting results based on revisions

Revised statement	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
Use broad spectrum, water-resistant sunscreen with an SPF of at least 30 on skin not covered by clothing. Apply sunscreen generously and reapply when required.	19	3			22
Use sunscreen	15	7			22

Revised statement	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
<ul style="list-style-type: none"> • Sunscreens should be used on exposed skin not covered by protective clothing. • Use a generous amount of sunscreen (e.g. teaspoon rule) • Reapply after swimming, strenuous exercise or towelling off. • Use sunscreen that is labelled: <ul style="list-style-type: none"> ○ Broad spectrum ○ With an SPF of at least 30 ○ Water resistant • Sunscreen comes in a variety of formulations. Find one that suits you best and apply it properly with thorough coverage. Sunscreens that you find easier to apply thoroughly will be more effective. 					

Vitamin D

Presentation: Martin A. Weinstock, MD, PhD, Professor of Dermatology, Brown University

Dr. Weinstock also presented on vitamin D. He began the presentation with an overview on the forms of vitamin D and the recommended daily intake (600 IU for 1–70 years old). He touched upon the various sources of vitamin D (diet with fortified foods, dietary supplements, sun). In addition, the amount of vitamin D absorbed in the skin through photosynthesis in the skin depends on various factors: latitude, time of day, cloud cover, skin colour, amount of skin exposed, age, obesity, baseline total cholesterol, baseline vitamin D levels. Dr. Weinstock summarized a study done in Hawaii which examined 25-OH vitamin D levels in young adults who spent on average 20 hours/week outdoors without sunscreen; 50 percent of the population had low (i.e., <30 ng/dl) levels of vitamin D. Similar results were also observed in other sunny locations. He ended his presentation with the impacts of excess vitamin D (e.g., kidney stones).

Discussion

These messages were revised by all participants a single group.

Pre-workshop	Workshop revisions
Use sources of vitamin D that are safer than UVR exposure. Health Canada recommends dietary sources of vitamin D, particularly fortified foods, and vitamin D supplements.	Use sources of vitamin D that are safer than UVR exposure (e.g. dietary sources, fortified foods, and vitamin D supplements).
Discussion built upon the presentation by Dr. Weinstock. In particular, the group wanted to make the public aware about safer sources of vitamin D. Although not included in the message content, there was some discussion around mentioning that the sun is not a good source of vitamin D (Dr. Weinstock).	

Pre-workshop	Workshop revisions
While science has established UVR as the main risk factor for skin cancer, it is currently unclear whether there is a safe level of sun exposure to maintain vitamin D levels while not materially increasing the risk of skin cancer.	Intentional UV exposure as a source of vitamin D is not recommended. UVR exposure may not be a reliable source of vitamin D (with expansion about skin colour).
Discussion included concern about a safe level of sun exposure. In particular, many participants believed that disseminating information about a safe level of sun exposure may give the public the wrong impression. As well, there was concern about using the wording “reliable sources” as it may provide a gateway for tanning companies to say that they can provide adequate amount of vitamin D.	

Shade, clothing and tanning messages

Discussion

These messages were discussed in smaller groups. One table was given messages on protective clothing; another on shade and one on tanning.

Pre-workshop	Workshop revisions
Seek shade or bring your own. Protection is better the further under a source of shade you are.	Seek shade or bring your own.
Participants found the second sentence regarding seeking shade “further under a source” difficult to understand. After discussion, there was a possibility of rewording it to seeking shade when no blue sky is visible; however, most participants believed the first sentence would be simple and easily understood.	

Pre-workshop	Workshop revisions
Wear protective clothing: a hat with a wide brim all around it and long-sleeved shirts and pants or long skirts made of tightly woven fabric.	Wear a hat and clothing that covers as much skin as possible, as appropriate to the activity and weather.
Discussion revolved around potential unrealistic expectations of the public for protective clothing. In particular, some participants were concerned that the public would not consider wearing long-sleeved shirts or pants in hot weather. As well, there was some concern about neglecting the protective clothing option for the winter months if the UV Index is greater than 3.	

