Electrotherapy is an essential component of physiotherapy (Watson, 2000) and comprises application of different forms of electrophysical agents (EPAs) for therapeutic purpose. EPAs are applied by microwave diathermy (MWD), shortwave diathermy (SWD), interferential, transcutaneous electrical nerve stimulation (TENS) and interferential equipment in 46 physiotherapy departments in NHS hospitals in the south of England, using a self-administered questionnaire.

Results indicated that therapeutic ultrasound was the most commonly available and most often used modality by surveyed departments. Pulsed shortwave diathermy, interferential, and laser were available to a lesser degree and also used less often. Continuous shortwave diathermy was used rarely and only in larger departments. Microwave diathermy was not available in any of the surveyed departments. The level of non-use of equipment despite availability was highest for continuous shortwave diathermy followed by pulsed shortwave diathermy and then laser.

The rare use and total non-use of some of the modalities, despite availability of equipment, may have implications for purchasers of this expensive equipment. While the findings of this study show a regional trend in NHS physiotherapy departments, this may not be generalizable to a national level.

Key words: Electrotherapy, electrophysical agents, equipment, National Health Service, physiotherapy, survey.

in urban centres as well as small community clinics. Departments were contacted by telephone and letter; and the physiotherapy manager or superintendent physiotherapist was requested to complete a consent form regarding participation in the study. Two departments replied stating that they were not interested in the study and nine departments did not respond. After receipt of consent, 46 departments were sent a self-completion survey questionnaire, a covering letter and instructions for completing the questionnaire. In particular, the letter requested that the respondent completing the questionnaire would do so after consulting with members of the department who used the electrotherapy equipment most often.

Ethical approval
Ethical approval for this study was obtained from the Multi-centre Research Ethics Committee (Wales), Research Protocol 02/9/04 and the Ethics Committee at Brunel University.

Survey instrument
A survey questionnaire was developed in-house that requested the number of devices available, their use and the frequency of use in the department. The questionnaire contained mostly closed questions. A Likert scale question ranked the frequency of use of different types of modalities on a nine-point scale, i.e. point one for the most commonly used modalities and point nine for the most rarely used modalities. The questionnaire was validated before administration by piloting among staff in the Department of Health Studies and Social Care at Brunel University. The final version of the questionnaire is available from the authors.

Data compilation and analysis
The data were collected from October 2002 to July 2003. Frequencies and descriptive statistics using the Statistical Package for Social Sciences (SPSS) for Windows (version 13) were used for the analysis.

RESULTS

Availability and number of electrotherapy devices
The availability and number of devices by type of electrotherapy modality are shown in Figure 1. Ultrasound equipment was available in all responding departments (n = 46) whereas MWD equipment was not available in any department. The number of various types of electrotherapy devices available in the department is shown in Figure 2. The maximum number of devices per department was 88 for TENS, 14 for ultrasound, 6 for PSWD, 5 for interferential, 3 for CSWD and 2 for laser.
The authors divided departments into small departments (having ten or fewer full-time physiotherapists) and large departments (having more than ten full-time physiotherapists). Results showed that the department size was significantly and positively related ($r = 0.374, P = 0.05$) to the number of ultrasound devices only and not related to the number of any other type of device.

**Use of equipment**

The use of electrotherapy modalities in departments where equipment was available is shown in Figure 3. The use of equipment varied between departments despite the availability of equipment. The modality used by the greatest number of departments ($n = 37, 80.4\%$) was ultrasound and the modality used by the least number of departments ($n = 4, 8.7\%$) was CSWD. Non-use of modalities despite availability was highest for CSWD followed by PSWD and then laser.

CSWD was used in large departments only. Despite the availability of equipment it was not used in small departments. PSWD was used in both small and large departments, and the non-use of PSWD was greatest in large departments. Non-use of laser despite availability was only found in small departments.

**Frequency of equipment use**

Figure 4 shows the ranking of the frequency of use of the various modalities reported by departments on a Likert scale from most commonly used (rank first) to least used (rank ninth).

The greatest number of departments ranked the use of ultrasound, TENS and interferential as first choice, the use of PSWD as second choice and the use of CSWD as sixth choice. An equal number of departments ranked the use of laser as first and second choices.

**DISCUSSION**

The recruitment rate in this study was 81\% (46 out of 57 departments); however, all 46 departments that agreed to take part in the study completed and returned the survey questionnaire. Thus, the response rate was 100\%.

Results indicate that ultrasound, interferential and PSWD devices were the most commonly available and most used modalities in the surveyed departments. However, because of the regional nature of this survey these findings cannot be assumed to represent the rest of the UK.

**Ultrasound**

Use of therapeutic ultrasound in Britain was found in 25\% of NHS hospitals (ter Haar et al, 1987). Pope et al (1995) reported that all of the NHS physiotherapy departments surveyed in England owned and used ultrasound. High frequency of use of ultrasound in England was also reported by Turner and Whitfield (1997a) and Kitchen and Partridge (1996; 1997).

The present study found that ultrasound is still the most commonly available and used electrotherapy modality, in agreement with previous studies (Lindsay et al, 1990; 1995; Pope et al, 1995; Kitchen...
and Partridge, 1996; 1997; Robertson and Baker, 2001). The study also found that ultrasound devices were available in all responding departments (n = 46) with none of the departments reporting non-use of this modality.

