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Alternatives to CFC-Containing MDIs

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Introduction

Canada is in the midst of switching the propellants used in metered-dose inhalers from chlorofluorocarbons (CFCs) to hydrofluoroalkanes (HFAs) to help rescue the depleting ozone layer. During the transition period, pharmacists will play a vital role in ensuring the changeover is smooth and patients are fully informed. This paper will help the practitioner in preparing for the switchover. It outlines the historical, environmental and health reasons behind this change. The differences between the two propellants and their respective formulations will be discussed, a list of therapeutic alternatives will be presented and a series of 'frequently asked questions' provided.

The Ozone Layer

The ozone layer is a layer of gas found in the earth's stratosphere. Ozone is beneficial to human health in that it absorbs harmful ultraviolet (UV) rays from the sun. However, in recent years the ozone layer has become so depleted by various factors, including the release of industrial chemicals into the environment, that we are losing the benefits it provides us. The impact on human health is demonstrated by an increase in skin cancers, eye damage and potentially, a weakening of the immune system.¹

Table 1. Health Canada timelines for the elimination of CFC-containing products

Drug	Action	Effective Date
Nasal products	Prohibit sale of CFC-containing nasal sprays	July 1, 2002
Salbutamol	Stop production and importation of CFC-containing MDIs	July 1, 2002
Salbutamol	Prohibit sale of CFC-containing MDIs	January 1, 2003
Corticosteroids	Stop production and importation of CFC-containing MDIs	January 1, 2004
All others	Stop production and importation of CFC-containing MDIs	January 1, 2005

Chlorofluorocarbons (CFCs) and The Montreal Protocol

Scientists believe that by stopping the use of ozone-depleting chemicals, the ozone layer will recover.¹ CFC use is one of the major culprits of ozone depletion.¹ Therefore, in 1996, Canada and other developed nations agreed to cease the production and importation of CFCs under a treaty called the Montreal Protocol.² Metered-dose inhalers (MDIs), which use CFCs as propellants, were granted a temporary exemption from the application of this treaty to allow for the development, production and post-marketing surveillance of alternative products. Once alternatives are established, the corresponding CFC-containing inhalers will to be discontinued. This strategy ensures that patients have uninterrupted access to their medications and that stakeholders have a hand in ensuring a smooth transition.²

New Health Canada Phase-Out Schedule

On March 13, 2002, Health Canada released a schedule by which CFC-containing pharmaceuticals are to be eliminated. The phase-out process is being done on a drug-by-drug basis, starting with salbutamol. The dates are presented in Table 1.^{3,4} It is anticipated that by 2005, CFCs will be eliminated from all pharmaceutical products.³

Differences Between HFA and CFC-Containing Inhalers

HFAs are the alternative propellants in the new formulations. HFAs are generally similar to CFCs in terms of patient safety and efficacy, but they are more environmentally-friendly.⁵ Table 2 summarizes some of the physical differences between the two propellants.^{5,6}

The specific differences between the CFC and HFA inhalers depend on the product. The HFA-salbutamol formulation (Airomir) is similar to the corresponding CFC-containing preparation in terms of bioavailability, efficacy, safety and tolerability.⁵ The HFA-fluticasone formulation (Flovent

HFA) has equivalent effects to the CFC-containing product.⁵ In contrast, the HFA-beclomethasone (QVAR) inhaler displays some important differences in terms of safety and tolerability when compared to its CFC-containing counterpart. The HFA-formulation supplies beclomethasone in a smaller particle size, leading to increased drug deposition in the lung and reduced corticosteroid deposition on the back of the throat.⁵ Therefore, the recommended dose of QVAR is approximately one-half the dose of the CFC-based formulation.⁶ In addition, the QVAR inhaler is formulated as a solution and does not require shaking prior to administration.⁶

QVAR and Airomir require priming with four test sprays before first time use and when the inhaler has not been used for more than 14 days.^{6,7} Ventolin HFA and Flovent HFA must be primed before they are used for the first time, and when the inhaler has not been used for more than four weeks and seven days, respectively.^{8,9}

Table 2. General overview of physical differences between CFC and HFA propellants

Parameter	CFC formulation	HFA formulation
Taste	Differs from HFA formulations	Differs from CFC formulations
Spray volume	Higher	Lower
Spray force	Higher	Lower (approx. 1/3)
Spray temperature	Lower	Higher (approx. 30°C)
Delivery of a dose from a nearly empty canister	Erratic	More consistent
Delivery of a dose under variable ambient temperatures	Variable	More consistent (down to -10°C)

PHARMACISTS CAN DOWNLOAD A POWERPOINT PRESENTATION AND A POSTER FROM ENVIRONMENT CANADA'S WEBSITE www.ec.gc.ca/ozone/mdi/profession_e.htm TO FACILITATE THE EDUCATION PROCESS.

