PAIN IN EUROPE IV

4th Congress of the European Federation of IASP Chapters (EFIC)

September 2 – 6 / 2003 ▪ Prague, Czech Republic

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* Don't Suffer In Silence

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* Pain and the Body
* Pain and the Patient
* Pain and Methodology
* Pain and the Brain
* Pain and the Individual
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Contents

Original Articles

Using facial expressions to assess musculoskeletal pain in older persons
Thomas Hadjistavropoulos, Diane L. LaChapelle, Heather D. Hadjistavropoulos, Sheryl Green and Gordon J. G. Asmundson 179

Acute pain management after surgery or in the emergency room in Switzerland: a comparative survey of Swiss anaesthesiologists and surgeons
Oliver H. G. Wilder-Smith, Jörg J. Möhrle and Nadine C. Martin 189

Unexplained severe chronic pain in general practice
J. J. Kerssens, P. F. M. Verhauk, A. I. M. Bartelds, M. J. Sorbi and J. M. Bensing 203

Children’s pain at home following (adeno)tonsillectomy
Jan P. H. Hamers and Huda Huijer Abu-Saad 213

Are childhood adversities relevant in patients with chronic low back pain?
R. Nickel, U. T. Egle and J. Hardt 221

Pain-related fear in acute low back pain: the first two weeks of a new episode
Judith M. Sieben, Johan W. S. Vlaeyen, Sandrine Tuerlinckx and Piet J. M. Portegijs 229

The auditory event related potentials in episodic and chronic pain sufferers
Serpil Demirci and Serpil Savas 239
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Using facial expressions to assess musculoskeletal pain in older persons

Thomas Hadjistavropoulos, Diane L. LaChapelle, Heather D. Hadjistavropoulos, Sheryl Green and Gordon J. G. Asmundson

Department of Psychology, University of Regina, Canada

Past research examined measures of pain among seniors who were experiencing movement-related exacerbations of musculoskeletal pain and obtained clear support for the utility of the behavioural coding of pain-related body movements (e.g., bracing, guarding). Support for the utility of the Facial Action Coding System (FACS), which involves the objective coding of facial reactions, was not as strong. The findings concerning FACS could have been an artifact of the methodology that was used. Specifically, the duration of the facial reactions was not taken into account and the patients suffered from a variety of painful conditions. Thus, the physical activities involved in the study could have been painful for some patients but not for others. The present study corrected these methodological concerns by accounting for the duration of facial reactions and ensuring that all patients suffered from the same painful condition. Participants were 82 post-surgical (knee replacement) inpatients. Cognitive status was assessed using the Modified Mini Mental Status Examination. Under physiotherapist’s supervision, the patients performed structured activities (i.e., reclining, standing, knee bends). Facial reactions were coded using FACS. Facial reactions varied as a function of the degree to which the various activities were strenuous. The results support the utility of FACS in the assessment of musculoskeletal pain among seniors undergoing rehabilitation following knee surgery. © 2002 European Federation of Chapters of the International Association for the Study of Pain. Published by Elsevier Science Ltd. All rights reserved.

KEYWORDS: pain, seniors, facial expressions, elderly, pain assessment.

INTRODUCTION

People in pain communicate their experience through a variety of means, including both self-report and nonverbal expressions. The communication of pain can be described as a three step, A → B → C, process (Hadjistavropoulos and Craig, 2002; Prkachin and Craig, 1995; Rosenthal, 1982). In this A → B → C model, the experience of an internal state such as pain (A) may be encoded in particular features of expressive behaviour (e.g., self-report, facial expressions; B) allowing observers to draw inferences (C) about the nature of the sender’s experience. The most common form of pain communication that is used in research is self-report. While useful in many contexts, self-report has significant limitations. Specifically, it is often not available (e.g., in persons with serious cognitive handicaps) and, because of its heavy reliance on higher mental processes, can be subject to conscious distortion (Hadjistavropoulos and Craig, 2002). Given such limitations, it is important to supplement self-reports of pain with nonverbal indices which are often more reflexive and, thus, more likely to be available among those who are unable to communicate verbally. Their reflexive nature also makes them less subject to conscious distortion (Hadjistavropoulos and Craig, 2002).

