

Risks to Asthma Posed by Indoor Health Care Environments



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A Guide to Identifying
and Reducing
Problematic Exposures



EXECUTIVE SUMMARY

Information garnered from contemporary literature plainly indicates that patients, staff, and visitors to hospitals and clinics can all experience some degree of risk to asthma. In light of the fact that people tend to think of hospitals and clinics as places of sanctuary from suffering and illness, it is astonishing to consider that spending time in a health care facility exposes individuals to health risks. An accumulation of evidence supports the concern that some substances typically utilized or found in health care facilities can be asthmagens (agents that cause asthma *de novo*) or triggers to asthma. The good news is that steps can readily be taken to mitigate risk due to these harmful exposures. This guide focuses on eleven key agents of concern with respect to their properties as potential risk factors for asthma; we then take an extensive look at alternative practices and products that can decrease potential harm.

This guide has been written for a widespread audience interested in the indoor air quality of health care facilities, specifically as related to asthma. It contains both rigorously researched exposure information and practical tools and resources that will promote effective implementation of safer alternatives. Information within this manual will be useful to health care providers, facility administrators, industrial hygienists and others responsible for environmental controls, in addition to the public health community. Outside of the immediate health care sector, individuals, advocates, or coalitions following concerns within health care environments will also find relevant details about commonly encountered agents within facilities and what can be done to reduce or eliminate these exposures.

The prevalence of asthma in children and adolescents has risen by a staggering 25-75% per decade since 1960. While the prevalence of asthma in adults is unclear, asthma induced or significantly exacer-



“Health care facilities should set examples for others by demonstrating practices that are safe for those who spend time for them and sustainable for the environment-at-large.”

bated by work exposures has emerged as the most commonly reported occupational lung condition, and it is estimated that 10-23% of new adult onset asthma in this country is due to occupational exposures. Awareness of these statistics should propel us into action; it is time to ask ourselves how the indoor environment created by individual facilities is contributing to adverse health outcomes.

Ironically, many products that are used in hospitals to keep patients, visitors, and personnel safe from pathogens represent some of the very same products that have some potential to cause or exacerbate asthma in susceptible individuals. We must reconsider the safety of certain practices that have long been believed to generate an established standard of care. Our creativity and commitment are both necessary for the maintenance of high standards as we investigate an array of safer options.

Fortunately, an abundance of information is now available to decision-makers in health care that can facilitate change for an improved indoor environment, and hence, less risk relative to asthma. Although the substances we refer to in this paper are specific to asthma, we should bear in mind that these same materials may pose other germane health concerns. Discussion of these additional risks is beyond the scope of this guide, but such information is widely available.

This document investigates the state of the evidence of chemical and biologic agents commonly encountered in health care facilities that pose a risk of asthma to people who spend time in them, including patients, staff, and visitors. We systematically review databases from three leading resources:

- The Association of Occupational and Environmental Clinics (AOEC)
- The Center for Health and the Environment (CHE)
- The Institute of Medicine (IOM)

Together, these sources comprise a comprehensive assessment of the current understanding of asthma risk within health care facilities. Each database is unique in its investigations and conclusions. The **AOEC** specifically lists occupational

agents that are asthmagens, without referring specifically to a substance's tendency to exacerbate asthma. Their information is explicit to chemicals, biologic agents, and physical hazards found in workplace environments, including hospitals. The **CHE** draws from three major textbooks of environmental medicine and toxicology, in addition to literature reviews, to determine strength of the evidence associating asthma with chemical and biologic agents (though no distinction is made between propensity to cause versus trigger asthma). Their research cuts across workplaces, indoor air, homes, and intrauterine environments, and is not entirely specific to asthma. Finally, the **IOM** report is an analysis of associations between indoor air quality and health problems in non-occupational settings. Also based on extensive reviews of the literature, they review the strength of the evidence associating 26 biological and chemical agents in indoor air with the onset and/or exacerbation of asthma. Where evidence is conflicting or outdated, we have attempted to fill in the gaps with our own review of relevant literature.