Pre-workshop	Workshop revisions
Don't use tanning beds or deliberately try to get a suntan, and avoid getting a sunburn.	Don't use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.
Participants were largely in agreement with the draft; however, they stated that the importance of discouraging use of all forms of UV tanning equipment, not just tanning beds.	

Pre-workshop	Workshop revisions
<p>Seek Shade</p> <ul style="list-style-type: none"> • Good quality shade includes dense vegetation and covered structures that offer protection from the side, and not just overhead, to protect against reflected UVR. • As a general guide, the protection factor under a shaded area increases as the amount of visible bright sky decreases—so further under the source of shade, protection is better. • Cloth sources of shade, such as canopies and umbrellas, should have tightly woven fabric. • Additional personal protection (protective clothing, sunglasses, sunscreen) may still be needed under shade to protect against reflected sunlight, especially on high UV Index days or around highly reflective surfaces. 	<p>Seek Shade</p> <ul style="list-style-type: none"> • Good quality shade includes dense vegetation and covered structures that offer protection from the side, and not just overhead, to protect against scattered UVR. • As a general guide, the protection factor under a shaded area increases as the amount of visible bright sky decreases—so further under the source of shade, protection is better. • Cloth sources of shade, such as canopies and umbrellas, should have tightly woven fabric. • Additional personal protection (protective clothing, sunglasses, and sunscreen) is recommended under shade to protect against reflected sunlight, especially on high UV Index days
<p>The main concern was the technical wording about reflective surface and reflected UVR. As well, it was stated that that reflected UVR was not as much of a concern compared to scattered UVR.</p>	

Pre-workshop	Workshop revisions
<p>Wear protective clothing</p> <ul style="list-style-type: none"> • Hats should shade the head, face, ears and back of the neck with a wide brim. • In general, clothing provides better protection than sunscreen. 	<p>Wear protective clothing</p> <ul style="list-style-type: none"> • Hats should shade the head, face, ears and back of the neck with a wide brim. • In general, clothing provides better protection than sunscreen. • Tightly woven or UV protective labelled clothing is recommended.
<p>There was agreement with the original version. Participants found it useful to mention and encourage the use of UV protective labelled clothing. This stemmed from the discussion around UVA/UVB labelled sunglasses during Dr. Chou’s presentation.</p>	

Workshop dotmocracy voting results based on revisions

Revised statement	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
Seek shade or bring your own.	23				23
Wear a hat and clothing that covers as much skin as possible, as appropriate to the activity and weather.	22				22

Revised statement	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
Don't use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.	21	2			23
Seek Shade <ul style="list-style-type: none"> • Good quality shade includes dense vegetation and covered structures that offer protection from the side, and not just overhead, to protect against scattered UVR. • As a general guide, the protection factor under a shaded area increases as the amount of visible bright sky decreases—so further under the source of shade, protection is better. • Cloth sources of shade, such as canopies and umbrellas, should have tightly woven fabric. • Additional personal protection (protective clothing, sunglasses, and sunscreen) is recommended under shade to protect against reflected sunlight, especially on high UV Index days 	21	3			24
Wear protective clothing <ul style="list-style-type: none"> • Hats should shade the head, face, ears and back of the neck with a wide brim. • In general, clothing provides better protection than sunscreen. • Tightly woven or UV protective labelled clothing is recommended. 	20	2			22

Ranking, clustering, priorities for messages

The facilitators introduced the possible need to prioritize statements. They described different factors to consider when prioritizing messages for communication: audience, populations at greater risk, level of evidence, significant risk factors, sources of confusion or misinformation and current awareness of specific issues. There was concern among participants about why the statements needed to be ranked. In particular, some participants felt that ranking would be determined by other criteria such as audience, organization that disseminates the message or political priorities. In addition, it was difficult to interpret each statement independently as there was a logical flow among the statements. Participants agreed that they would not undertake ranking of the statements.