Among the most reflexive and automatic nonverbal indices of pain are facial expressions. Much of the pioneering work in this area has been
done by Kenneth D. Craig (e.g., Craig et al., 2001; Craig, 1998; Craig and Patrick, 1985; Craig et al., 1991a,b) who used the Facial Action Coding System (FACS; Ekman and Friesen, 1978). FACS is a comprehensive, anatomically-based system that involves the use of rigorous, explicit criteria to identify 44 discrete facial actions involving specific muscles or groups of muscles. These are typically identified through the use of slow action video and stop-frame feedback. The system has been shown to be highly reliable in many studies (e.g., Hadjistavropoulos and Craig, 1994; Craig et al., 1991a; LeResche and Dworkin, 1988; Prkachin, 1992). Through the use of this system, a distinct pattern of facial actions that are characteristic of pain has been identified in young adults (e.g., Craig et al., 1992). These actions include increases in inner brow raising, outer brow raising, brow lowering, cheek raising, eyelids tightening, nose wrinkling, upper lip raising, lip corner pulling, chin raising, lip puckering, lip stretching, lip pressing, lips parting, jaw dropping, mouth stretching, eyes closing, as well as a decrease in blinking (e.g., Craig et al., 2001; Prkachin, 1992).

Facial expressions have been widely studied among younger adults and infants (e.g., Grunau and Craig, 1990, 1987; Craig et al., 1991b). Some studies have examined such expressions among seniors but their positive findings come primarily from observations of very acute and phasic pain (i.e., produced by venipuncture and injections) which are likely not representative of the day-to-day pain that typically troubles people in this age group. Nonetheless, such studies have demonstrated very brief increases in facial activity as a result of venipuncture or injection (Hadjistavropoulos et al., 1997, 1998).

In a more recent study, Hadjistavropoulos et al. (2000) set out to examine the validity of non-verbal measures in detecting musculoskeletal pain. This type of pain was conceptualized as being more representative of the day-to-day pain experience of seniors than is venipuncture and injection. These investigators measured pain among seniors who were experiencing movement-related exacerbations of musculoskeletal pain and obtained clear support for the utility of the behavioural coding of pain-related body/limb movements (e.g., bracing and guarding; Keefe and Block, 1982) in the identification of pain and discomfort. For example, more guarding behaviour was manifested while patients were walking as compared to sitting, standing and reclining. As well, more guarding behaviour was manifested during transfers (e.g., moving from a seated to a standing position) as compared to sitting, standing and reclining. Support for the utility of the FACS (Ekman and Friesen, 1978), however, was not strong. Specifically, in contrast to pain-related body/limb movements, no main effect for physical activity (i.e., reclining, walking, standing, transferring) was found using an overall FACS-based index of facial activity. Nonetheless, a patient cognitive status x physical activity interaction provided some support for the utility of the index among seniors with dementia. Moreover, only two specific facial actions (of 17 studied) were found to vary significantly as a function of activity and the variability of these actions was haphazard. Nonetheless, the findings concerning FACS could have been an artifact of methodological aspects of the study. In particular, the duration of the facial reactions was not taken into account. This means, for example, that an individual who reacts to pain by tightening his or her eye orbits for less than one second and another who reacts by tightening the eye orbits continually for one minute could have obtained the same score. Furthermore, the patients suffered from a variety of painful conditions (e.g., arthritis, arm pain, hip pain, knee pain) and the physical activities involved in the study could have been painful for some patients but not for others.

The present study corrected these methodological concerns by accounting for the duration of facial reactions and ensuring that all patients suffered from the same painful condition. More specifically, we aimed to examine whether facial reactions of a group of seniors who had recently undergone knee-replacement surgery would increase during physiotherapy exercises that were expected to exacerbate pain. We hypothesized that FACS scores (based on intensity, frequency, and duration of facial movement) would be indicative of a higher amount of facial activity (believed to be representative of pain and
discomfort) when patients were engaged in more physically demanding activities (i.e., while standing and bending their knees) than during physically passive periods (i.e., resting in a reclining position). We also hypothesized that the most vigorous facial activity would be displayed during the knee bending period, followed by the standing period, then by the reclining period.

METHODS

Participants

Participants represented a convenience sample of post-surgical (knee replacement) inpatients (average age 73.1 [SD = 7.6; Range: 60-98]; 65.9% female). On average, they had undergone surgery 8 days (SD = 3.72) prior to participating in the study. Their cognitive status was assessed using the Modified Mini Mental Status Examination (3MS; Teng and Chui, 1987). Scores on this measure range from 0-100 and scores lower than 77 suggest the likelihood of cognitive impairments (Canadian Study on Health and Aging Working Group, 1994). The average 3MS score of our participants was 89.8/100 (SD = 9.0). Six participants scored within the range that is suggestive of cognitive impairment (Canadian Study on Health and Aging Working Group, 1994).

