The ABCs of Sun Protection for Children

Maryellen Maguire-Eisen
Karen Rothman
Marie France Demierre

Excessive sun exposure in childhood is a critical variable influencing skin cancer risk. Nurses must teach parents how to properly protect their children from excessive sun exposures by demystifying UV radiation and teaching proper sun-protection measures. Protecting children from excessive sun exposure, while not curtailing recreation, should be the goal of all nurses caring for children.

Skin cancer is the most prevalent cancer in our society with over 1 million new cases annually. Skin cancer is becoming more common in children and accounts for approximately 4% of pediatric malignancies. It is estimated that 90% of all skin cancers are preventable (Schmidt-Wendtner et al., 2002). This is a staggering statistic when you consider that one American dies every hour from skin cancer. Nurses can play a pivotal role in prevention and early detection of this serious cancer by teaching proper sun protection to children and their parents.

Background
Skin cancers are malignancies that develop in the epidermis, dermis, or the adnexal structures of the skin most often due to overexposure to both natural and artificial sources of ultraviolet light. There are three major types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and melanoma. Anyone can get skin cancer but inherent risk factors are very important (Maguire-Eisen, 2003). Skin color, eye color, freckling tendency, nevi count, and family history increase one’s risk of developing skin cancer. However, the individual’s childhood sun-exposure history appears to significantly influence the risk of skin cancer (Kennedy, Bajdik, Willemze, & Gruijl, 2003; Rhodes, 1995; Silverberg, 2001; Tsao, Atkins, & Sober, 2004). Skin cancers are associated with both intense, sporadic sun exposure (sunburn) and with chronic sun exposure (tanning) (Koh, Geller, Miller, Grossbart, & Lew, 1996).

Objectives
This educational activity is designed for nurses and other health care providers who care for and educate patients regarding sun protection for children. For those wishing to obtain CE credit, an evaluation follows. After studying the information presented in this article, the nurse will be able to:
1. Describe the risk of skin cancer in children.
2. Discuss sun-protection policies recommended for children.
3. List characteristics of sun-protective clothing.
4. Describe the characteristics of sunblocks for protecting children from the sun.

Maryellen Maguire-Eisen, MSN, RN, OCN, is an Oncology Certified Nurse, and Executive Director, Sun Protection Foundation, Hingham, MA.

Karen Rothman, MD, is an Assistant Professor of Medicine and Pediatrics, Division of Dermatology, University of Massachusetts Medical School, Worcester, MA.

Marie France Demierre, MD, FRCP(C), is an Assistant Professor, and Director, Skin Oncology Program, Boston University School of Medicine, Boston, MA.

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and cutaneous melanomas are the most serious health risks.

Sun-Protection Actions

Sun-protection policies recommend avoiding artificial and natural ultraviolet light sources, proper use of sunscreens, and the appropriate use of shade or sun-protection gear (see Table 1) (American Academy of Pediatrics, 1999; Centers for Disease Control [CDC], 2002). However, studies indicate that sun-protection measures are infrequently utilized to prevent sun damage. Sunscreens, hats, sunglasses, and avoiding midday sun are routinely used by less than one-third of children (Banks, Silverman, Schwartz, & Tunnessen, 1992; Hall, McDavid, Jorgenson, & Kraft, 2001; Geller et al., 2002; Olson et al., 1997). Most schools in the United States lack sun-protection policies. The CDC (2002) and the National Association of State Boards of Education (2005) have sample school policies on skin cancer prevention. Recently, states began introducing legislation that addresses skin cancer prevention for children at school. California has led the way in this effort with the ratification of the Billy Bill (CA-SB 310). This bill prevents schools from prohibiting children from wearing sunglasses or hats on campus (Sun Safety for Kids, 2005; William S. Graham Foundation for Melanoma Research, 2005).

Ultraviolet Protection

Ultraviolet radiation varies dramatically both daily and seasonally. Peak readings occur at midday during noon time and seasonally on the Summer solstice, June 21st. UV intensity is higher in May than in August, leading to a high incidence of sunburn in the Spring. Altitude is another important variable to consider, because UV intensity is greater at higher altitudes, increasing by 2% for every 1,000 feet above sea level. Water, sand, and snow create reflective surfaces that increase scatter by 10%, 15%, and 80% respectively (Environmental Protection Agency [EPA], 2004)

Educating parents and teachers how to use the Global UV Index to gauge the potential for sun damage from natural sources is an important way to protect children from excessive exposures to the sun. The UV Index, developed by the National Weather Service and the EPA, is a prediction or estimate of UV intensity and the associated risk of overexposure to human skin. There are sun precautions or actions that correspond to UV intensity levels. These actions include sunglasses, sunscreens, physical protection, and sun avoidance (see Table 2).