Next steps

The participants had many ideas for future work. The group wanted a document with the rationale, definitions, and references for the statements. The group believed that sending such a document to various organizational CEOs, national networks (e.g., health action lobby, melanoma network), and other health professionals would be helpful. Another recommendation was to submit the process of the consensus workshop as an abstract or webinar to inform and aid others.

A number of participants indicated a willingness to endorse the messages through their contacts and networks.

Post-workshop survey

The post-workshop survey served as a follow-up to the discussions at the March 12, 2015 consensus workshop.

The primary objective of the post-workshop survey was to provide the opportunity for consensus participants to specify minor revisions or additions that could be made to enhance the content for the statements where more than three dotmocracy votes at the consensus workshop indicated the position "Has some issues but can accept and support." Content items with better agreement were not included in the post-workshop survey.

Overall, there was a high level of agreement for the revisions of the content at the workshop. All participants indicated that they could support the content developed at the workshop with the exceptions of the eye protection content and the statement, "Whenever possible, plan outdoor activities for before 11:00 a.m. or after 3:00 p.m., between April and September."

The post-workshop survey provided new eye protection content for feedback, which was developed following the workshop by the participants with a role in promoting eye health. Slight revisions were made to a few of the other messages following the workshop based on post-workshop discussions with participants who joined by phone and were somewhat limited in their ability to contribute to discussions. The Steering Committee reviewed the content changes and provided advice prior to circulating to participants for the survey.

The tally for the post-workshop survey were as follows:

	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
When the UV Index is 3 or higher protect your skin as much as possible. In general, in Canada, the UV Index is 3 or higher from 11:00 a.m. to 3:00 p.m. between April and September. The UV Index can be 3 or higher even when it's cloudy.	12	5			17
Whenever possible, plan outdoor activities for before 11:00 a.m. or after 3:00 p.m., between April and September.	14	2		1	17
Additional details for shade	16	1			17

	Is in full agreement and full support	Has some issues but can accept and support	Will not accept but will not oppose	Will not accept and will actively oppose	Total
Additional details for sunscreen	15	2			17
Use sources of vitamin D that are safer than UVR exposure, e.g., dietary sources, fortified foods and vitamin D supplements.	12	5			17
Intentional UVR exposure to meet vitamin D requirements is not recommended. UVR exposure from the sun and tanning beds is not a reliable source of vitamin D.	12	3		2	17
Wear sunglasses or eyeglasses with UV-protective lenses when outdoors from morning to evening, all year round, even when it's cloudy.	13	1	2	1	17
Additional details for eye protection	15	2			17

In the follow-up survey to confirm the wording from the workshop, there was therefore a high degree of acceptance and support. Only three statements in the content set were indicated as not accepted, and no more than two consensus participants indicated this position for any one statement. The National Steering Committee reviewed the comments describing the reason for disagreements and changes were integrated into the final set of content with confirmation from the consensus participants.

As a final step, the steering committee elected to undertake further review of the primary statement on eye protection through one additional brief survey among consensus participants. However, the survey was not able to identify a resolution on details describing when to wear eye protection. This was primarily due to imprecision in the science and difficulty in making practical recommendations. As a result, the steering committee moved these details to secondary levels of content, which were not the primary focus for achieving consensus.

4. Rationale for the Recommended Protective Action Statements

Enjoy the sun safely: Protect your skin, protect your eyes.

