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A Comprehensive Review of Formaldehyde Exposure Hazards in Gross Anatomy Laboratories

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Abstract

Formaldehyde, an important agent in preserving cadavers in gross anatomy labs, is currently used in large quantities in institutions of higher learning and is a major occupational safety risk to students, instructors, and technical staff. Despite numerous studies having considered the impact of formaldehyde exposure and the associated health conditions, none of the studies have carried out systematic reviews of the literature to comprehensively understand the scope of evidence in terms of institutional activities, regulatory observance, the health implications, and mitigation measures thereof. The current review is a summary of the knowledge of occupational health, toxicology, engineering of ventilation, and medical training, and a detailed review of the risks of exposure to formaldehyde in academic dissection laboratories. The literature shows repeated patterns of the level of exposure, acute and chronic health outcomes, and significant gaps in the implementation of safety over more than two decades. Comparisons between international regulatory norms and empirical compliance rates show that they do not match recommended and actual safety measures, and comparisons of the conventional methods of exposure control with the emergent ones, such as chemical alternatives and mechanical-ventilation innovations, show that those remain uneven in their efficiency. In combination, these results highlight the immediate need to ensure the standardization of safety guidelines and policy change, especially in under-resourced academic environments. Besides providing the synthesis of over-dispersed evidence, the review is also a source of original information on future studies and institutional investigations, as well as a potential course of altering the curriculum in the medical and anatomical sciences.

Keywords: Formaldehyde exposure, Gross anatomy labs, Occupational safety, Ventilation control, Toxicological risk

INTRODUCTION

Formaldehyde is a traditional, important component in gross anatomy rooms, being mostly utilized in the embalming and preservation of cadaveric material. Its effectiveness in maintaining tissue integrity during long periods makes formaldehyde a keystone of anatomical studies and practice of dissection in all medical and related health institutions around the globe (Adamovic et al, 2021; Kawamata and Kodera, 2004). Despite this teaching value, there is increased awareness of the compound toxicological assessment that has raised critical issues on occupational health and safety. In many cases, it is reported that airborne concentrations of formaldehyde exceed recommended levels regularly among students, faculty, and technical individuals (Homwutthiwong & Ongwandee, 2017; Cammalleri et al., 2022; Fustinoni et al., 2021). The fact that it is highly volatile means that its presence will be overwhelming in times of dissection, and that it builds up in areas with poor ventilation enhances the chances of exposure (Dugheri et al., 2020; Castellani et al., 2024).

Extensive documentation of many acute and chronic effects of exposure to formaldehyde mucosal irritation, respiratory distress, and carcinogenic effects, among others, has caused the compound to become a point of regulatory intervention and scientific study (Baan et al., 2009; Protano et al., 2021; Austin et al., 2024). Formaldehyde is ranked as a Group 1 carcinogen by the International Agency for Research on Cancer, which points to the necessity to assess the presence of formaldehyde in educational establishments where exposure to this substance is regular and is frequently inevitable (IARC, 2006). Research also shows that the presence of cumulative negative effects may even be caused by an intermittent, or low exposure, e.g., as experienced in regular dissection classes (Scheepers et al., 2018; Raja & Sultana, 2012).

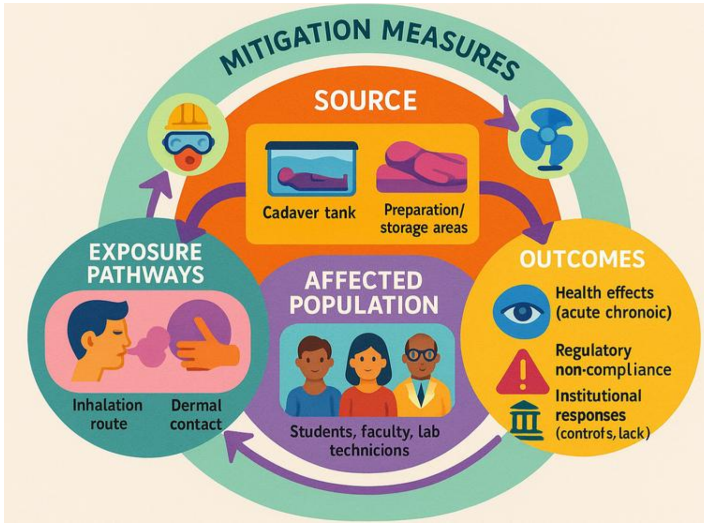

Figure 1: Conceptual Framework of Formaldehyde Exposure Hazards in Gross Anatomy Laboratories. A diagram illustrating the interconnected aspects of formaldehyde exposure, including sources, health outcomes, regulatory standards, and mitigation strategies within academic dissection environments.