Dermatology nurses should be pragmatic regarding limiting midday exposures and outdoor play. Instruct parents that when the UV intensity is high, early morning, late afternoon, or early evening outdoor activities should be planned whenever possible. If midday activities are unavoidable, recommend portable shade including parasols, beach umbrellas, and sun tents, as well as protective clothing and sunblock. They are all practical and easy to employ.

Advising parents about the real risks of indoor tanning is imperative. There is no such thing as a “safe tan” despite advertisements to the contrary. Indoor tanners are at increased risk of developing all forms of skin cancer (Lazovich & Forster, 2005). Legislation forbidding indoor tanning in young teens has been ratified in Wisconsin and Illinois. Many other states are working on bills to protect this population (Lim et al., 2005).

Sun-Protective Clothing

Sun-protective clothing is an excellent way to shield children from ultraviolet radiation exposure. Sun-protective clothing can range
from hats, t-shirts, and sunglasses to specialized garments. Hats can provide shade to the face and neck. Hats with wide brims provide the most protection. Summer clothing usually provides limited protection because of the looseness of weave, ranging from 2 to 6.5 SPF (sun-protection factor). Synthetic materials used in sun-protective garments provide better protection because of the tightness of the weave (Adams, 1999). These specialized garments demonstrate high solar protection in studies despite color or moisture content. Sun-protective clothing is now widely available and can be found at local stores or via the Internet. Coolibar, Sun Precautions, Nozone, and Solartex are some of the retailers that offer these garments for children and adults. The styles are practical and stylish and have become popular with children and adults worldwide. Laundry additives can enhance the sun protection afforded by garments by boosting the SPF in garments. Rit® Sun Guard™ is one commercially available additive available at local drugstore retailers or via the Internet.

Sunglasses are recommended for children of all ages. Appropriate sunglasses should provide broad-spectrum protection with 99% of the ultraviolet rays blocked. Broad spectrum denotes protection against both UVA (longer wavelengths ranging from 320 to 400 nm) and UVB (shorter wavelengths ranging from 280 to 320 nm). Look for sun-

### Table 1. Sun Protection Glossary

<table>
<thead>
<tr>
<th>Sun Term</th>
<th>Definition</th>
<th>Application</th>
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<tbody>
<tr>
<td>UV Intensity</td>
<td>Ultraviolet light intensity is influenced by rotation and revolution of the planet (daily and seasonal variations), proximity to the equator, ozone concentration, altitude, and weather (cloud cover and wind velocity).</td>
<td>Meters are available to measure UVB intensity and the scales may range from 0-15.</td>
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<tr>
<td>Ultraviolet Index</td>
<td>A measure of the risk for sunburn on a given day. Collected via satellite and adjusted for environmental conditions including humidity, wind, and clouds.</td>
<td>Global UV Index ranges from 1-11+ with color coding for risk estimates.</td>
</tr>
<tr>
<td>Sun Protection Factor (SPF)</td>
<td>The ratio of time to develop a sunburn wearing a specific sunscreen as compared to the time to develop a sunburn without a sunscreen. For example, a SPF 15 will provide a person who burns in 10 minutes, 150 minutes of sun protection.</td>
<td>SPF ≥15 is recommended as the minimal strength of sunscreen. One ounce per application is the required dose to achieve the SPF.</td>
</tr>
<tr>
<td>Physical Blockers (non-chemical)</td>
<td>Inorganic compounds that may include titanium dioxide or zinc oxide. New techniques that micronize the inorganic compounds have resulted in improved consumer acceptability.</td>
<td>Work on application and are great for children with sensitive skin.</td>
</tr>
<tr>
<td>Chemical Blockers</td>
<td>Chemical ingredients that may include PABA, PABA derivatives, cinnamates, salicylates, and anthralins. These agents vary in their ability to protect against longer ultraviolet wavelengths.</td>
<td>Higher SPFs may include multiple ingredients to achieve the higher SPF rating.</td>
</tr>
<tr>
<td>Broad Spectrum</td>
<td>Denotes protection against both UVA and UVB radiation.</td>
<td>Degree of protection into UVA spectrum can vary by ingredients.</td>
</tr>
<tr>
<td>Substantivity</td>
<td>The ability for a sunscreen to maintain its SPF rating given exposure to water and adverse conditions. It is classified as either water resistant or very water resistant.</td>
<td>Immediate reapplication of sunscreen after any water exposure or heavy perspiration may further safeguard sun-sensitive individuals against sunburn.</td>
</tr>
<tr>
<td>Water Resistant</td>
<td>Claims that a sunscreen maintains its SPF after two 20-minute water immersions or moderate physical activity.</td>
<td></td>
</tr>
<tr>
<td>Waterproof</td>
<td>Claims that a sunscreen maintains its SPF after 80 minutes of water immersion or extreme physical activity.</td>
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</tbody>
</table>
| Ultraviolet Protection Factor (UPF) | An industry standard for sun-protective garments. It provides a guideline for consumers to evaluate the degree of protection available in a product.                   | Good = 15-24  
Very good = 25-39  
Excellent = 40-50+                                                                                                    |

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DERMATOLOGY NURSING/December 2005/Vol. 17/No. 6 421
glasses that indicate the glass absorbs ultraviolet light up to 400 nm. Sunglasses are an essential component of sun-protection attire and should not be overlooked. They may protect the eyes from ultraviolet damage and help prevent against cataracts, macular degeneration, and ocular melanoma (American Academy of Ophthalmology, 2005).