Therapeutic Alternatives

Although CFCs are the primary propellants for MDIs used in asthma, the same does not hold true for the nasal sprays. The majority of nasal products are in an aqueous form that utilizes a pump rather than a propellant to deliver doses. Alternatives to CFC-containing inhalers, including dry powder inhalers and other formulations, are presented in Table 3.

Role of the Pharmacist

Pharmacists have an extremely important role during the transition and should be ready to disseminate information to physicians and patients as CFC-containing products are phased out. The next time your patients come in for their inhaler renewal, discuss the changes that will occur. This dialogue will also allow you to review their medications and administration tech-

nique. Important points to remember include:

- ◆ Educating patients about the reasons for, and importance of, the switch. This will facilitate understanding and encourage acceptance during the transition.
- ◆ Discussing the options available to the patient and contacting the prescribing physician for new prescriptions. Note that dosing changes are required with QVAR.⁵

Table 3. Alternatives to CFC-containing inhalers^{10,11}

Drug	CFC-containing inhaler	HFA-containing inhaler	Dry powder inhaler or other option
Inhaled bronchodilators			
Formoterol	Not applicable (N/A)	N/A	Foradil dry powder capsules for inhalation, Oxeze Turbuhaler
Fenoterol	Berotec	N/A	Berotec inhalation solution
Salbutamol	Various	Airomir, Ventolin HFA, Alti-Salbutamol HFA	Ventodisk, Ventolin Rotacaps, oral/inhalation solutions and oral tablets
Salmeterol	Serevent	N/A	Serevent Diskus
Terbutaline	N/A	N/A	Bricanyl Turbuhaler
Ipratropium	Atrovent	N/A	Inhalation solutions
Inhaled corticosteroids			
Beclomethasone	Alti-Beclomethasone	QVAR	N/A
Budesonide	N/A	N/A	Pulmicort Turbuhaler Pulmicort Nebuamps
Fluticasone	Flovent	Flovent HFA	Flovent Diskus
Triamcinolone nasal spray	Nasacort	N/A	Nasacort Aq, various other aqueous nasal sprays
Mast cell stabilizer			
Sodium cromoglycate	Intal	N/A	Intal Spincaps, various inhalation solutions
Combination products			
Salbutamol/ipratropium	Combivent	N/A	Combivent Inhalation Solution
Salmeterol/fluticasone	N/A	Advair Inhaler HFA	Advair Diskus
Formoterol/budesonide	N/A	N/A	Symbicort Turbuhaler

- ◆ If an HFA-containing inhaler will be used, explaining the differences one may expect.

Pharmacists can download a PowerPoint presentation and a poster from Environment Canada's website www.ec.gc.ca/ozone/mdi/profession_e.htm to facilitate the education process.¹⁰

Frequently Asked Patient Questions

- ◆ *The new puffer looks the same as my old one. What is the difference?*

The old puffers used a gas called CFC to propel the medication into your lungs. CFCs are harmful to the environment because they deplete the ozone layer. The new inhaler contains a different propellant that does not harm the environment. As a result, you may notice a few differences between the two inhalers like a different taste and a softer, warmer spray.¹⁰

- ◆ *Am I getting the same amount of medication because the puff feels different with the new HFA-containing inhaler?*

Although the puff from the new inhaler will be softer than the old inhaler, you will receive the same amount of medication. You may also find that the spray from the new inhaler is warmer and tastes different.¹⁰

- ◆ *What if I use a spacer?*

Although not necessary with all formulations, HFA-containing inhalers can be and are recommended to be used with your spacer.⁵

- ◆ *What if I don't want to switch?*

This is understandable if you are doing well on your current inhalers. However, CFCs deplete the ozone layer, and to protect the environment, and ultimately, people's health, CFC-containing inhalers are being phased out. There are different options available. Some medications are available in forms other than the new inhalers. Let your pharmacist and doctor know what you prefer. If you do switch to the new inhaler, be reassured that the new one is just as effective as the old one.¹⁰

- ◆ *Were CFCs dangerous to my health?*

CFCs were never directly harmful to you. They can cause health problems indirectly by depleting the ozone layer. The ozone layer protects you and others from harmful UV rays, which can cause skin cancer and cataracts.⁵ This is the reason CFCs are being eliminated and why you need to switch inhalers.¹⁰

Conclusion

Canada is in the midst of implementing the switch to CFC-free inhalers. Pharmacists play a vital role in ensuring a smooth transition.

Communicating the reason for the change and explaining the differences to expect after switching to a non-CFC product is crucial. Armed with this information, patients will be involved in the decision to switch to alternative products. **CPJ/RPC**

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