A synthesis of hazards involved in formaldehyde exposure in gross anatomy laboratories is given in the current review. It explores existing evidence about normal concentrations of exposure to formaldehyde, health outcomes of both acute and chronic exposure, conformance of institutions with the regulatory standards, and effectiveness of mitigation measures such as engineering measures, as well as alternatives to chemical measures. It is also noted in the review that there are constant gaps in the literature and, more specifically, regarding standardized exposure assessment protocols and long-term epidemiologic studies. Important probes to researching this subject matter remain: What quantified levels of exposure are to be observed in the anatomy labs? What are the documented symptomatic and pathological results of people exposed? So, how are we faring with these strategies in place to mitigate such risks, and what comes with the future pangs of an environment that is safe to dissect? This review has attempted to contribute to institutional policy and practice with the view to guiding new research in the direction of environmentally sustainable and health-aware anatomical education.

FORMALDEHYDE IN GROSS ANATOMY LABORATORIES: SOURCES AND EXPOSURE CONTEXT

Formaldehyde forms a foundation behind gross anatomy laboratories, mainly in terms of embalming/preservation of cadaveric specimens. The compound, mostly used in the formalin form, is a solution containing 37-40 % formaldehyde with water and methanol, which is a powerful preservative and inhibits tissue breakdown and microbial growth (Dubey and Das, 2021; Fustinoni et al., 2021). To deliver the fluid, arterial injection and cavity embalming are used, and off-gassing of residual formaldehyde from the tissues still occurs throughout the preservation. This uninterrupted aerosol questioning leads to the continuous chemical particulate in the laboratory air, especially in such locations close to the dissection tables, such as storage tanks and cadaver storage facilities (Dugheri et al., 2020; Adamović et al., 2021).

The amount of exposure to formaldehyde is also not similar among all, as it depends on ventilation qualities, the rate of touching cadavers, and the structure of the room. Many studies found levels of concentration at levels above recommended occupational exposures indoors. For instance, Raja and Sultana (2012) noted that 0.5-2.0 ppm of formaldehyde were found during active cutting during the dissection process, whereas Homwutthiwong and Ongwandee (2017) found that the concentration of nitrogen in poorly ventilated labs reached 3.1 ppm (Raja and Sultana, 2012; Homwutthiwong and Ongwandee, 2017). Occupational Safety and

Health Administrations (OSHA), the permissible exposure limit (PEL) is the time-weighted average exposure limit of 0.75 ppm as an 8-hour standard (OSHA, 2023), and it is defined as the short-term exposure limit (STEL) 2 ppm in 15 minutes (OSHA, 2023). However, the establishment of such thresholds still exceeds the reported exposure concentrations in many academic institutions, especially those in low-resource countries, especially in the first weeks of operations involving cadavers (Scheepers et al., 2018; Ebojele and Aihie, 2024).