Self-report measures

Coloured visual analogue scale (CAS; McGrath et al., 1996)

This measure was developed to provide a practical clinical measure for children and others with marginal self-report skills and has been found to be easier to administer than the standard visual analogue scale. Pain on the CAS was rated by moving a plastic glide along a 14.5 cm long triangular shape varying in width and color from 1 cm wide and a light pink color at the bottom, to 3 cm wide and deep red color at the top. The extremes of the scale are anchored with the words ‘No Pain’ at the bottom and ‘Most Pain’ at the top. This allows participants to have visible cues for scaling their pain severity (i.e., scale length, word anchors, width variations, hue changes from pink to red). The plastic scale has numbers marked at the back so that the person administering the scale can record a number (ranging from 0 to 10) representing the participant’s pain. McGrath et al. (1996) have found that this CAS approach to the measurement of pain is reliable and valid with children. Similarly, the procedure has been found to be useful with elders without cognitive deficits and with elders who have mild to moderate cognitive deficits (Hadjistavropoulos et al., 1998).

Verbal descriptors scale (VDS; Melzack, 1975)

This instrument consists of a list of seven verbal descriptors ranging from ‘no pain’ to ‘pain as bad as it could be’. Pain is assessed by asking participants to select the one descriptor that best describes their pain. Scores on the scale range from 0-6 with higher scores representing more extreme pain. The measure has been used successfully in the assessment of geriatric pain (Gagliese and Melzack, 1997).

Behaviour rating scale (BRS; Linton and GoteStam, 1983)

This measure focuses on the behavioural effects of pain and includes six response alternatives ranging from ‘no pain’ to ‘pain present, cannot be ignored, rest or bed rest required’. Participants are asked to choose which of the six response alternatives best describes their pain. Scores on the scale range from 0-5 with higher scores representing more extreme pain. This measure has been used successfully in the assessment of geriatric pain (Gagliese and Melzack, 1997).

Procedure

Under physiotherapist’s supervision, the patients performed a physiotherapy session that consisted of a series of structured activities including the following:

1. Reclining—a control condition in which participants were instructed to rest for 1 min.

2...
Participants were made as comfortable as possible with a pillow under the knee and there was no movement involved.

(2) Knee Bending—an exercise designed to increase range of motion. During this exercise participants were in a reclined position and alternated between bending their knee as far as possible and straightening their knee as much as possible by sliding their heel up and down the bed. Participants were instructed to engage in this exercise for 1 min.

(3) Standing—participants were instructed to stand for one minute. All participants completed this activity with the aid of a walker.

Facial reactions were captured on video during the entire physiotherapy session (the camera was zoomed on the participant's face). Immediately following each activity, the patients provided self-report pain ratings on the CAS, VDS, and BRS for that activity. The videotapes were subsequently FACS coded. The Knee Bending, Standing, and Reclining activities were hypothesized to represent high, medium, and low levels of pain.

Using rigorous explicit criteria, a trained FACS (Ekman and Friesen, 1978) coder, who was qualified after passing the examination administered by the developers of the system, identified and discriminated the actions of 44 separate action units (AUs) with the assistance of slow motion video-editing equipment. The coder was blind to the hypothesis of the study and the only way that she could discriminate between the Knee Bending and Reclining activities was through facial expressions because the order of these activities was varied from patient to patient. Each AU was coded for its frequency of occurrence, intensity of expression (on a 5 point scale), and duration of expression (in secs).

RESULTS

In order to examine participants' self-reported responses on the CAS, VDS, and BRS, a series of repeated measures ANOVAs were completed with exercise type serving as the within subjects variable. The findings were consistent with our expectations and significant main effects were further analysed using the Tukey procedure. That is, self-reported pain levels were significantly greater during the more strenuous activities (i.e., Knee Bending and Standing) as compared to the less strenuous activity (i.e., Reclining). The relevant means are summarized in Table 1 and the statistical results are shown in Table 2. Given that the analyses of the self-report scores confirmed the expected relative painfulness of the three activities, we proceeded with the analyses of the FACS scores.

