

**SHORT REPORT**

# Awareness of swimming pool suction injury among tour operators

**A Davison, J W L Puntis***Arch Dis Child* 2003;**88**:584–586

A 6 year old girl suffered rectal prolapse after being sucked onto a swimming pool drain from which the cover had been removed. After six days in hospital she made a full recovery. The severe form of this injury may result in evisceration of small bowel, short bowel syndrome, and the need for long term parenteral nutrition. A survey of travel agents revealed a low awareness of this potentially devastating hazard, and a failure on the part of some companies to take adequate responsibility for customer safety. Preventive measures are reviewed.

While on holiday in the Greek islands a 6 year old girl was sucked onto an uncovered drain as she climbed into the communal swimming pool. The drain was located on the second of the steps giving access to the water and had not had its cover replaced after routine cleaning. The force of suction was strong enough to pull her onto the drain and hold her tight, creating a vacuum, until the power to the pump was interrupted. Unfortunately, because of language difficulties and not knowing how to isolate the power supply, the girl remained stuck to the drain for several minutes. She became extremely distressed and when eventually freed, was found to have developed a mass about the size of an orange protruding from her anus. Urgent transfer to a medical facility on the Greek mainland was arranged and there followed a two and a half hour journey by hydrofoil to a major hospital. Here she underwent a computed tomography (CT) scan of the pelvis prior to manual reduction of the rectal prolapse under sedation. Five more days were spent recovering in hospital.

The pelvic CT scan showed a fluid collection outside the rectum, which at the time was thought likely to represent a bowel perforation, but was later considered to be fluid exudation from traumatised tissues. At a hospital consultation in the UK several weeks later the girl was well, although still experiencing some pain and discomfort on defaecation. The family had found the whole experience deeply upsetting, and had been referred by their general practitioner for psychological support. There have been no long lasting physical sequelae.

**SWIMMING/PADDLING POOL SUCTION INJURIES**

The most severe form of this kind of injury leads to trans-anal intestinal evisceration, of which there have been at least eight documented cases.<sup>1</sup> The true incidence is unknown, with mild cases going unreported. In each case there is a common mechanism of injury.<sup>2</sup> Circulation systems needed for water filtration are integral components of swimming pools and the drain outlet is fitted with a cover. However, if for some reason the cover has been removed and a child sits or is sucked onto an unprotected drain, a seal is formed with the skin of the perineum and buttocks allowing a vacuum to be created by the pump. This can result in the generation of high pressures, capable of exerting a force of up to 800 psi<sup>2</sup> on the rectal wall.

This negative pressure is transmitted to the abdominal cavity, and in severe cases causes evisceration of the small bowel through a full thickness tear in the rectum. In this situation it is common for the small intestine to be avulsed from its mesenteric attachments.<sup>1-4</sup> In severe injury, stoma formation is the rule and in six of the eight severe cases described, loss of absorptive small bowel surface area necessitated long term parenteral nutrition.<sup>1</sup> The frequency of suction injuries in swimming pools is thought to be increasing.<sup>3</sup> This is probably a result of increased power of suction required to produce features such as artificial wave machines, inadequate pool security, and increased use of holiday pools in resorts where there are insufficient or inadequately trained staff. Our case lead us to explore how much the travel industry is aware of this potentially devastating injury, and to review those measures necessary for prevention.

**METHODS**

A list of tour operators and their telephone numbers was obtained from an up to date business directory in the city reference library. Although around a quarter of numbers were no longer in use, 42 UK companies providing holidays abroad were successfully contacted via telephone and email. At the initial telephone contact a request was made specifically to talk to a company representative responsible for swimming pool safety. Questions from a structured interview (see box) were asked regarding knowledge of suction/entrapment injuries, in addition to enquiries about specific safety checks carried out, and the presence of lifeguards in facilities used by holidaymakers. All telephone interviews were conducted by AD.