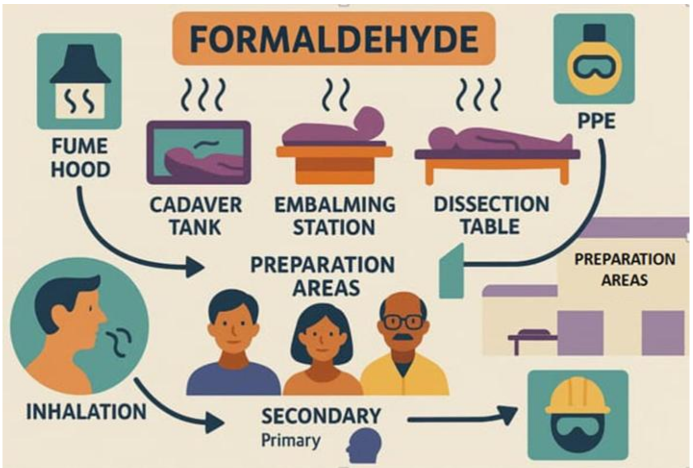

Figure 2: Typical Sources and Exposure Pathways of Formaldehyde in Anatomy Laboratories. A schematic showing the primary and secondary sources of formaldehyde emissions (e.g., cadavers, storage tanks, dissection tables) and common exposure routes (inhalation and dermal absorption) among students and staff.

The anatomy laboratories have complex emission sources. The special currents illustrated in Figure 2 depict that the main source of emission is the cadavers, followed by storage tanks and dissection tables during active procedures. The major form of exposure is usually by inhalation, particularly to those people who work close to the specimen or are involved themselves in handling tissues. The secondary exposure may be made by dermal absorption in case personal protective equipment is still poor or damaged (Mkela et al., 2003; Yamato et al., 2005). Zones of high exposure are usually identical to zones of cadaver preparation, storage rooms, and central dissection tables, where airflow and local exhaust control are limited and local exhaust systems are not maintained (Nacher et al., 2007; Morteza et al., 2013).

Table 1. Reported Formaldehyde Concentrations in Gross Anatomy Laboratory Settings

Laboratory Setting Description	Ventilation Type	Typical Concentration Range (ppm)	Peak Exposure Levels (ppm)
Older labs using natural ventilation and ceiling fans	Minimal or passive	0.5 – 2.5	Up to 3.0+

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Labs with basic mechanical ventilation	Standard exhaust systems	0.2 – 1.5	Around 2.0
Labs with monitored ventilation and localized systems	Advanced local exhaust systems	0.03 – 0.7	Below 1.0
Recently renovated labs with HEPA filters and sensors	High-efficiency air purification	0.01 – 0.2	Below 0.5
Mixed ventilation settings (based on meta-reviews)	Varies across institutions	0.05 – 1.8	Occasionally >2.0

Table 1 has combined a very wide variety of formaldehyde levels in gross anatomy laboratories in a wide variety of countries and institutional environments. These data indicate that environmental design, in particular, the absence/presence of mechanical ventilation systems, has a tremendous effect on exposure. Effectively, high concentrations of airborne formaldehyde are significantly reduced with advanced ventilation and air-purification systems, but non-equipped settings still report high levels of the material (Homwutthiwong and Ongwandee, 2017; Ohmichi et al., 2007; Pfeil et al., 2020; Castellani et al., 2024).

The existing body of evidence demonstrates that, despite the evident necessity of formaldehyde in the process of anatomical preservation, its prevalence and ongoing persistence in gross anatomy departments put it in a complex exposure environment that requires strict monitoring and control. Figure 1 and Table 1 deliver to

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the fore the many-dimensional exposure pathways, though pointing out the relationship between environmental circumstances and the quality of exposure. Laboratories with poor ventilation conditions are registering high levels of formaldehyde, and this strengthens the importance of environmental measures to control the risk of health effects of formaldehyde.

DOCUMENTED HEALTH EFFECTS OF FORMALDEHYDE EXPOSURE

Occupational contact with formaldehyde in gross anatomy courses is always accompanied by a range of negative health effects that goes as far from immediate discomfort to long-term systemic consequences. It has been found that the commonest acute symptoms of exposure include irritation of the eyes, nose and throat, dysphoria, headache, dizziness, cough, nausea, general malaise and they occur mostly among the female students, staff, and laboratory technicians upon entering dissection environment (Austin et al., 2024; Ufelle et al., 2022). They are normally the responses to brief exposure to high doses and what is exacerbated by poor ventilation and close contact with preserved cadavers (Raja & Sultana, 2012; Scheepers et al., 2018).