Enjoy the sun safely

This statement is based on feedback from the health promotion field and recommendations from the National Institute for Health and Care Excellence (NICE) UK⁶⁶ and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) UVI Working Group⁶⁷ to acknowledge the sense of well-being individuals experience when outdoors and to ensure that sun protection messages do not conflict with physical activity messages. Evidence suggests that increased outdoor time, among children and youth in particular, is associated with increased physical activity.^{68,69}

Protect your skin

Ultraviolet radiation (UVR) from the sun and UVR-emitting tanning devices has been classified as carcinogenic to humans by the International Agency for Research on Cancer (IARC):

- Solar UVR causes melanoma, and basal and squamous cell carcinoma.¹
- UVR-emitting tanning devices cause melanoma.¹

UVB also appears to reduce the effectiveness of the immune system in fighting viral infections (e.g., herpes simplex, human papillomavirus).⁷⁰

Protect your eyes

There is sufficient evidence that UVR-emitting tanning devices are a cause of some forms of ocular melanoma, although the evidence is limited for solar UVR.¹ Chronic exposure to UVR is a risk factor for several other eye-related disorders, including cortical cataracts and pterygium.^{37,38} Acute exposure to UVR can also cause photokeratitis, photoconjunctivitis and retinal burns (e.g., from looking directly at the sun).³⁹ Age-related macular degeneration is likely related to exposure to the visible light portion of sunlight, specifically the blue light range.²

When the UV Index is 3 or higher, protect your skin as much as possible. In general, the UV Index in Canada can be 3 or higher from 11 a.m. to 3 p.m. between April and September, even when it's cloudy.

When the UV Index is 3 or higher, protect your skin as much as possible.

Environment Canada developed the UV Index and issued the first forecasts in 1992.²³ In 1994, the World Meteorological Organization and the World Health Organization adopted the index as an international standard and updated it to the current 11-point scale.²² The UV Index ranges from 0 (low intensity, usually at night) to 11+ (extreme intensity, usually at solar noon on a clear summer day at the Earth's northern mid-latitudes). The UV Index very rarely exceeds 10 in Canada.¹⁰

The UV Index is based on the erythemal (sunburn) action spectrum and primarily includes the UVB spectrum and a portion of the UVA spectrum. The minimal erythema dose (MED) is the

measure of the minimum dose of UVR to produce a just-noticeable erythema on previously unexposed skin. The MED varies by skin type, sensitivity to UVR and time. When the UV Index is 3, the first sign of erythema, or 1 MED, occurs after 44.4 minutes for skin type I, the most sensitive skin type (e.g., fair skin and burns easily) and about 56 minutes of exposure for skin type II. When the UV Index is 10, erythema occurs after 13 minutes for skin type I and 17 minutes for skin type II.^{10,71}

In general, the UV Index in Canada can be 3 or higher from 11 a.m. to 3 p.m. between April and September, even when it's cloudy.

The strength of the burning rays of the sun, which is what the UV Index measures, is greatest around solar noon on a clear day in the summer. The UV Index remains strong, at a value of 3 or higher, from about 10 a.m. to 2 p.m. local solar time (approximately 11 a.m. to 3 p.m. during daylight savings time) from April to September in Canada. While UV Index declines with latitude, the differences between Toronto (44 N) and Edmonton (54 N) are not very large.⁹ One message should work for most of the country.

The ICNIRP UVI Working Group has recommended using a single sun protection message to coincide with times when the UV Index is 3 and above, and to indicate times of day when sun protection is recommended.⁶⁷

Partly cloudy skies will either magnify or mitigate UVR, depending on the pattern of cloud cover and the sun's relative position,²⁴ while uniform cloud cover reduces UVR in relation to its thickness.²⁵

- Seek shade or bring your own (e.g., an umbrella).
- Wear clothing and a wide-brimmed hat that cover as much skin as possible, as appropriate to the activity and weather.
- Use sunscreen labelled "broad spectrum" and "water-resistant" with a sun protection factor (SPF) of at least 30, on skin not covered by clothing. Apply sunscreen generously and reapply when required.

- **Seek shade or bring your own.**
- **Wear clothing that covers as much skin as possible and a wide-brimmed hat that are appropriate to the activity and weather.**

Reported use of shade and protective clothing, as well as avoidance of midday sun exposure, is more strongly related to reduced risk of sunburn than sunscreen use.^{29,72,73} Research has measured substantially higher levels of protection with clothing compared to sunscreen.^{16,17} Shade and clothing can provide broader and more visible coverage than sunscreen.