**Sunblock**

The SPF, spectrum of protection, vehicle, and substantivity (water resistance) should be considered when recommending a sunblock. Sun-protection factor is a concept that parents must understand because it is a measure of protection afforded by sunblocks against ultraviolet B (burning rays) only. The SPF rating is calculated based on the time it takes for the skin to develop minimal erythema (sunburn) with the application of 2 cc/cm² of sunscreen. Minimal erythema or sunburn is the result of overexposure to UVB rays. SPF is not a measure of the potential damage from UVA rays and does not denote protection from the tanning rays. There is no official rating system for UVA protection at this time. A label that specifies broad-spectrum protection is the best indication of UVA protection.

Proper sunscreen application is the only way to achieve the SPF rating indicated by the manufacturer. A consumer must apply one ounce of sunblock per total body application (a handful) for an adult and half ounce for the average child. A SPF 15 sunscreen rating indicates that the protected skin is shielded from UVB radiation for 15 times longer than unprotected skin. On a day with high UV intensity (>6) a person with pale skin would burn in an average of 10 minutes. Therefore, a SPF 15 sunscreen applied in the appropriate dose would protect the individual for approximately 150 minutes, provided there isn’t any heavy perspiration or prolonged water submersion. However, because most consumers apply a sub-therapeutic does of sunblock there is a resulting relative lowering of the sun-protection factor. For example, when a parent applies 25% of the recommended does of a SPF 15 sunblock instead of the correct dose, the sunblock protection approximates a SPF 4.

**Table 2.**

<table>
<thead>
<tr>
<th>Global UV Index</th>
<th>Rating</th>
<th>Recommended Precautions</th>
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<tbody>
<tr>
<td>1-2</td>
<td>Low</td>
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<tr>
<td>3-5</td>
<td>Moderate</td>
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<tr>
<td>6-7</td>
<td>High</td>
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<tr>
<td>8-10</td>
<td>Very High</td>
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</tr>
<tr>
<td>11+</td>
<td>Extreme</td>
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**Table 3.**

Appropriate Sunblock Application

1. Know when to protect yourself: Apply sunblock when the UV Intensity is >2.
2. Use an adequate SPF: Use a SPF ≥15 for limited exposures and SPF ≥30 for prolonged or intense exposures.
3. Wear the right sunblock: Wear broad-spectrum sunblocks that protect against UVA and UVB exposures. Ingredients that include titanium dioxide, zinc oxide, or Parsol 1689 provide excellent broad spectrum protection.
4. Wear the proper dose of sunblock: Sunblock is to be applied thickly; adults require one ounce (a handful) per application and children require half ounce.
5. Don’t forget difficult sites: Write BEENS on your sunblock bottle to remind you to apply to Back of knees, Ears, Eye area, Neck, Scalp. Apply sunblock before going outside to insure protection and to cover border areas (under straps/waistbands).
6. Don’t forget to reapply: Reapplication is recommended every 2 hours during prolonged exposures or after swimming or heavy perspiration.
7. SUNBLOCK SHOULD NOT BE USED TO INCREASE UV EXPOSURE TIMES.
Nurses should recommend sun-blocks with a broad spectrum of protection (UVB/UVA), in a cosmetically appealing vehicle, with a waterproof or water-resistant rating. Water resistant denotes a longer period of protection than waterproof. Waterproof claims indicate that a sunscreen maintains its SPF after two 20-minute water immersions or moderate physical activity. Water resistant claims indicate that a sunscreen maintains its SPF after 80 minutes of water immersion or extreme physical activity.

Titanium dioxide, zinc oxide, or Avobenzone (Parsol 1789), a PABA derivative, provide excellent broad-spectrum protection. Sunblocks should be applied 30 minutes before sun exposure and reapplied every 2 hours or after swimming or heavy perspiration. Although spray sunblocks are appealing due to the ease of application, their coverage is often inadequate due to difficulty in judging dosing and thickness of coverage.