There are cases of chronic respiratory disease, including asthma, bronchitis, and rhinitis, associated with repeated exposure, mostly among instructors and laboratory technicians whose normal working environment usually involves formaldehyde-contaminated surroundings (Wolkoff & Nielsen, 2010; Bhargava et al., 2021). It is also documented that skin irritation and allergic reactions occur, and this has been indicated to be dermatitis, especially in those handling cadavers who lack proper protective gear (Makela, 2003; Fustinoni, 2021). Changes in several immunological parameters, as well as plasma protein concentrations, suggest that such long-term exposure is accompanied by more billows effects (Ebojele & Aihie, 2024).

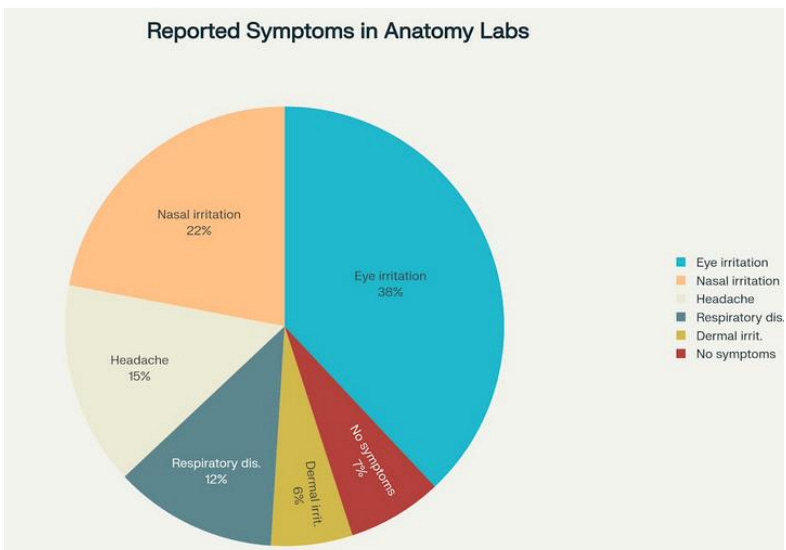

Figure 3: Comparison of Measured Formaldehyde Concentrations Against Global Regulatory Standards. A graph comparing real-world formaldehyde concentrations in gross anatomy labs with recommended exposure limits set by agencies such as OSHA and WHO, highlighting frequent exceedance of safety thresholds.

Importantly, formaldehyde belongs to Group 1 human carcinogens listed by the International Agency for Research on Cancer (IARC, 2006; Baan et al., 2009). The correlation between nasopharyngeal cancer, leukemia, and their presence in the same environment suggests the relevance of occupational safety in academic and clinical anatomy. It has been demonstrated that those with longer exposure times (such as the staff who prepare bodies and embalm them) are at higher risk of such long-term complications than learners (usually intermittent exposure), which tends to be over shorter periods (Adamović et al., 2021; Protano et al., 2021).

The extent and nature of the effects of formaldehyde vary based on concentration, length of exposure, individual sensitivity, and demographic background. School children probably notice direct sensory discomfort, but only long-term workers can notice a continuous discomfort as well as carcinogenic adverse impact on the body in the long run (Raja & Sultana, 2012; Ufelle et al., 2022). A longitudinal study has reflected the cumulative effect of even a low degree of exposure, which is an indication of creating awareness in health investigation and effective environmental management within these laboratories.

Table 2. Health Outcomes Linked to Formaldehyde Exposure in Gross Anatomy Labs

Subject Group	Typical Exposure Duration	Reported Symptoms	Exposure Level Context
Medical students	Short-term (weeks/months)	Eye irritation, headaches, nausea, and throat dryness	Often >0.5 ppm in poorly ventilated labs
Anatomy instructors	Long-term (years)	Chronic cough, asthma, rhinitis, dermatitis	Repeated exposure in cadaver rooms
Lab technicians/embalmers	Daily, prolonged	Respiratory illnesses, skin disorders, carcinogenic risk	High cumulative exposure, especially in prep rooms
General lab workers	Intermittent	Nasal congestion, fatigue, dry skin	Variable, depends on

			proximity to sources
Cadaver handling staff	Frequent direct contact	Dermatitis, chronic irritation, and possible leukemogenic changes	Prolonged direct dermal and inhalation exposure