**RESULTS**

One in four (26%) of the 42 travel companies declined or were unable to comment on any of the issues raised, and an additional 16% of respondents did not sell holidays that included use of swimming pools. Representatives from 24 companies with holidays including pool access did provide a response when questioned. Only a third of personnel interviewed had some knowledge of suction injuries, and sometimes this amounted to no more than having heard of the problem. No company routinely gave advice to clients regarding suction injuries or the need to look for uncovered drains before entering a pool. This is despite the fact that over a third (37.5%) routinely provided written general safety guidelines, including for swimming, for customers booking a holiday.

Around two thirds (70.8%) of the companies whose clients had use of pools and who were prepared to discuss safety issues did not carry out any safety checks themselves, but regarded this as the responsibility of the hotel or apartment owners. Seven of 24 companies did carry out their own safety checks, and these included ensuring that drains were covered. In addition, two tested difficulty of removal of the covers and five had knowledge of how to isolate the power supply in cases

**Questions posed to company representatives identified as being responsible for swimming pool safety, following a description of suction entrapment injuries**

- (1) Have you any knowledge of this type of injury and did you know it could arise as a result of an uncovered swimming pool drain?
- (2) Are safety checks carried out on pools in facilities abroad, and if so, by whom?
- (3) What safety checks does your company carry out? How often are these performed? Are drain covers the focus of specific checks?
- (4) Do the checks include identifying where drains are situated?
- (5) Where is the power supply that would switch off filtration pumps located? Is there free access, or is it in a locked plant room? If so, where is a key kept?
- (6) Are there emergency panic buttons situated at the poolside?
- (7) What information is given to holidaymakers regarding pool safety? Is any mention made of suction injuries in company literature?
- (8) Do the pools have lifeguards or pool attendants?
- (9) Is it a company requirement to employ English speaking lifeguards/attendants?
- (10) Are there any other topics relating to pool safety that we have not discussed that you feel are important?

of emergency. In four of these five instances, however, the isolating switch was locked in the plant room and only one company had emergency panic buttons installed at poolside that could be used to switch off the power. The same company also employed a further safety refinement in the form of an alarm that was triggered if anything covered a drain for more than a few seconds. In no country where holidays were offered was it a legal requirement for lifeguards to be in attendance at poolside. In fact, only 1 in 6 (16.7%) companies used lifeguards and two stated that if pools were unattended children were forbidden to swim. Only one company had lifeguards at all their pools, and all of these spoke English. Three of the other four operators using lifeguards required them to be English speakers.

## DISCUSSION

Suction/entrapment in the swimming pool is a potentially serious problem that may have devastating long term consequences. This study indicates a relatively low awareness of the issues involved among those holiday firms who were prepared to discuss customer safety, with only a small minority setting a high standard in terms of prevention. Tour operators may have a legal responsibility for their clients' wellbeing,<sup>5</sup> but holidaymakers clearly cannot take safety for granted. For example, a recent undercover survey by the Consumers Association reported that among 43 pools in Cyprus and Gran Canaria, 28 were condemned as dangerous, five were rated as poor, and only 10 passed inspection.<sup>5</sup>

If this seems to be a poor reflection on the travel industry it should be noted that the Federation of Tour Operators exists to bring about improvement in all areas affecting customers' holidays, including standards of safety, health, and hygiene overseas.<sup>6</sup> Membership is by invitation only, and any safety checks regarded as desirable are left to the discretion of individual tour operators to implement. It is not a regulatory body, but does have a Safety Committee of industry professionals supported by independent technical experts in such areas as fire safety and health. This organisation clearly has a role in

promoting swimming pool safety; 16 of the companies contacted in our survey were members.