### Table 4. Sun-Protection Curriculums

<table>
<thead>
<tr>
<th>Curriculum</th>
<th>Organization</th>
<th>Grade level</th>
<th>Web Address</th>
<th>Content</th>
<th>Evaluations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn Not 2 Burn™</td>
<td>Sun Protection Foundation</td>
<td>Pre-school to grade 12</td>
<td><a href="http://www.sunprotectionfoundation.org">www.sunprotectionfoundation.org</a></td>
<td>Lesson plan includes learning objectives, strategies, and resources for providing an interactive classroom lessons.</td>
<td>In process</td>
</tr>
<tr>
<td>National Science Olympiad</td>
<td>Centers for Disease Control</td>
<td>Middle and high school</td>
<td><a href="http://www.cdc.gov/excute/skincancer/index.htm">www.cdc.gov/excute/skincancer/index.htm</a></td>
<td>Skin cancer module designed to prepare students for Olympiad. Other applications for health education included.</td>
<td></td>
</tr>
<tr>
<td>Skin Check</td>
<td>Melanoma Education Foundation</td>
<td>High school</td>
<td><a href="http://www.skincheck.com/mef_page_4.htm">www.skincheck.com/mef_page_4.htm</a></td>
<td>Sunspots, a 16 minute videotape, training session on site for health educators. Quiz questions, supplementary info for teachers</td>
<td></td>
</tr>
<tr>
<td>Sun Safe Project</td>
<td>The Norris Cotton Cancer Center at Dartmouth-Hitchcock Medical Center</td>
<td>NA</td>
<td><a href="http://www.dartmouth.edu/dms/sunsafe">www.dartmouth.edu/dms/sunsafe</a></td>
<td>Downloadable educational materials for teachers, nurses, and parents.</td>
<td>Grant-Petersson, Dietrich, Sox et al. (1999)</td>
</tr>
<tr>
<td>Sunny Days Health Ways</td>
<td>AMC Cancer Research Center</td>
<td>Kindergarten through grade 5</td>
<td><a href="http://www.sdhw.info">www.sdhw.info</a></td>
<td>CD-Rom provides a comprehensive curriculum with lesson plans, student activities, and assessments.</td>
<td>Buller, Hall, Powers et al. (1999)</td>
</tr>
</tbody>
</table>
application and are not recommended. Because sunblocks work by reflecting or absorbing ultraviolet radiation, they are broken down or depleted more quickly on a high UV intensity day. A higher SPF or more frequent application is advisable on a very high or extreme UV day (see Table 3).

**Sun-Safety Education**

School nurses must take responsibility for protecting children from excessive amounts of ultraviolet radiation at school. There are many wonderful sun-safety educational curriculums that have been developed for preschool through high school. They can be easily implemented to teach sun safety (see Table 4). Experts in the field of education and health care have collaborated to create fun and informative programs that teach sun protection to children and early detection of skin cancer to adolescents. Many of these programs are available free of cost, and can be adapted or modified for application in the community. Although the best curriculum is the one that results in both improved knowledge and sun-protective practices, it is important to remember that repeated health messages are necessary to promote behavior change.

**Conclusion**

Sun protection is the responsibility of both parents and nurses. We can no longer think of sunburn or sun damage as a minor health problem for children but rather as permanent genetic damage. Many parents do not know how to adequately protect their children from excessive ultraviolet radiation. Well-
informed nurses are invaluable in teaching parents effective sun protection. Sun-safety education must be taught with a common sense approach. With proper guidance and support from nurses, parents should be able to protect their children from overexposure to the sun’s dangerous rays without it affecting their children’s quality of life or dampening their enjoyment of recreational activities.

References


**Answer/Evaluation Form**

**The ABCs of Sun Protection for Children**

This test may be copied for use by others.

**COMPLETE THE FOLLOWING:**

Name: __________________________________________

Address: ________________________________________

City: __________________________ State: _______ Zip: __________

Preferred telephone: (Home) ____________________ (Work) ________________

CE application fee: DNA member $10.00 Nonmember $15.00

1. If you could imagine that you have fully implemented what you learned from this activity into practice, what would be different?

________________________________________________________________________________________________
________________________________________________________________________________________________
________________________________________________________________________________________________

**Evaluation**

2. By completing this offering, I am able to meet the stated objectives.
   a. Describe the risk of skin cancer in children.  
   b. Discuss sun-protection policies recommended for children.
   c. List characteristics of sun-protective clothing.
   d. Describe the characteristics of sunblocks for protecting children from the sun.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
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3. The content was current and relevant.
4. The content was presented clearly.
5. The content was covered adequately.
6. I am more confident of my abilities since completing this material.
7. The material was (check one) □ new, □ review for me

Comments ____________________________________________

________________________________________________________________________________________________

8. Time required to complete reading assignment: __________ minutes

9. I verify that I have completed this activity ____________________________________________

Signature ________________________________________

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