REGULATORY STANDARDS AND INSTITUTIONAL PRACTICES

Formaldehyde falls under the strict control of various health and occupational safety bodies upon the synthesized realization of its known toxicity and carcinogenicity. The Occupational Safety and Health Administration (OSHA), the World Health Organization (WHO), the National Institute for Occupational Safety and Health (NIOSH), and the American Conference of Governmental Industrial Hygienists (ACGIH) are all institutions that have implemented permissible exposure limits (PELs) to limit health risks in the workplace. OSHA has given a time-weighted limit (TWA) of 0.75 parts per million (ppm) in a workday of 8 hours and a short-term exposure limit (STEL) of 2 ppm in 15 minutes. On the same note, ACGIH and WHO have proposed a ceiling exposure limit of 0.3 ppm and even lower limits in environments where vulnerable groups or cases of chronic exposures are likely to be found.

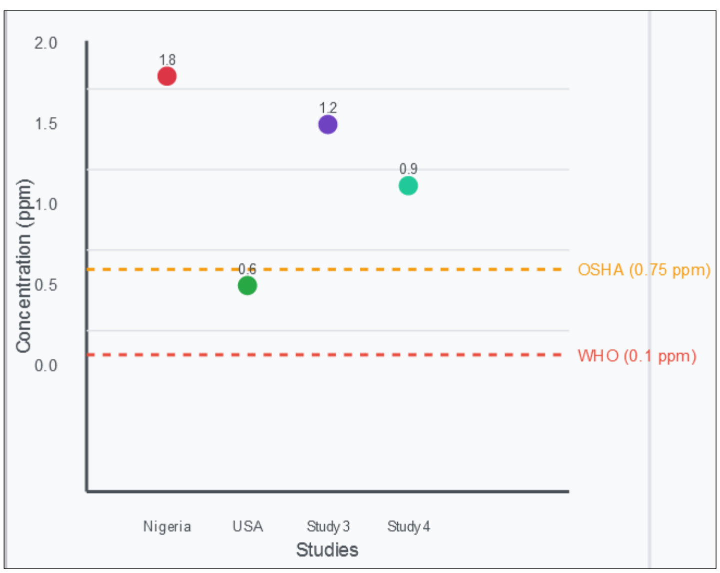

Figure 4: Effectiveness of Mitigation Strategies in Reducing Formaldehyde Exposure. A summary chart showing percentage reductions in airborne formaldehyde concentrations achieved by different intervention strategies, including engineering controls, administrative measures, and alternative fixatives.

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Figure 4 represents a plot comparing actual measured formaldehyde concentrations from different studies against WHO (0.1 ppm) and OSHA (0.75 ppm) limits, showing how real-world exposures often exceed safety guidelines. Although these boundaries are so well defined, there is a wide spectrum of compliance occurring in academic establishments, particularly in the departments of anatomy. Figure 4 shows the distribution of comparative exposure limits established by the regulatory bodies in different parts of the world, which indicates the discrepancy and the agreement on safe formaldehyde levels. Nevertheless, there is other observational evidence and institutional inspection that has shown that the exposure levels in most laboratories of gross anatomy are often higher than the recommended dose, especially during the active periods of dissection or preparation of the cadavers, where emission levels soar with tissue manipulation and weak containment.

Table 3. Compliance Levels and Safety Practices Reported in Institutions

Institution/ Region	Compliance with PELs	Ventilation System Type	PPE Enforcement	Formaldehyde Monitoring	Notes/Audit Findings
North American Medical School	High	Central HVAC with fume hoods	Strict	Quarterly	Fully compliant; regular training conducted
South Asian Anatomy Lab	Moderate	Ceiling fans, open windows	Irregular	Absent	Exposure peaks during summer; poor ventilation
European Teaching Hospital	High	HEPA filters, laminar flow	Strong	Monthly	Advanced engineering controls in place

African University Lab	Low	Natural ventilation only	Inconsistent	None	Lack of funding and formal policies
Southeast Asian Medical College	Moderate	Mixed mechanical/natural	Moderate	Sporadic	PPE available but not uniformly used

In the institutional reviews, obstacles to effective compliance have been formulated. The most important of these involves outdated or inadequate systems of ventilation, the absence of localized exhaust systems, and monitoring of air quality that is less than routine. Some environments lack the motivation to enforce regulatory boundaries, with little display of this kind of comprehension amongst the faculty and the facility management personnel. Moreover, resource-constrained institutions have both economic and infrastructural constraints that fail to allow the use of recommended engineering controls or even the use of sophisticated choices in preservation.