We calculated composite FACS scores that took into account the frequency, intensity, and duration (frequency × intensity × duration) of each facial action unit (AU) shown by previous research as being most relevant to pain (e.g., Craig et al., 2001; Prkachin, 1992). These pain-relevant AUs include AU1 (inner brow raise), AU2 (outer brow raise), AU4 (brow lower), AU6 (cheek raise), AU7 (lids tight), AU9 (nose wrinkle), AU10 (upper lip raise), AU12 (lip corner pull), AU17 (chin raise), AU18 (lip pucker), AU20 (lip stretch), AU24 (lip press), AU25 (lip part), AU26 (jaw drop), AU27 (mouth stretch), AU43 (eyes closed), and AU45 (blink). Most AU scores tend to be higher during periods of pain but AU 45 (blinking) tends to show reductions during painful events (Prkachin, 1992). These AUs represent discrete movements of muscles or groups of muscles and, as such, the average intercorrelation among them was non-significant.

Consistent with previous research (e.g., Hadjistavropoulos and Craig, 1994), we narrowed down the sample of pain-related AUs to the ones that were pain relevant within the specific context of this study. Specifically, we determined the total number of video segments in which any given AU could occur at least once (i.e., 3 [Reclining, Standing, and Knee Bending] × 82 patients = 246). We then included in our analysis only the pain-related AUs that occurred in at least 13 (i.e., >5% of 246) of the pain related segments (i.e., Knee Bending and Standing). AUs that did not occur with at least that frequency,
TABLE 1. Means and standard deviations of the self-report and FACS measures.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Reclining mean (SD)</th>
<th>Standing mean (SD)</th>
<th>Knee bending mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coloured analogue scale</td>
<td>3.01 (2.15)</td>
<td>3.91 (2.32)</td>
<td>5.38 (2.32)</td>
</tr>
<tr>
<td>Verbal descriptor scale</td>
<td>1.89 (1.12)</td>
<td>2.56 (1.28)</td>
<td>3.34 (1.09)</td>
</tr>
<tr>
<td>Behaviour rating scale</td>
<td>1.78 (1.24)</td>
<td>2.22 (1.24)</td>
<td>3.02 (1.20)</td>
</tr>
<tr>
<td>AU1 (inner brow raise)</td>
<td>17.40 (65.20)</td>
<td>50.71 (126.68)</td>
<td>25.34 (100.12)</td>
</tr>
<tr>
<td>AU2 (outer brow raise)</td>
<td>13.88 (52.95)</td>
<td>60.05 (132.31)</td>
<td>40.17 (145.86)</td>
</tr>
<tr>
<td>AU4 (brow lower)</td>
<td>43.93 (70.21)</td>
<td>81.81 (166.74)</td>
<td>122.71 (202.76)</td>
</tr>
<tr>
<td>AU6 (cheek raise)</td>
<td>2.96 (10.25)</td>
<td>28.18 (121.75)</td>
<td>36.77 (126.18)</td>
</tr>
<tr>
<td>AU12 (lip corner pull)</td>
<td>10.23 (38.67)</td>
<td>47.34 (129.97)</td>
<td>23.12 (82.65)</td>
</tr>
<tr>
<td>AU17 (chin raise)</td>
<td>3.23 (17.03)</td>
<td>0.79 (5.58)</td>
<td>30.02 (119.65)</td>
</tr>
<tr>
<td>AU18 (lip pucker)</td>
<td>3.49 (14.57)</td>
<td>5.21 (31.56)</td>
<td>13.57 (54.35)</td>
</tr>
<tr>
<td>AU20 (lip stretch)</td>
<td>1.88 (14.89)</td>
<td>0.04 (0.19)</td>
<td>6.64 (51.79)</td>
</tr>
<tr>
<td>AU24 (lip press)</td>
<td>55.37 (136.16)</td>
<td>88.66 (145.00)</td>
<td>164.88 (429.97)</td>
</tr>
<tr>
<td>AU25 (lips part)</td>
<td>17.99 (51.69)</td>
<td>28.47 (73.26)</td>
<td>34.48 (79.53)</td>
</tr>
<tr>
<td>AU26 (jaw drop)</td>
<td>17.88 (40.90)</td>
<td>35.52 (72.49)</td>
<td>57.43 (107.16)</td>
</tr>
<tr>
<td>AU43 (eyes closed)</td>
<td>18.76 (50.31)</td>
<td>0.38 (1.79)</td>
<td>29.59 (57.13)</td>
</tr>
<tr>
<td>AU45 (blink)</td>
<td>337.28 (737.48)</td>
<td>365.47 (550.30)</td>
<td>272.56 (670.03)</td>
</tr>
<tr>
<td>Overall FACS</td>
<td>24.08 (29.27)</td>
<td>52.53 (46.97)</td>
<td>73.65 (105.92)</td>
</tr>
</tbody>
</table>

AU = Action unit.

