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CASE STUDY

# SAFETY ALERT FOR TREADMILLS IN HEALTH & FITNESS FACILITIES IN AUSTRALIA: RESULTS FROM A PILOT STUDY OF AN OBSERVATIONAL AUDIT TOOL

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## **ABSTRACT**

**Introduction:** Design of a health/fitness facility is a crucial element in managing risks to its operators, users and others. Improper location of treadmills not compliant with industry recommendations can increase the risk of injuries, adverse events and subsequent legal liability for health/fitness facility operators. The aim of our study was to analyse the location (spacing and placement) of treadmills in health/fitness facilities in Australia.

**Methods:** An on-site observational audit was conducted at regional and metropolitan health/fitness facilities (n = 11) in New South Wales, South Australia, Victoria and Queensland. The spacing surrounding the treadmills was measured in centimetres (cm). Placement was assessed by the objects within two metres behind the treadmills.

**Results:** In all health/fitness facilities the distances surrounding the treadmills on the sides, and behind were less than the recommended minimum distances (0.5 - 1m on the sides, 2m behind) by the manufacturers. In most of the health/fitness facilities there was other equipment (60%, n = 6) within two metres behind the treadmills.

**Discussion:** The findings suggest that most of the health/fitness facilities audited in this study do not comply with industry minimum recommendations on location of treadmills necessary for safe operation.

**Conclusion:** Health/fitness facility operators in Australia should be trained to increase their awareness about the risks associated with improper location of treadmills to take appropriate preventive measures.

**Key words:** risk management, health/fitness industry, facility design, safety, injury, liability

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## INTRODUCTION

Treadmills are one of the most common cardiovascular machines present in health/fitness facilities. Despite the health benefits associated with their use they can contribute to many of the equipment-related injuries.<sup>1, 2, 3</sup> The Australian Competition and Consumer Commission (ACCC) has prompted the regulation of the supply of treadmills guided by the high risk of injuries (e.g. friction burns) for young children caused by, for example, home users not realising their kids behind or kids trying to climb on a running treadmill.<sup>4,5</sup> However, this regulation only applies to people selling, exchanging, leasing, or hiring out treadmills and is limited to the mandatory provision of a permanent warning label on all treadmills stating: “WARNING: keep young children away from this machine at all times. Contact with the moving surface may result in severe friction burns.”

An analysis of case law in the United States of America (USA) has shown that improper spacing, placement, maintenance and installation of treadmills that does not conform to the published industry standards or manufacturer’s guidelines can increase the risk of untoward events such as musculoskeletal injuries or even head traumas resulting in death and subsequent legal liability for health/fitness facility operators.<sup>6</sup> In the case of *Xu v. Gay*<sup>7</sup> in the Michigan Court of Appeals, the plaintiff fell off the treadmill resulting in a severe head injury and his death approximately a month later. The representative for the plaintiff contended that when Xu tripped while running, the treadmill throw him back into the wall or the window ledge behind him and that there was only 75cm clearance behind the treadmills. An expert witness in this case testified that according to the industry’s standard for duty of care there should be a minimum of 1.5 metres safety clearance behind treadmills. Henceforth, the industry standard for treadmills was revised in 2012 and currently requires minimum 2 metres safety clearance at the back of treadmills.<sup>8</sup>

There are no published industry standards in Australia relevant to the location (spacing and placement) of treadmills in health/fitness facilities.

**Table 1:** Manufacturer’s guidelines on space allocations for treadmills

Manufacturer’s Manual	each side	behind
*Cybex 750T Treadmill Owner’s Manual	0.5m	2m
**Nautilus® Sport Series Treadmill Service Manual	0.5m	2m
***Life Fitness Club Series Treadmill Operation Manual	1m	2m
****MatrixT3xe, T3x, T1xe, T1x Treadmill Owner’s Manual	0.6m	2m

*Note.* \* Be sure your treadmill is clear of walls, equipment and other hard surfaces. \*\*Warning: Never position the treadmill with the back end (direction of belt travel) facing a wall or any other objects such as furniture or other pieces of fitness equipment. \*\*\*Warning: Keep the treadmill clear of any obstructions, including walls, furniture, and other equipment. \*\*\*\*The back of the treadmill must be clear of any obstruction and provide the user a clear exit path from the machine.

However, the standard of care (duty of care) for safe operation of treadmills in health/fitness facilities can be established by the courts according to the industry/manufacturer’s guidelines. The aim of our study was to analyse the location (i.e., spacing and placement) of treadmills in health/fitness facilities in Australia measured against relevant manufacturers’ guidelines (see Table 1).

## METHODS

This study was approved by the University Human Research Ethics Committee (RO: 1676). As part of the Australian Fitness Industry Risk Management (AFIRM) Project (LP120100275) an on-site observational audit tool (AFIRM-OAT) was developed to explore information as to current safety practices relating to the layout, operating procedures and conditions of fitness facilities<sup>10</sup>. The items in the AFIRM-OAT were developed based on review of literature, the American College of Sports Medicine’s (ACSM) fitness facility standards and guidelines<sup>11</sup> and Australian work health and safety (WHS) and fitness industry codes of practice.

Content and face validity of the AFIRM-OAT was ensured by a multidisciplinary panel

comprising of experts in injury prevention, risk management, legal liability, occupational health and safety, and sports science. The final AFIRM-OAT contained 81 items under six main sections:

- Environment
  - Entry to facility (3 items)
  - General facility environment (19 items)
- Cardiovascular/motorised equipment (19 items)
- Weight/pin-loaded machines (14 items)
- Free/plate-loaded weights (14 items)
- Emergency situations (8 items)
- Procedures (4 items)

Opportunity sampling was used to recruit 11 fitness facilities, based on the research team members' locations across Australia, to conduct the pilot audits. These 11 facilities extended across seven metropolitan and regional Australian cities in New South Wales, Queensland, South Australia and Victoria.