Institutional practices regarding the management of formaldehyde are summarized in Table 3. Modern technology in some anatomy laboratories utilizes the use of air filtering systems, personal protective equipment (PPE) procedures, and the use of formaldehyde audits and other modern planning techniques, but others just use natural air flow ventilation and informal prevention measures. It is also important to note that institutions that carry out formal risk assessment or those that are frequently inspected by safety inspectors have better rates of compliance, supporting the governance and accounts systems' ability to enforce safety requirements.

MITIGATION STRATEGIES AND INNOVATIONS

Considering the abundant scientific evidence of the toxicological profile of formaldehyde, significant efforts have been made in an attempt to reduce the ambient level of this agent in gross anatomy labs. Engineering controls are widely recommended in the present guidelines as the first line of intervention. Precursive efforts such as small canopy hoods and custom-extraction duct work developed in the 1980s and 90s demonstrated that an engineered airflow could lower 8-h time-weighted averages under regulatory thresholds (Edwards & Campbell, 1984; Coleman, 1995; Esswein & Boeniger, 1994). Most recent developments in the field comprise downdraft dissection tables fitted with photocatalytic or adsorption modules, which provide median concentration reductions of 70 % to 85 % (Yamato et al., 2005; Ohmichi et al., 2007; Pfeil et al., 2020). The optimization of the HVAC system to whole-room designs of long-throw nozzles, high-efficiency filters, and real-time feedback sensors allows keeping background levels at less than 0.2 ppm consistently when balanced appropriately (Ogawa et al., 2019; Castellani et al., 2024). These benefits are supported by empirical studies in embalming suites: local exhaust hoods with the use in front of the thoracic cavity during injection also reduce the exposure of the operator significantly (Gressel et al., 2001; Hiipakka et al., 2001).

Administrative controls represent a secondary, cost-effective solution where engineering solutions are limited by the amount of capital or architectural capabilities. The temporal scheduling, including the dissection during off-peak timings, limiting session times, and implementing the rest-airing breaks between classes, often produces 15 to 30 % decreases in peak formaldehyde concentrations, which are caused by reducing occupancy density and driving the dilution (Nacher et al., 2007; Scheepers et al., 2018). To supplement the measures, real-time monitoring systems have been implemented to act as a means of cheap surveillance which, upon beforehand determination of institution-specific threshold values, intercepts when the ambient concentrations are above the defined threshold values and prompts immediate ventilation modifications (Dugheri et al., 2020; Trocquet et al., 2023).

Table 4. Summary of Exposure Mitigation Approaches and Outcomes

Intervention Category	**Specific Measures (examples)**	**Typical Reduction in Airborne Formaldehyde**	**Feasibility / Cost Considerations**
Engineering controls	Local exhaust hoods, downdraft tables, high-efficiency HVAC with HEPA/activated-carbon modules	60–90 %	High initial capital; low operating cost once installed
Administrative controls	Session scheduling, reduced dissection time, and real-time monitoring alerts	15–30 %	Minimal cost; relies on compliance and scheduling flexibility

Chemical approaches	Ethanol/phenoxyethanol fixatives; urea or ammonium carbonate sprays; ozone or photocatalytic units	30–80 % (method-dependent)	Moderate; material costs and potential tissue-quality trade-offs
Biological/passive	Indoor potted plants (Areca palm, etc.)	10–20 % (limited efficacy)	Low; requires maintenance, large plant density
Personal protective equipment	Respirators with CBRN canisters, nitrile gloves, and face shields	>95 % (respirators); variable (glove breakthrough)	Low-to-moderate; hinges on user training and comfort

