The use of a metered dose inhaler (MDI) for an asthma-related condition is common at all levels of fitness training and athletic competition. In most cases, MDIs are used to treat exercise-induced asthma (EIA) or exercise-induced bronchospasm (EIB). There have been reports that more than one-half of elite cross-country skiers\(^1\) and 11% of casual runners\(^2\) have been diagnosed to have EIA or EIB. An MDI delivers medication that permits an athlete with breathing limitations to participate in demanding activities; however, there is potential for misuse and even abuse. The purposes of this report are to identify possible areas of MDI misuse and to discuss the role of the athletic trainer or therapist (AT) in monitoring MDI use, recognizing misuse, and intervening when a dangerous situation exists.

### Misuse of a Prescribed MDI

Asthma medication delivered by an MDI differs from the administration of other types of prescription medication. MDI use generally involves self-determination of the need for administration of medication in response to perceived symptoms during practice or competition, rather than a prescribed schedule for administration of a specific dose of medication at regular intervals. This usage pattern leads athletes to become “self-regulators” of the amount of medication that is ultimately delivered within a given period of time. If the medication is used appropriately, self-regulation can provide maximum benefit, but the MDI delivery mechanism presents the potential for misuse of asthma medication. The imprecise dosage that can result from indiscriminate use of an MDI may lead to less respect for asthma medication than other prescribed medications that are administered in a more precise manner.

Lack of understanding about therapy goals is a common reason for MDI misuse. Asthma medication is prescribed to prevent and treat short-term bronchoconstriction, which results from rapid inhalation of relatively cool, dry air (unconditioned by nasal breathing) during exercise.\(^3\) The incidence of EIA is elevated among cold-weather athletes who tend to inhale cooler and drier air than warm-weather athletes. Many asthmatic athletes have chronically inflamed airways that are susceptible to further irritation during exercise. A key symptom of asthma is shortness of breath, with a musical, wheezing sound that is caused by narrowed airways. Wheezing can be most clearly heard through...
the use of a stethoscope. During an asthmatic attack, the expiratory phase of breathing is often prolonged and labored. Excessive use of accessory neck muscles may be evident, which are recruited to force out air that is trapped in the lungs by the narrowed airways.

Generally, bronchodilators are prescribed to open the airways, whereas steroids are prescribed to reduce inflammation. Albuterol (Proventil®, Ventolin®) is the most frequently prescribed short-term bronchodilator that is delivered by an MDI—often referred to as a rescue inhaler. Rescue inhaler use is appropriately prescribed for asthmatic athletes to prevent or treat bronchoconstriction. Many asthmatics are managed with more than one medication, e.g., a long-term bronchodilator combined with a steroid such as Advair®, which contains both salmeterol and fluticasone. Maintenance or long-term asthma treatment (sometimes in the form of disc inhalers) is not appropriate for use during athletic events. Some bronchodilators (e.g., epinephrine) have strong cardiac effects, an undesired side effect of these medications. Recently developed bronchodilators have a reduced effect on the heart. Use of an asthma medication to achieve cardio-stimulatory effect represents abuse. Asthma medication is not prescribed to enhance athletic performance or to provide a rest opportunity for the athlete.

**Misuse of a Nonprescribed MDI**

A potentially more dangerous situation is the use of an MDI by an individual who has not received a prescription for an asthma medication. Sharing of MDIs among teammates or unauthorized access to a medical kit may be a more prevalent problem than many ATs realize. An athlete may have used an MDI in the past and rationalizes that use of another player’s device is warranted. The use of nonprescribed medication is clearly dangerous. An athlete may be seeking a perceived ergogenic advantage or he or she may be unaware of the specificity of another person’s prescription.

**Proper Use of an MDI**

ATs may assume that an athlete has been instructed in the proper use of an MDI by the prescribing physician. Instruction should include the proper breathing method to maximize distribution of the medication, the use of a spacer, and the best timing for administration (Figure 1). Improper administration technique can compromise the effectiveness of medication delivery. Using the MDI with a spacer (Figure 2) helps to maintain the medication in an aerosol suspension prior to inhalation. Without the use of a spacer, a higher proportion of the medication impacts the oral cavity, without depositing an optimal amount into the lungs. Timing the inhalation with the beginning of a long inspiration

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Here’s what to do:

1. Remove the cap and hold the inhaler upright.
2. Shake the inhaler.
3. Tilt your head back slightly and breathe out.
4. Hold the inhaler as in one of the pictures above. A or B are the most effective, but C is okay for people who are unable to use A or B.
5. Spacers are useful for all patients, especially young children and older adults (see picture B).
6. Press down on the inhaler to release the medicine as you start to breathe in slowly.
7. Breathe in slowly for 3 to 5 seconds.
8. Hold your breath for 10 seconds to allow medicine to go deeply into your lungs.
9. Repeat puffs as directed. Wait 1 minute between puffs to allow the second puff to get into the lungs better.