

# Minimising pain resulting from THE REPETITIVE NATURE OF ASEPTIC DISPENSING

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*This article presents the outcome of a survey which examines some of the factors predisposing to pain due to the repetitive manipulations involved in aseptic dispensing. Possible solutions are also discussed*



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The development of pharmacy-based aseptic services over the past decade has led to a rapid increase in workload for hospital pharmacy staff. While the benefits of these services to both patients and ward staff have been documented,<sup>1</sup> the effect on pharmacy staff operating these services has not received much attention.

At the Sheffield Children's Hospital, an isolator-based total parenteral nutrition (TPN) and cytotoxic reconstitution service had operated for a number of years before the introduction of a centralised intravenous additive (CIVA) service. A marked increase in the reporting of joint pain and other types of pain by staff undertaking aseptic dispensing was noted after the introduction of the CIVA

service. This may be due to the fact that the work which had been shared among a large number of staff around the hospital was now being carried out by a much smaller number of staff in the hospital's pharmacy department.

Advice was sought from the hospital's health and safety committee and the occupational health department. An assessment of working practices was carried out by a physiotherapist and a medical practitioner from the Employment Medical Advisory Service. The problem areas identified were the repetitive nature of the work undertaken and the posture adopted by staff working at the isolators. These led to the occurrence of pain of the type which is seen in such disorders as repetitive strain injuries.

Repetitive strain injury, or RSI, is used as an all-embracing term for a number of disorders affecting the muscles, tendons, and nerves of the upper limbs and neck. Such disorders include carpal tunnel syndrome, trigger finger, shoulder impingement syndrome, tennis elbow, thoracic outlet syndrome, tension neck syndrome and myofascial pain disorders.<sup>2</sup>

Other terms have also been used to describe such injuries, including work related upper limb disorder (WRULD), cumulative trauma disorder (CTD), regional pain disorder and occupational over-use syndrome.

RSI is caused by recurrent overuse of joints and muscles, resulting in microtrauma to tissues. The symptoms include pain even after rest, swelling and tenderness, pins and needles, numbness, and restriction or loss of movement in the affected parts.<sup>3</sup> Some of the causes of RSI are repetitive and awkward movements, static load on muscles, poor posture, and insufficient breaks or changes in activity. Current estimates in the US suggest that RSI accounts for up to 56 per cent of all occupational injuries. RSI may affect between 15 and 20 per cent of the US workforce.<sup>4</sup>

Three stages of RSI have been identified.<sup>2</sup> They are:

**Stage 1 (mild)** Pain, aching and tiredness of the wrists, arms and shoulders or neck during and after the working day, which then improves overnight. This stage can last

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*Table 1: Anatomical sites of RSI-type pain*

Anatomical site	Percentage incidence
Thumb	43
Hand	40
Wrist	25
Forearm	10
Elbow	11
Shoulder	25
Neck	28
Back	36
None of the above	20

for weeks or months but is reversible (threatened overuse injury).

**Stage 2 (moderate)** Recurrent pain, aching and tiredness occurs earlier in the working day, persists at night and may disturb sleep. Physical signs may be visible, such as a cyst-like swelling near a joint or a tender swelling in the affected area. This stage can last for several months.

**Stage 3 (severe)** Pain, aching, weakness and fatigue are experienced even when the person is resting completely. Sleep is often disturbed and the sufferer may be unable to carry out even light tasks at home or work. This stage can last for months or years and damage may be irreversible (established over-use injury).

The effects of RSI can have significant implications for employees and employers, and it is imperative that prompt action is taken to reduce the risks. Only one published article was found relating to RSI in pharmacy aseptic dispensing.<sup>5</sup> However, communication with other aseptic units revealed that RSI-type pain was widespread.

## SURVEY

A survey was sent to a number of aseptic units in the UK in an attempt to describe the nature of RSI-type pain in staff undertaking aseptic dispensing, quantify the incidence of pain, and possibly identify the factors predisposing to such pain. A search was also made in the literature to identify ways of minimising the occurrence of RSI-type pain.

The survey took the form of a two-part questionnaire. Part A required information about the unit as a whole; part B required information about individual staff. To reach as many aseptic units as possible, the Pharmaceutical Isolator User Group (a group that comprises staff involved in the use, design, construction and testing of pharmaceutical isolators) was approached for help in identifying subjects. The group supplied address lists of its members and the delegates at the group's most recent conference.

Questionnaires were sent to 128 hospital pharmacy aseptic units, out of which 50 sets of completed questionnaires were returned and included in the final analysis. Recipients were asked to complete one copy of part A for the unit and one copy of part B for each member of staff working in that unit. Part B of the questionnaire was completed by 258 staff. Of these, 115 worked regularly in an aseptic unit, and 143 worked on rotation through the units.

A breakdown of the staff according to the equipment they use showed that 146 members of staff worked in isolators alone, 83 in both isolators and laminar air flow cabinets (LAFCs), and 29 in LAFCs alone.

**Assessment of the incidence of pain** In part B of the questionnaire, the staff were asked to report on joint and muscle pain which they believed had arisen as a result of performing aseptic manipulations and not from other causes such as participation in sport. Staff were asked to indicate their experience of this type of pain in eight anatomical sites: thumb, hand, wrist, forearm, elbow, shoulder, neck and back. The percentage incidence of pain was calculated from the following equation:

*Percentage incidence of pain =*

$$\frac{\text{Sum of number of sites of pain}}{\text{Number of staff} \times 8} \times 100$$

Staff were asked about the average length of time spent continually performing aseptic manipulations and also the average length of rest periods between work sessions.