TABLE 2. Analyses of the self-report measures.

<table>
<thead>
<tr>
<th>Variable</th>
<th>ANOVA main effect</th>
<th>Significant differences (Tukey’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS</td>
<td>$R^2(156) = 56.07$, $p &lt; 0.0001$ (eta squared = 0.66)</td>
<td>Knee Bending &gt; Reclining Knee Bending &gt; Standing Standing &gt; Reclining</td>
</tr>
<tr>
<td>VDS</td>
<td>$R^2(156) = 59.07$, $p &lt; 0.0001$ (eta squared = 0.62)</td>
<td>Knee Bending &gt; Reclining Knee Bending &gt; Standing Standing &gt; Reclining</td>
</tr>
<tr>
<td>BRS</td>
<td>$R^2(156) = 35.45$, $p &lt; 0.0001$ (eta squared = 0.45)</td>
<td>Knee Bending &gt; Reclining Knee Bending &gt; Standing Standing &gt; Reclining</td>
</tr>
</tbody>
</table>

CAS = Coloured Visual Analogue scale; VDS = Verbal descriptors scale; BRS = Behaviour rating scale.

were not deemed to be pain relevant in this context. The means and standard deviations of these pain-relevant AUs broken down by activity are summarized in Table 1. Utilizing a series of repeated measures ANOVAs, we then compared the three coded segments with respect to these specific AUs. The findings were generally consistent with our expectations. That is, pain-related AUs demonstrated the expected patterns and differentiated the more strenuous activities (i.e., Knee Bending and Standing) from the less strenuous activity (i.e., Reclining). These findings are summarized in Table 3.

It is noteworthy, that the only AU that varied significantly as a function of activity and did not behave in the expected fashion was AU 43 (eyes closed). Specifically, this AU occurred more frequently during reclining than it did during standing. This was likely an artifact of the possibility that, while standing, the patients needed to keep their eyes open in order to maintain their balance. Furthermore, there may be a natural inclination to keep the eyes closed while in the reclining position. Given these considerations we decided not to consider AU 43 as being informative with respect to pain assessment under the
TABLE 3. Analyses of the facial action coding system.

<table>
<thead>
<tr>
<th>Variable</th>
<th>ANOVA main effect</th>
<th>Significant differences (Tukey's)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU1 (inner brow raise)</td>
<td>$F(1,78) = 2.85, \ p = 0.06$</td>
<td>Standing &gt; Reclining</td>
</tr>
<tr>
<td>AU2 (outer brow raise)</td>
<td>$F(1,78) = 3.45, \ p = 0.03$</td>
<td>Knee Bending &gt; Reclining</td>
</tr>
<tr>
<td>AU4 (brow lower)</td>
<td>$F(1,78) = 6.14, \ p = 0.003$</td>
<td>Standing &gt; Reclining</td>
</tr>
<tr>
<td>AU6 (cheek raise)</td>
<td>$F(1,78) = 2.46, \ p = 0.09$</td>
<td>Knee Bending &gt; Reclining</td>
</tr>
<tr>
<td>AU12 (lip corner pull)</td>
<td>$F(1,78) = 3.10, \ p = 0.06$</td>
<td>Knee Bending &gt; Standing</td>
</tr>
<tr>
<td>AU17 (chin raise)</td>
<td>$F(1,78) = 4.54, \ p = 0.01$</td>
<td></td>
</tr>
<tr>
<td>AU18 (lip pucker)</td>
<td>$F(1,78) = 2.12, \ p = 0.12$</td>
<td>Knee Bending &gt; Reclining</td>
</tr>
<tr>
<td>AU20 (lip stretch)</td>
<td>$F(1,78) = 0.96, \ p = 0.38$</td>
<td>Knee Bending &gt; Standing</td>
</tr>
<tr>
<td>AU24 (lip press)</td>
<td>$F(1,78) = 3.65, \ p = 0.03$</td>
<td>Knee Bending &gt; Standing</td>
</tr>
<tr>
<td>AU25 (lips part)</td>
<td>$F(1,78) = 2.28, \ p = 0.10$</td>
<td>Knee Bending &gt; Standing</td>
</tr>
<tr>
<td>AU26 (jaw drop)</td>
<td>$F(1,78) = 6.65, \ p = 0.002$</td>
<td>Knee Bending &gt; Standing</td>
</tr>
<tr>
<td>AU43 (eyes closed)</td>
<td>$F(1,78) = 10.74, \ p = 0.0001$</td>
<td>Standing &lt; Reclining*</td>
</tr>
<tr>
<td>AU45 (blink)</td>
<td>$F(1,78) = 1.39, \ p = 0.25$</td>
<td></td>
</tr>
</tbody>
</table>