Interferential
In 1995, Pope et al reported that interferential with electrodes and interferential with suction electrodes were available in 95% and 86%, respectively, and used by 99.5% and 90% departments, respectively, where equipment was owned. The present study did not request information regarding the availability and use of interferential by type but as interferential only. Results showed that this modality was available in 96% departments and used by 80% of departments that had the equipment. This suggests that there has been a decline in the use of this modality since 1995.

TENS
In the present study, the use of TENS was less than that reported by Pope et al (1995). This indicates that the use of TENS has decreased in the NHS departments surveyed in this study.

SWD: CSWD and PSWD
In their 2001 study, Shields et al reported that the maximum number of SWD devices per department was three; however, they did not provide a breakdown between CSWD and PSWD. Lindsay et al (1990; 1995) and Cooney et al (2000) reported greater availability of CSWD than PSWD devices. However, the present study found availability of PSWD devices to be higher than CSWD; with a maximum of three devices for CSWD and eight devices for PSWD, per department. According to Al-Mandeel and Watson (2006), SWD is widely used in the UK. Shields et al (2001) reported the use of PSWD and CSWD to be equal in Ireland. However, in the present study the number of departments that used PSWD was greater than those that used CSWD. The greater use of PSWD compared to CSWD in NHS departments may be due to preference for use of non-thermal modalities by physiotherapists in Britain (Kitchen and Partridge, 1996).

Laser
In the present study, the availability and use of laser was lower than that reported by Pope et al (1995) who found laser equipment available in 52% departments and used by 86% departments that owned the equipment. The number of laser devices per department in the present study was in accord with McMeeken and Stillman (1993), who found a maximum number of three laser devices per department. However, use of laser in departments where devices were available was higher in the present study than that reported by Lindsay et al (1990). In the present study, the use of laser was greater than use of CSWD but less than ultrasound and PSWD, in accordance with the findings of Kitchen and Partridge (1996).

Non-use despite equipment availability
Non-use of MWD despite availability of the equipment in some departments was reported by Ide and Partridge (1986) and Pope et al (1995). The present study confirms previous findings that there is non-use of PSWD and CSWD despite equipment availability in some departments (Pope et al, 1995; Shields et al, 2001). However, non-use of CSWD and PSWD was higher than that reported by Pope et al (1995). The present study also highlights non-use of laser despite availability of the devices.

The authors did not ask for reasons for the non-use or the rare use of the surveyed modalities. Kitchen and Partridge (1996) have argued that the use of electrotherapy modality depends on the availability of the equipment. However, like many previous studies (Ide and Partridge, 1986; Pope et al, 1995; Shields et al, 2001), the present study’s findings reveal non-use of some of the modalities despite the availability of equipment. This suggests that the use or non-use of electrotherapy modalities is determined not only by the availability of equipment but also by other factors. The following factors have been suggested:

- Issue of efficacy (Kitchen, 1995; Robertson and Spurritt, 1998)
- Physiotherapist’s choice (Pope et al, 1995)
- Knowledge of a particular modality (Turner and Whitfield, 1997b; 1999)
- Safety concerns (Larsen et al, 1991; Ouellet-Hellstrom and Stewart, 1993; Robertson and Spurritt, 1998; Lerman et al, 2001)
- The nature of the clinical condition being treated (Kitchen and Partridge, 1996).

Figure 4. Frequency of use of electrotherapy modalities – ranked by departments
CONCLUSION

This study investigated the availability and use of various electrotherapy modalities for treatment in a sample of NHS physiotherapy departments in Greater London and 12 counties in south England. The availability and use of the equipment was found to vary between surveyed departments. Therapeutic ultrasound was the most commonly available and most commonly used modality, whereas MWD was not available at all. The order of frequency of use was as follows:

1. Ultrasound
2. Interferential
3. PSWD
4. Laser
5. TENS
6. CSWD.

The non-use of CSWD, PSWD and laser despite equipment availability in some NHS physiotherapy departments in south England has important implications for purchasers of such expensive devices. However, further investigation is warranted as this may be a regional trend, which may not be generalized throughout the UK.

This study was funded by Health & Safety Executive, UK (Grant. No. 4371/R47.022). The authors wish to thank all the physiotherapists including managers and superintendents within NHS physiotherapy departments for their time in taking part in this study. The authors acknowledge helpful comments from the International Journal of Therapy and Rehabilitation's anonymous reviewers.

Conflicts of interest: none.


This survey showed that microwave diathermy was not available in any of the surveyed departments.

Ultrasound, interferential, pulsed shortwave diathermy, transcutaneous electrical nerve stimulation and laser were used by more than 70% of departments that had the equipment.

Continuous shortwave diathermy was used rarely and in larger departments only. In some departments, continuous shortwave diathermy, pulsed shortwave diathermy and laser were not used despite availability of equipment.

The use or non-use of electrotherapy modalities is not dependent on the availability of equipment only but other factors are also involved.

Non-use of CSWD, PSWD and laser equipment despite availability may have implications for the purchasers of this expensive equipment.