The aim of this guide is threefold: 1) to point out that for certain substances common in health care facilities, potential risk of asthma risk is significant; 2) to dem-

onstrate how prompt attention to reduce exposures can be carried out; and 3) to facilitate decision-making within health care institutions. We present a detailed overview of eleven categories of agents:

- Cleaners, disinfectants, sterilants
- Natural rubber latex
- Pesticides
- Volatile organic compounds/
Formaldehyde
- Baking flour
- Acrylics
- Fragrances
- Phthalates
- Environmental tobacco smoke
- Biologic allergens
- Drugs (medicines)

In our discussion of each substance, the following three elements serve as the foundation for our analysis:

1) Scientific evidence of potential to produce harm: The potential to induce or exacerbate asthma is determined from our three chief resources: the AOEC, the CHE, and the IOM, plus additional literature reviews where applicable. Quality of evidence is presented using the language specific to each resource. Table 1 offers a summary of asthma associations with substances of concern as related to strength of the evidence. We have integrated each database's system of

reporting within the table so that readers can compare strength of the evidence among resources.

2) Exposure considerations regarding people in health care facilities:

Individual risks are predicated upon personal susceptibility factors, in addition to the types and degrees of exposure experienced within various areas of specific facilities. Those in closest proximity to the substances, and those who spend more time in certain problematic areas are likely to experience higher risk. Some exposures, such as fragrances and cleaners, are nearly universal, and therefore could affect anyone within a facility. Other exposures are more specific to occupational duties, and may affect those using the substance more exclusively, such as acrylics in orthopedic departments, or baking flour in facility kitchens. Still other materials, such as pesticides, may involve high exposures for those who use them directly, but may still produce some undefined risk to many others at lower levels. Table 2 reveals specific areas within hospitals that can involve exposures for personnel, patients, and visitors. Readers will note that some degree of universal exposure is possible in eight of the eleven categories.

3) Availability of safer materials or processes: Although pointing out potential risk patterns is critical, were it not for the availability of alternatives, little could be done in spite of awareness of the problem. Alternative practices or materials are included as vital components within our discussion of each agent. Each facility must determine the advantages and disadvantages of implementing alternatives within their systems. Some alternatives involve significant policy changes, such as tobacco smoke-free or fragrance-free policies. Others involve modifying substances (for example, using products minus problematic constituents) or practices (such as initiating dirt track-off systems, cleaning by a needs assessment rather than an arbitrary schedule, or switching to digital radiology equipment so that film development—and therefore glutaraldehyde exposure—is eliminated). Each of these methods can substantially decrease or eradicate hazardous exposures. Table 3 is an extensive resource guide to alternatives that can be put into practice to reduce risk of asthma within facilities. Information within Table 3 is presented so that readers can use the guide efficiently and comprehensively when attempting to identify specific concerns.

After reviewing this guide, readers should feel sufficiently informed about asthma risks from exposures within health care institutions, in addition to the breadth of alternatives that could substantially diminish these risks. Because putting these principles into practice can be complicated, we offer a final section on tools for decision making within facilities. We discuss how to assemble a working group, and how such a group might consider exposure information and alternative initiatives. We provide the example of a decision tree as a functional tool to effectively integrate the most relevant information into resolution. Finally, we offer a synopsis of recommendations, based on the amalgamation of our findings with a precautionary approach.

In summary, we recommend implementation of alternatives for the following agents because the evidence of potential harm is strong, the number of exposed individuals is high or low, and alternatives are available for:

- Selected cleaners/disinfectants/sterilants
- Natural rubber latex
- Formaldehyde
- Baking flour
- Acrylics
- Environmental tobacco smoke
- Biologic allergens
- Selected drugs

We recommend thoughtfully considering implementation of alternatives for the following items because, although the evidence to produce harm is limited or inconsistent, the number of exposed individuals can be high, and alternatives are available:

- Pesticides
- Volatile organic compounds
- Fragrances
- Phthalates

For those substances which have not been clearly identified as asthmagens or definite triggers to asthma, but ample concern has been generated by the literature as it relates to pulmonary risk or other health impacts, we suggest a precautionary approach, in which available evidence is combined with a protective attitude on behalf of individuals and ecosystems. Where safer alternatives for individuals and the environment are readily available, implementation of alternatives is an approach that makes sense as a general risk reduction strategy relative to a broad range of potentially affected beings.

Given the abundance of information demonstrated in this guide, it is our intent that readers will experience a meaningful call to action. Those who facilitate positive changes in their facilities by implementing the outlined alternatives will distinguish themselves as practicing health care of a higher order because they have realized that ministering to their own indoor environment is a critical component of health. By raising the standard of care in this way, they will also raise consciousness at a community level, thus sending a more global and inclusive message of care.



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