There are no general recommendations as to where pool drains are sited, the type of covers that should be used, the amount of suction that can be created by filtration units, or where the power cut-off switches for filtration systems should be situated. Design features, however, are important factors in accident prevention. Standard drain covers let water in from the top to rush downwards; this creates a vortex spiral above. Good practice indicates that drains should be covered with antivortex grates. These are covers that have no opening on the top, but instead water enters from the sides.<sup>1</sup> Other ways of promoting safety include ensuring that drain outlet covers can only be removed using special tools, and that there is regular pool inspection and maintenance. If a child does get stuck on a drain, immediate relief of the negative pressure by breaking the vacuum seal between the patient and drain is essential in order to limit the extent of the injury. Because of the strong forces involved this can only be achieved by switching off the power to the pump. Clearly those staff in attendance must know both how to turn the power supply off and have the necessary access to achieve this. If there are no supervising staff, panic buttons and cut-off switches should be available at poolside.

In the light of our review we feel the following points are relevant to the prevention of suction injuries:

- Increased awareness of swimming pool dangers among both the public and travel companies.
- Safety information to be included in general advice booklets given to those booking holidays.
- Regular safety and maintenance checks on swimming pools to be the responsibility of tour operators.
- Checks to include location of drains and type/condition of drain covers.
- Use of antivortex covers that are difficult to remove.
- Filtration system power cut-off to be simple and accessible.
- Poolside panic buttons.
- Poolside attendants and supervision of swimmers.
- Dual drain systems in new pools (reduced suction force).

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..... **COMMENTARY** .....

The authors describe the case of a girl who was drawn onto an open outlet of a swimming pool and subsequently had suction injuries to her bowel. They then interviewed 42 travel agents about their level of understanding relating to this type of injury and about swimming pool safety standards. The authors found that the level of awareness was poor and discussed ways in which it might be improved.

There is little easily accessible data for overseas accidents; however, there are UK figures relating to home and leisure accidents. The Department of Trade and Industry publishes *Working for a Safer World*; the latest edition is the 23rd annual report of the Home and Leisure Surveillance system for the year 1999. A total of 1164 children aged 0–14 years with swimming pool related injuries presented to the 18 hospitals which comprise the study group of A&E departments involved in the data collection. From this data it was extrapolated that there were 21 692 children out of a total of 25 404 patients who attended UK A&E departments owing to such injuries for that year. This suggests that there are a large number of swimming pool associated accidents in the UK, a country where the regulation of safety standards is high.

The Consumer's Association survey did find a large number of overseas swimming pools to be unsafe (reported at <http://news.bbc.co.uk/1/hi/uk/597285.stm>). It also found that on average eight children drown every year in pools while abroad.

The Federation of Tour Operators (FTO) has a voluntary membership and is active in lobbying governments as well as local tourist authorities relating to safety standards. They produce a health and safety handbook which is directed towards informing tour operators and helping them to improve the standards in the accommodation that they book for their clients.

All English and Welsh tour operators are subject to the Package Travel Regulation which was made law on 1 January 1993; this states that the tour operators are responsible for the safety of their customers. The FTO point out that half of the people who go abroad do so independently of tour operators, hence safety cannot be guaranteed for all travellers.

The Association of British Travel Agents (ABTA) is the trade association for tour operators and travel agents; not all of its members are joined to the FTO, however. It has 800 tour operators and 6700 travel agency offices, being responsible for the sale of 80% of UK sold holidays.

The authors chose 42 tour operators which, as can be seen, is a small sample, and did not make it clear as to whom they interviewed. There may be a very different response from questioning an office bound worker responsible for booking a holiday compared with a tour operator representative whose job is to ensure the accommodation for their clients is safe. The poor response is, however, worrying and the key principles of injury prevention, namely education, legislation, and enforcement of safety standards need to be applied by both members and non-members of FTO. The collection of data is vital in order to affect change and to show that preventive strategies are effective. This should be available for all to see and not be regarded as commercial information.

This paper raises an important concern about severe injury arising from poor safety standards, and given the large number of patients in the UK with swimming pool related injuries (and a largely unknown number from people going abroad, albeit with a noticeable annual death toll among children), it stimulates thought about how to prevent injury, and so allow for a happy holiday to be had!

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