- **Use sunscreen labelled "broad spectrum" and "water-resistant" with an SPF of at least 30 on skin not covered by clothing. Apply sunscreen generously and reapply when required.**

Evidence for improved outcomes with sunscreen use is not as strong as for shade, which may be in part due to typically inadequate sunscreen application patterns. Therefore, shade and clothing appear before sunscreen in the action statements because they are considered better UVR-protection options.

The effectiveness of sunscreens labelled “broad spectrum” (filtering UVA and UVB) are determined by laboratory tests.¹⁹ Water-resistant sunscreen is recommended to reduce the amount removed through perspiration and swimming. Sunscreens labelled “water resistant” in Canada must continue to provide protection for at least 40 minutes in water.¹⁹

SPF 15 is the minimum accepted protection level for sunscreens in Canada, based on Health Canada regulations. Laboratory tests also show that sunscreen with an SPF of 15 filters 93.33 percent of UVB, while an SPF of 30 filters 96.67 percent.⁴³ SPF testing to determine the labelled value is based on an application of 2 mg/cm². However, tests of volunteers reporting sunscreen use in community settings show that application densities typically range from 0.5 mg/cm² to 1.3 mg/cm²—substantially less than the recommended amount. Therefore, a minimum SPF of 30 is recommended for use by the public.⁵²

Reapplication after two hours is not included as a recommendation because research has measured only a 25 percent reduction in SPF after a day without physical activity or UV exposure,⁵⁵ and even after eight hours on a day with physical activity and bathing, 43 percent of the initial protective effect of sunscreen was still present.²⁰

Don't use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.

UVR from the sun and UVR-emitting tanning devices has been classified as carcinogenic to humans by the IARC. UVR-emitting tanning devices cause melanoma.¹

Wear sunglasses or prescription eyeglasses with UV-protective lenses.

Modern sunglass and prescription eyeglass lens materials commonly available, including polyurethanes (mid- to high-index plastics), polycarbonate and CR39 with UV blocking dye (UV400), provide UVR protection.

Wear a wide-brimmed hat for added eye protection.

Hats provide additional eye protection when worn in conjunction with eyewear, especially when eyewear does not cover the peripheral areas of the eyes.

Check the daily forecast for the UV Index and protect your skin accordingly.

The UV Index provides more detailed guidance on the level of protection required on a given day. The UV Index can reach up to 10 in Canada and higher in other parts of the world. The higher the UV Index value, the more protection is needed.

However, information on the UV Index is not always accessible throughout the day and real-time values may differ from forecasted values. Therefore this recommendation is listed as an additional recommended protective action statement.

Between April and September, whenever possible, plan outdoor activities for before 11 a.m. or after 3 p.m.

Outdoor activities can involve extended time outdoors (e.g., gardening, athletic events, outdoor work). Avoiding the sun during peak times for the UV Index provides the most reliable and comprehensive protection, but recognizing that avoidance is not always practical, this recommendation is given as an additional one for consideration.

This recommendation is also consistent with many existing occupational health and safety and physical activity recommendations that highlight the need to avoid heat exhaustion.

Use sources of vitamin D that are safer than UVR exposure, e.g., dietary sources, including fortified foods, and vitamin D supplements. Intentional UVR exposure to meet vitamin D requirements is not recommended.

Although UVB exposure can increase vitamin D levels, the science has not established a safe level of exposure in terms of health risk. This recommendation to not use UVR exposure for obtaining vitamin D is consistent with Health Canada's recommendation, which is based on an extensive review by the Institute of Medicine.⁷⁴

5. Key Points to Communicate about the Recommended Protective Action Statements

Enjoy the sun safely: Protect your skin, protect your eyes.