**Responses** The number of aseptic unit staff experiencing RSI-type pain was 208 out of the 258 surveyed (80 per cent).

Staff working exclusively with isolators experienced a greater incidence of RSI-type pain (40 per cent) than those working with both LAFCs and isolators (27 per cent) or exclusively with LAFCs (25 per cent).

The results were also analysed according to the site of pain experienced by staff (Table 1). Responses could be broadly categorised into those reflecting manipulative injuries (thumb, hand, wrist, forearm and elbow) and those reflecting posture (shoulder, neck and back). Due to the nature of aseptic manipulations, the thumb and hand, not surprisingly, appear most prone to injury, with 43 per cent of aseptic unit staff reporting problems with the thumb, and 40 per cent reporting problems with the hand. Posture also seemed to present problems, with just over 35 per cent of staff reporting back pain and 25–30 per cent reporting neck pain.

Another observation from the responses was that staff who spent more time working in isolators tended to experience more pain. This was especially so when staff worked for longer than two hours without a break. The

incidences were: less than one hour, 20 per cent; between one and two hours, 24 per cent; and more than two hours, 34 per cent.

The length of time that staff regularly spent away from performing aseptic manipulations also seemed to have a positive effect on reducing the incidence of pain. The incidences were: less than five minutes, 39 per cent; five to 10 minutes, 28 per cent; more than 10 minutes, 25 per cent.

## POSSIBLE CAUSES OF PAIN

The nature of aseptic manipulation leads to an expectation that RSI-type injuries may develop. Syringe work often involves forceful, repetitive movements of the thumb, hands and wrist, particularly when transferring large fluid volumes or filtering solutions. In this survey, the large number of staff reporting problems affecting these joints fulfils this expectation. Staff may be forced to adopt a poor posture when performing aseptic work, a situation that is compounded by poor cabinet design, poor seating arrangements and lack of training. This can lead to back problems.

The increased incidence of pain in staff working exclusively in isolator cabinets may reflect the increased risk of RSI-type injuries from static posture.<sup>6</sup> Moreover, the posture adopted may be poor, with staff often stooping from the waist, working with arms outstretched (often unsupported), and making awkward twisting movements of the arms to reach the cabinet hatches. Static posture leads to increased strain not only on the back, but also on the neck and shoulders.<sup>7</sup> The National Organisation for Healthy Backs<sup>8</sup> advises changing position at least every 20 minutes. This can be difficult within the confines of an isolator cabinet. LAFCS do allow for more movement, which may help to reduce the problems. However, this is a limited solution as many units either do not have LAFCS, or use them only for specified products.

## MINIMISING RISK OF PAIN

Aseptic dispensing can give rise to two potential types of RSI problems: those related to manipulation and those related to posture. Several approaches found in the literature can be applied in an attempt to reduce the incidence of both types of injury. These are discussed below.

**Optimising work-rest schedules** The responses to this survey indicated that by reducing the cabinet work time for each member of staff and by allowing regular rest times, the incidence of pain experienced by staff was reduced. Ideally, where the staffing levels allow, work sessions of about an hour should be followed by a 10-minute break away from performing manipulative tasks.

A model has recently been devised to predict the work-rest schedule that will

minimise fatigue in a given repetitive job, thereby potentially increasing productivity and reducing the incidence of cumulative trauma disorders.<sup>9</sup>

**Optimal use of available staff** The task of aseptic dispensing should, where possible, be rotated among as many individuals as possible.<sup>10</sup> Work tasks should be varied, and employees should be offered opportunities to develop their job and influence their work schedules. Supervisors, who are usually senior pharmacy technicians, have a key role in monitoring for RSI-related problems.

**Ergonomically correct workstations** Manufacturers have improved the ergonomics of isolator cabinets by, for instance, changing the locking mechanisms on hatches to reduce twisting movements of the arm and wrists, allowing knee space under the isolators to allow staff to sit closer and thus prevent stooping, altering the shape of the work zone to reduce stretching and twisting while cleaning or reaching inside the hatches.<sup>11</sup> Further research into the optimal ergonomic design of isolators is needed. An ergonomically correct chair design should encourage an upright posture and should be adjustable in height to suit all individuals.

**IV additive filling pump** The use of commercially available peristaltic filling pumps can reduce pressure exertion type injuries from activities such as depressing the plunger of a syringe. These can be used to reconstitute vials, fill syringes and infusion bags and even to completely prepare TPN bags. Such devices, with proper validation and staff training, can significantly reduce manipulative strain, especially on the hands and thumb.<sup>5</sup> Although filling pumps reduce certain RSI risks, they tend to increase the speed of work throughput and thus may increase the overall number of repetitive manipulations a member of staff is making.

**Staff education and training** Staff should be aware of the causes, symptoms and prevention of RSI and the need to reduce the risks by adopting proper posture, following laid down procedures, using mechanical filling devices when available, and avoiding contributory habits such as hand and jaw clenching. Performing defined stretching exercises can reduce stress on particular muscles and thus reduce the occurrence of RSI-type injuries.

**Evaluation of new employees** A US-based multinational company recently introduced an RSI risk management intervention programme involving a health and lifestyle assessment for new employees. Before job placement, employees who have a high risk of developing RSI are assigned to a period of transitional work. The programme has resulted in reduced worker

compensation costs and an increase in work hours of 56 per cent.<sup>12</sup>

## SUMMARY

Further guidelines on the reduction of upper limb disorders in aseptic pharmacy practice have been produced by the National CIVAS Group.<sup>13</sup> Experienced and fully trained staff represent a substantial investment and should be treated as such.

Prevention remains the best treatment for RSI in the workplace. Reducing known risk factors, as well as educating staff could have major financial benefits for the employer because both staff absenteeism through ill health and costly litigation could be avoided. More importantly, employers will benefit from having a healthier and happier workforce.

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