At the same time, other chemical scavengers and fixatives have been tested. Solutions based on ethanol, the mixtures of phenoxyethanol, and glutaraldehyde-paraformaldehyde hybrids all can reduce the levels of airborne formaldehyde by 50–80% (Kawamata & Kodera, 2004; Kawata et al., 2019; David & Niculescu, 2021). Nonetheless, it is still questions about the properties of handling the tissues, inhibiting microbes, toxicity of using these alternatives. It has been demonstrated that when applied topically onto the surface of cadavers, ammonium carbonate can neutralize the emission of formaldehyde (Kawamata and Kodera 2004), although the only small pilot study to assess this technique available has reported that an experimental non-reproducible effect was obtained when given ammonium carbonate at the doses used (Kawamata et al., 2012). Sprays of urea can also be used to quickly quench any formaldehyde point sources that may appear during teaching activities; Kawata Experiments where biological sinks, most prominently potted Areca palms, are used report smaller 10 to 20 percent airborne increment in aerial removal, results that have been discussed in recent literature that cast doubt on the ability of plants to regulate volatile organic compounds (Cummings & Waring, 2020; Dingle et al., 2000).

Personal protective equipment (PPE) is the last resort, especially where engineering retrofits are out of the question. Air-purifying respirators with chemical-biological-radiological-nuclear (CBRN) cartridge eliminate

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>95 % of inhaled formaldehyde in case of adequate wear of the respirators (Currie et al., 2009; Staack et al., 2021; De Vos et al., 2009). However, glove studies warn that water formaldehyde can penetrate latex gowns in 30 min; thus, the significance of nitrile or chemically strong gloves as well as strictly enforced replacement periods (Makela et al, 2003). Institutional surveys also provide evidence of inconsistency, especially in students who might not consider the risk of exposure sufficiently or feel uncomfortable when using PPE throughout the long term (Ufelle et al., 2022; OSHA, 2023).

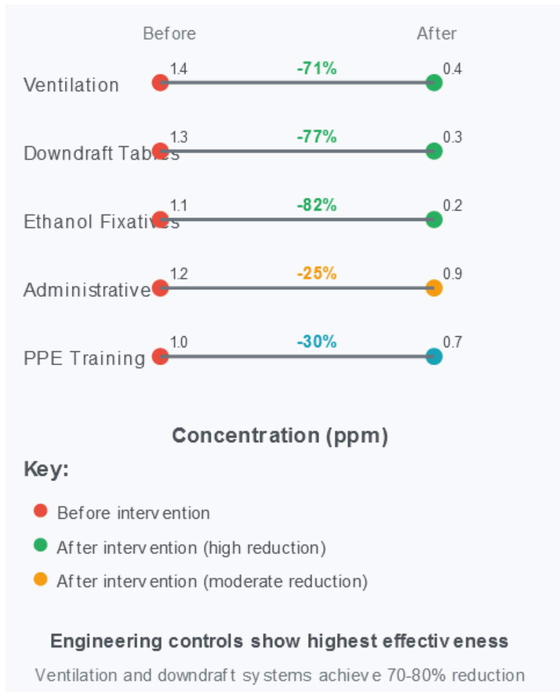

Figure 5: Effectiveness of Mitigation Strategies in Reducing Formaldehyde Exposure

The results indicate that engineering mitigation interventions are the strongest mitigation form of preventing exposure to formaldehyde at work; however, in cases where it is possible, special chemical-substitute and high-filtration respirators will provide additional protection (Figure 5). Due to the complexity of formaldehyde emissions, an integrated approach is necessary, and Table 4 shows a comparative matrix of the major mitigation measures and specifies the performance and operational limitations of each option to design a good program. Table 4 summarizes representative preintervention and postintervention airborne formaldehyde levels in the four most important strategies: ventilation retrofits (1.4 ppm pretreatment, 0.4 ppm post-treatment), downdraft tables (1.3 ppm to 0.3 ppm), ethanol-buffer fixatives (1.1 ppm to 0.5 ppm), and rotational scheduling (1.2 ppm to 0.9 ppm). It is evident that the engineering interventions produce the sharpest drops, whereas chemical substitutions also bear the potential when a complete HVAC overhaul is awkward to perform.