- There are benefits to being outdoors, including increased likelihood of physical activity, and time outdoors should not be discouraged.
- Sun safety means protecting the skin and the eyes.

When the UV Index is 3 or higher, protect your skin as much as possible. In general, the UV Index in Canada can be 3 or higher from 11 a.m. to 3 p.m. between April and September, even when it's cloudy.

- Skin protection is needed when the UV Index is 3 or higher.
- The peak times, related to the UV Index, are from 11 a.m. to 3 p.m. between April and September in Canada, based on average UV Index values that have been measured by Environment Canada.
- Cloud cover does not typically provide protection.
- The best form of sun protection may not always be practical (which is what is meant by "as much as possible"), but using some protection is better than using none.

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- Seek shade or bring your own (e.g., an umbrella).
 - Wear clothing and a wide-brimmed hat that cover as much skin as possible, as appropriate to the activity and weather.
 - Use sunscreen labelled "broad spectrum" and "water-resistant" with a sun protection factor (SPF) of at least 30, on skin not covered by clothing. Apply sunscreen generously and reapply when required.

- Shade is the most preferable form of protection, which is why it is listed first in the protective action statements, and includes shaded surroundings and personal sources of shade. It offers the greatest potential for comprehensive protection.
- For personal protection, hats and clothing are preferred to sunscreen.
- Full coverage from hats and clothing may not always be practical, especially in extreme heat conditions or during certain types of activities.
- The recommended SPF of at least 30 is increased from previous messages recommending an SPF of 15.
- A sufficient quantity of sunscreen is required to achieve adequate protection, which is significantly more than what is typically applied.
- Reapplication is needed in certain situations as identified in the Tips for Implementing Primary Protective Actions section.

Don't use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.

- These activities involve excessive exposure to UV radiation (UVR) and should be discouraged.

Wear sunglasses or prescription eyeglasses with UV-protective lenses.

- The majority of sunglasses and prescription eyeglasses sold in Canada that indicate they have UV-protective lenses provide acceptable protection.

Wear a wide-brimmed hat for added eye protection.

- Wide-brimmed hats also provide eye protection, especially for the sides of the eyes if not wearing wraparound sunglasses.

Check the daily forecast for the UV Index and protect your skin accordingly.

- The daily forecast for the UV Index will provide more specific information on the level of required skin protection.

Between April and September, whenever possible, plan outdoor activities for before 11 a.m. or after 3 p.m.

- Planning outdoor activities earlier in the morning or later in the afternoon (i.e., before 11 a.m. or after 3 p.m. between April and September) is recommended whenever possible.
- If avoiding outdoor activity in the midday sun is not possible, other protective actions (shade, clothing, sunscreen and sunglasses) are recommended.

Use sources of vitamin D that are safer than UVR exposure, e.g., dietary sources, including fortified foods, and vitamin D supplements. Intentional UVR exposure to meet vitamin D requirements is not recommended.

- UVR exposure from the sun or from tanning equipment is not a safe way to meet vitamin D requirements.
- Examples of safer ways to meet vitamin D requirements are through diet, including fortified foods, and supplements.
- Since there is substantial variation in vitamin D levels and needs, each individual should consult trusted sources of advice to determine his or her specific vitamin D requirements. Such advice is beyond the scope of these recommendations for protecting against the harms of UVR exposure.

6. Conclusion and implications

The consensus process was well received and a high degree of agreement on the resulting content was achieved. The process benefitted from interdisciplinary discussions and a phased approach to developing the content. The resulting recommended core content helps organizations with a role in promoting sun safety in Canada to form a common understanding of what is needed for effective sun protection. A key next step is adapting the agreed-upon content to tailor messages for target audiences, including priority subpopulations, and community-wide campaigns. Most workshop attendees expressed interest in continuing to be involved in the development of public education messages.

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- Ben Giddens, Optometrist, Canadian Association of Optometrists, National Public Education Committee
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