The AFIRM-OAT items related to treadmills under the 'cardiovascular/motorised equipment' section were included in this study. One of the health/fitness facilities audited did not have treadmills and was excluded from this study. All data collected were de-identified as to the specific facility. The minimum spacing around a treadmill in a facility was measured using a tape measure and recorded in centimetres. The placement of treadmills was assessed according to what was within two metres behind the treadmills.

Following measurement of all treadmills in each facility, the treadmill with the least spacing at each facility (n = 10) was selected and recorded for the study. Due to the geographical spread of the facilities, seven different people conducted the audits. One auditor was present at every audit across each facility and six other trained auditors assisted during the data collection process throughout the country.

The AFIRM-OAT results were entered into SPSS 20 and descriptive statistics were used to calculate Mean and range values of the spacing measurements.

**Table 2:** Placement of the treadmills in health/fitness facilities

What is behind the treadmills (within 2 metres)?	%	n
Walkway	60	6
Other equipment	60	6
Electrical outlet	40	4
Wall	30	3
Railing	10	1
Mirror	10	1

*Note.* There can be more than one item that describes the placement of a treadmill in a health/fitness facility.

## RESULTS

The mean distances surrounding the treadmills (n = 10) were 12.1cm (range = 4cm - 25cm) on the left, 12.4cm (range = 3cm - 31cm) on the right, 74.3cm (range = 3.2cm - 156cm) at the front and 105.1cm (range = 45cm - 171.5cm) behind.

In most of the health/fitness facilities there was a walkway (60%, n = 6) and/or other equipment (60%, n = 6) within two metres behind the treadmills. Other common items behind the treadmills were an electric outlet (40%, n = 4) and/or a wall (30%, n = 3) (see Table 2).

## DISCUSSION

The findings of this pilot study indicate that health/fitness facilities in Australia are not meeting the minimum criteria for space allocations and placement of treadmills recommended by leading international and national treadmill manufacturers. In all health/fitness facilities the distances surrounding the treadmills on the sides and behind were less than the recommended minimum distances (0.5 - 1m on the sides, 2m behind). While the treadmill manufacturers warn to keep the treadmill clear of any obstructions, including walls, furniture and other equipment, in most of the health/fitness facilities there was other equipment

(60%, n = 6), an electric outlet (40%, n = 4), wall (30%, n = 3) or mirror (10%, n = 1) within two metres behind the treadmills.

These results are worrisome as inappropriate location of treadmills can result in serious injuries with severe consequences including incapacitation from daily activities and/or work and death of exercise participants and subsequent legal liability.<sup>6</sup> Research shows that one of the most common causes of treadmill injuries is “trip and fall” that can result in dislocated joints, fractures, head trauma and even death.<sup>3</sup> This is because when a person falls off on a running treadmill, they usually get thrown off the treadmill hitting their vital body parts including face and head against the machine, floor, and other objects or wall behind. Trip and fall on a treadmill may occur due to the negligence of a user such as wearing improper or loose shoes, closing their eyes while using the treadmill, or using electronic mobile devices such as cell phones<sup>12</sup> that can cause distraction and loss of balance. A person may also fall off a treadmill if, for example, the treadmill suddenly stops while running due to a product defect or a lack of preventive maintenance,<sup>6,13</sup> or the running speed was inappropriately prescribed by a fitness instructor<sup>14</sup>. However, no matter what the root cause of a trip and fall injury may be, a health/fitness facility operator can be found liable for negligently increasing the level of risk of injury by not following the industry/manufacture’s guidelines on location (spacing and placement) of treadmills and failing to satisfy the standard of care.

## **CONCLUSIONS**

Treadmills are an important part of services provided by health/fitness facilities to satisfy the health and fitness needs of their clients. However, improper location of treadmills can result in severe injuries and adverse events. Therefore, it is crucial for health/fitness facility operators, managers and staff to be trained in risk management specific for the context of the health/fitness industry.<sup>15</sup> This can increase their awareness about the hazards and risks associated with treadmills in order to

implement appropriate control measures as part of a preventive maintenance program to protect the safety of their clients.<sup>13</sup>

The main limitations to this pilot study were time and budget that limited the number of facilities that could have been recruited for a more representative sample. Nevertheless, this study highlights the importance of further nationwide more comprehensive research (i.e., auditing of all treadmills in a facility for more validity) on this topic across the fitness industry.

## **PRACTICAL APPLICATIONS**

Health/fitness facility operators and/or managers should check the location of the treadmills to identify hazards and allocate enough and clear space around the treadmills according to the manufacturer’s guidelines for safe operation.

If it is not sustainable or practicable for the health/fitness facility to allocate enough and clear space around the treadmills, treadmills should be replaced with alternative cardiovascular fitness equipment that occupies less space such as elliptical trainers or bikes.

All new users should be given an orientation on how to safely operate the treadmills including use of emergency break keys and clips that can stop the treadmill from running to minimise the risk of fall related injuries.

All users should be informed about how to safely operate the treadmills by permanent signage that is easy to see and read.

The cardiovascular training area in the facility should be regularly inspected for hazards and constantly supervised to avoid equipment misuse and ensure that users do not disembark a treadmill until it reaches a full stop.

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