



Synthetic Turf

Joel Forman, MD, Associate Professor, Department Community and Preventive Medicine, Associate Professor and Vice-Chair for Education Department of Pediatrics, Mount Sinai School of Medicine, New York, NY 10029, USA.

Second generation synthetic turf is an artificial field surface made up of a complex layered structure including a drainage layer, a shock absorbing layer, and a surface layer. The surface layer is composed of plastic blades that simulate grass and ground rubber particle 'infill' that keeps the blades upright while providing a grass-like surface. This system is vastly superior to the original artificial turf design, AstroTurf, which was essentially a spongy carpet on top of a hard backing. AstroTurf was notoriously unpopular with athletes because of its hard surface and increased injuries compared to natural grass fields. Because synthetic turf offers the potential for nearly full-time use and low maintenance, communities have rushed to install many of these fields in schools and parks over the last decade.

As obesity has become epidemic in the United States and the specter of dramatically increased health burdens looms, communities, particularly in urban areas with limited recreation space, have looked for ways to make sports fields more available to the public. Manufacturers of synthetic turf tout advantages like overall lower costs due to reduced maintenance expenses, durability in varied weather conditions, and continuous access. Other advantages may include reduced carbon emissions (no gas powered mowers needed), water conservation (no need to water), and a use for recycled tires (ground up to make the infill).

Unfortunately, synthetic turf comes with a host of established and potential health risks. The most well established risk is excessive heat. These surfaces are dramatically hotter than natural grass fields reaching temperatures of 173 degrees Fahrenheit on a 98 degree day in a University of Missouri study. The propensity for these fields to be very hot raises concerns of burns, dehydration, and heat exhaustion in children using these fields in the summer. In addition, excessive heat may limit the availability of these fields in hot weather and/or require watering to cool the surfaces, partially negating the potential water conservation benefit.

There is also some evidence that the additive effect of many such fields may contribute to the urban heat island effect.

Another significant risk appears to be an increased risk of skin infections from 'turf burns'. These breaks in the skin can become infected, particularly when there are additional risk factors like poor hygiene, sharing of towels and sports equipment, and contaminated therapeutic interventions like whirlpool baths. Several CDC investigations have documented 'turf burns' from second generation synthetic turf fields as a risk factor in clusters of MRSA (methicillin resistant staph aureus) infections.

Finally, there is significant concern about potential toxic exposures from the infill rubber which is often made from recycled tires. This infill can contain potential carcinogens like polycyclic aromatic hydrocarbons (PAHs) as well as toxic metals like lead, chromium, and zinc. Several small studies have documented volatilization of these substances into the air and leaching into water. Infill rubber does not stay on the field and can be found in run-off as well as stuck to the clothing of children who play on these fields. There is very limited research about the extent of human exposures to these toxins and their potential health effects.

Although the desire to improve access to recreational sports fields is clearly well intentioned the risks that accompany synthetic turf need to be carefully considered. Modern natural grass system fields have made substantial advances in the last decade and should be given careful consideration as an alternative to synthetic turf installations. Although such natural grass fields may not offer the full time access that synthetic fields can potentially provide, they have become much more durable, easier to maintain, and more accessible than old natural grass fields and may compare quite favorably in terms of costs. Given the uncertainty of the environmental and health risks associated with synthetic turf, communities should carefully consider all of the alternatives available including modern natural grass systems when they work to improve the availability of sports fields for children.

What can parents do? Parents should insist that their communities, schools, and parks departments carefully consider all of the issues related to synthetic turf and include health risks from synthetic turf, alternatives like advanced modern natural grass fields, and a

balanced cost comparison of the various options in their decision making. When dealing with already installed synthetic turf fields parents should:

- Do not use the turf fields on extremely hot days.
- Be sure to clean and monitor any “turf burns” obtained while playing.
- Attempt to remove all pellets from shoes and clothes prior to leaving the fields.
- At home, shake out your children’s equipment and clothes in the garage or over the garbage.
- Have your child shower and wash thoroughly after playing on the field.