Industrial Health for all

In a global economy where all people are valued, it is essential to provide working conditions that do not damage workers’ health. If we are to consider ‘all people’ then working conditions must take account of human diversity.

To follow the principle of health for all people, it is clear that we must establish knowledge of the nature and characteristics of that diversity and use that knowledge to provide industrial health for all. Research programmes will provide knowledge of human characteristics and a system of international standards can specify working conditions that avoid damage to health. A system of standards, political will, a system of implementation and a culture that promotes health and safety that pervades internationally, will ensure healthy conditions.

Appropriate Physical Environments

One component of providing industrial health for all is to provide environments that are conducive to health and appropriate for those who occupy them. There has been much research into how people respond to noise, vibration, heat and cold, air quality, light and more. Knowledge gained has allowed the design of environments that are not a threat to health. Some of this knowledge has been incorporated into international standards.

The ISO sub-committee ISO TC 159 SC5 ‘Ergonomics of the physical environment’ provides strategic direction for the production of standards to allow the design of acceptable environments. It has an expanding programme and currently has five working groups as follows.

WG1 Thermal environments
WG2 Lighting
WG3 Signals and communication in noisy environments
WG4 Integrated environments
WG5 Environments for people with special requirements

Working group 1 (WG1) produces standards concerned with human responses to thermal environments. These include standards for the assessment of heat stress (ISO 7243; see Parsons, 2006 and ISO 7933; see Malchaire, 20061–4); cold stress (ISO 11079; ISO 157435, 6); and thermal comfort (ISO 7730; ISO 105517, 8). Other standards include a number relevant to assessment for example on clothing insulation (ISO 9920; see Holmer 20069, 10), skin contact with hot, moderate and cold surfaces (ISO 13732 parts 1, 2 and 311–13), risk assessment (ISO 1526514) and terminology (ISO 1373115) as well as others (see Parsons 200316). The activities of working group 4 (WG4) and working group 5 (WG5) reflect a recently developed strategy for standards. WG4 is developing a standard environmental survey as a pragmatic method of surveying the total environment including thermal environments, noise, lighting, air quality and vibration. (ISO CD 2880217). WG5 was established in response to the recognition that existing standards did not apply to all. A new standard concerned with environments ‘for people with special requirements’ (ISO CD 2880318) is under development and considers appropriate environments for people who would be considered to be outside of the scope of current international standards. (e.g. people with disabilities, the elderly and others). A review of the strategy for standards to provide appropriate environments will be provided in a future issue of the journal ‘Industrial Health’.

Inclusive design

Inclusive design is concerned with designing so that all people can use what is designed. In the context of environments, an inclusive design will be an environment that is appropriate for all people. The implication is that no special modification or separate version of the design is necessary as the design itself covers all. Accessible design is a term often used and is related to this. In the context of standards for environments it has been defined as ‘……designing…. environments that are readily usable by most users without any modification’. ISO/IEC Guide 7119.

The principle is that when designing environments we should identify the requirements of all users and design for all. A problem arises because of what is known as the ‘knowledge gap’. Our knowledge of human response to the environment is incomplete and it is only in recent years that an integrated approach to the subject has been
taken. Knowledge gained applies to typically fit, young, healthy males mostly from countries with the most developed economies. Environments for the wider and diverse global population, taking account of disabilities and age as well as custom and culture, have not been researched sufficiently to provide global guidance and this requires global initiatives.

Principles for assessment have been developed that can be considered to be universal (e.g. heat balance, frequency weighting etc) and it is these principles that can provide guidance towards inclusive and accessible design. (e.g. ISO CD 28803). An example of the use of principles to give guidance would be using the principle of heat balance to specify an environment for a person with a spinal lesion. Sweating will not be active on the body below the lesion and this can be taken into account in heat balance calculations. Without extensive studies of people with spinal lesions therefore, guidance can still be provided on the assessment of heat stress and hence the design of appropriate and inclusive environments.

Standards that are truly international

Standards that are truly international will include people from all countries and we are far from having complete knowledge to produce them. It is natural that more research has been conducted on people from industrially developed countries than those with fewer resources. The International Standards Organisation (ISO) as well as other international agencies (WHO, ILO etc) provide the opportunity to include all nations in discussions and debate. A democratic system of voting on proposed standards and national and regional prerogatives for implementation, provide mechanisms for producing working environments that avoid damage to health. The political will to be involved depends upon priorities and it is important that international influence encourages the drive for industrial health for all. An example of where more countries should be involved, is that less than twenty out of well over one hundred member countries, participate in the production of standards in ISO TC 159 SC5. If standards are to be truly international, then global participation is required. Mechanisms must be found to ensure that those countries who do not participate, and incidentally they are often those who could benefit greatly in terms of providing industrial health, can provide their own perspective leading to a global view and truly international standards.

Physiological monitoring

A final note on physiological measurements. These are becoming prevalent when considering industrial health, particularly in extreme environments, as they provide a method for monitoring individual health and hence can take account of both diversity and a lack of predictive methods.

ISO 9886 is an example of a standard that considers physiological measurements for thermal strain. Heart rate, skin temperature, internal body temperature and sweat loss are described in terms of measurement method and interpretation. Other environmental components will have their own physiological measures that indicate environmental strain. It is important to note that although physiological monitoring equipment is becoming accessible in terms of availability and price, expertise in measurement and interpretation of the results is essential. It is very important to embed any physiological monitoring procedure into a complete working system which has been designed and tested before use in practical applications.

An example is in the monitoring of internal body temperature which is an indicator of heat storage in the body and thermal strain. A single measure of say, rectal or ear canal temperature will give an indication of physiological strain but must be used and interpreted in conjunction with other measures (e.g. heart rate and skin temperature). A maximum value of 38.5 °C may be recommended, but risk will depend upon context and in some situations this will be too high to avoid damage to health. For example in hot conditions where people are wearing totally encapsulated protective clothing, the time for the clothing to be removed from the person may be significant and if not taken into account it may be too late to avoid heat stroke if we use 38.5 °C as an upper limit value for internal body temperature in that working environment.

Physiological monitoring may become more accessible to those monitoring human response to environments but it must be used in a whole systems approach before subjecting individuals to hazardous environments.

References


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when using required clothing insulation (IREQ) and local cooling effects. International Standards Organisation, Geneva

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