FUTURE DIRECTIONS AND RESEARCH GAPS

Still, regardless of the wide coverage of formaldehyde toxicology profile and the emerging collection of data as it is sensed in gross anatomy laboratories, there exist several imperative gaps that restrain the complete mitigation of risk. First of these is a lack of uniform exposure measuring procedures. Research methodologies differ considerably: on sampling duration, location (ambient vs. personal), analysis, reporting units, and methods, signifying that cross-institutional comparisons are hard and undermining the premises underpinning meta-analysis or regulatory benchmarking. A similar structured approach to exposure measurement, possibly in line with time-weighted average (TWA) and peak-level recommendations, would enable a more determined assessment of routine exposure and effectiveness of measures.

No less urgent is the lack of properly designed cases of longitudinal epidemiological study, which focuses on long-term exposures to formaldehyde with student populations, faculty, and support personnel, and occurs within anatomy teaching settings. Although the short-term effects, including mucosal irritation and headache, are well-documented, the long-term health outcomes, including those associated with respiratory dysfunction, dermatitis, and cancer, are mainly inferentially based on occupational studies at mortuaries, laboratories, and industrial facilities. The academic institutions are a specific demographic, which is younger, randomly exposed, and less occupationally knowledgeable, and thus, cohort studies are scientifically and ethically required.

The other issue that has to be solved on a huge scale is the creation of safer methods of embalming and preservation. Although chemical alternatives (glutaraldehyde, phenoxyethanol, and a mixture of ethanol solutions) have shown promising results, a great number present new risks or are not tissue-specific. The research ought to target the balance between efficacy in microbial control and anatomical realism, combined with little off-gassing. Such innovations in cadaver storage include vacuum-sealing, vapor-trap dissection pods, and enzymatic preservation are both unexplored and under-funded, even though they hold great potential.

Finally, harmonization and enforcement of these policies are becoming a consensus, especially among academic programs in anatomy. Differences in the level of ventilation standards, PPE procedures, and allowable exposure not only contain unbalanced stakes of stakeholders and produce institutional inertia. Formaldehyde risk audit, training certification, and minimum engineering standards might be required as mandatory policies by the national or regional accrediting bodies to meet the minimum protection. On the same note, international partnerships might advance the sharing of data and convergence of regulations.

All these future directions represent the need to work on a multidisciplinary response to these future directions, i.e., a combination of toxicology, occupational hygiene, material science, pedagogy, and policy making that will need to be undertaken to fill the existing gaps and to make safer learning environments in the future for next generations of health professionals.

CONCLUSION

Extensive use of formaldehyde has led to an obvious form of concern about occupational and academic health consequences; over the decades, the use of formaldehyde in gross anatomy labs was a necessary means of preserving and disseminating cadavers. The current review summarizes existing information about formaldehyde exposure: its major sources, exposure routes, and both acute and chronic health effects recorded among students, staff, and technicians. The findings have remained consistent, and they point to excessive exposures to recommended exposure levels, especially in poorly ventilated areas or when dissection is intense.

Even though regulatory bodies have determined certain permissible exposure levels, compliance with these regulations is variable because of structural attributes, lack of awareness, or non-enforcement. The negative health impact that has materialized in the form of both acute symptoms, like ocular and respiratory irritation, or chronic health consequences, like carcinogenicity, explains the urgency of action that is needed to organize such an intervention. However, mitigation measures such as engineering and administrative controls, alternative preserving agents, and personal protective devices have been practiced on an institution-by-institution basis.

To protect future generations of medical and allied health care practitioners, medical education organizations should consider implementing blanket measures of safety. These guidelines should include the latest advances in ventilation, the use of more harmless forms of embalming, increased attention regarding monitoring exposure, and further education in the field of classes that exist in the teaching of chemical safety. At the same time, the efforts of collaboration is needed to work out more secure preservation methods and unify policies at the level of regulation and education. Such unified efforts are imperative in resolving formaldehyde risks in anatomy instruction in a conscious and viable manner.

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