*The finding that AU43 (eyes closed) was less frequent during Standing is likely an artifact of the possibility that the patients needed to keep their eyes open in order to maintain their balance. Furthermore, there may be a natural inclination to close one's eyes while in the reclining position.

circumstances of the present study. In order to determine whether a distinct facial expression of pain could discriminate among the three activities under study, we calculated a combined FACS score that consisted of the mean composite score for all pain related AUs that were found to differentiante between any two of the three activities that we studied (with the exception of AU 43). The analysis revealed a significant main effect for activity, $F(1,78) = 11.37, \ p < 0.0001$ (eta squared $= 0.31$). Post-hoc Tukey's comparisons revealed that the Knee Bending and the standing activities resulted in significantly more facial activity than Reclining. Knee Bending also resulted in more facial activity than Standing. Figure 1 illustrates that the combination of these AUs clearly differentiates among the three activities in the precise manner that was predicted. The correlations between the overall FACS score and our self-report indices of pain were not significant.

Since the participants varied to some extent with respect to level of cognitive functioning, we examined whether there were any significant relationships of 3MS scores with pain-related facial reactions or self-report. There were no significant correlations between 3MS scores and the overall pain-related facial reactions or any of the self-report measures during Reclining, Knee.

![Overall Facial Action Coding System means for each of the physiotherapy activities studied.](image)

Bending, or Standing. Since only six participants were deemed to have cognitive impairments, we also re-ran the same correlational analyses after excluding these six individuals in order to determine whether there is a linear relationship between 3MS scores and pain indices (including FACS) among persons of normal cognitive ability. No such relationship was identified.

DISCUSSION

This study yielded clearer support for the use of FACS as a means of assessing pain in seniors. Consistent with our hypothesis, the results demonstrate that FACS cannot only discriminate between pain and absence of pain but can also
provide information about the variability of the pain experience of seniors with musculoskeletal problems. Facial reactions varied as a function of the degree to which the various activities were strenuous. The Reclining activity, which was expected to lead to the least amount of discomfort, could be discriminated from both the activity that was expected to lead to intermediate levels of discomfort (i.e., Standing) as well as the activity that was expected to lead to high levels of discomfort (i.e., Knee Bending). The Knee Bending and Standing activities also differed from one another in the expected direction. FACS, therefore, appears to be sensitive to changes in pain that are instigated by increases in the intensity of activity. The self-report ratings were consistent with the pattern of results obtained using FACS, thus providing further evidence of validity for our manipulation. Caution should be exercised, however, since group averages do not necessarily generalize to every individual. In fact, the precise expected ordering of exercise conditions (based on FACS) was only manifested in close to 40% of the patients (which is comparable to the ordering based on the self-report CAS rating). In other words, while our results clearly support the utility of our nonverbal measure and our exercise manipulation when group averages are of interest (e.g., in clinical trials research), their clinical use for the individual patient requires further refinement and investigation.

In an attempt to determine the sensitivity of each of our main dependent measures (i.e., overall FACS score and self-report indices) in identifying pain variability across exercise conditions, we examined the magnitude of effect for each of the relevant ANOVAs (see Table 2 and Results section). The eta squared coefficients suggest that the exercise manipulation accounted for a substantial portion of the variance in each of our main dependent measures although this was more pronounced for the self-report indices. Clearly, self-report is extremely important in pain assessment. Our results suggest, however, that in situations where self-report is unavailable or unreliable (e.g., in studies of persons with limited ability to communicate), FACS can be a useful tool.

Overall, the results show that FACS is a useful measure of pain in the seniors' population. While it may be difficult to use in busy clinical settings because it is time consuming and requires special training, its sensitivity to both the presence/absence of pain as well as variability in the pain experience has potential applications in clinical research examining the efficacy of palliative and other interventions for seniors. Recent applications of real-time coding of pain behaviors (Prkachin et al., in press), combined with practical applications of FACS, made possible with technological advances in computerized tracking and scoring methods, may prove particularly fruitful in this regard.

Our self-report indices were not significantly correlated with the FACS measure. This is consistent with previous research (e.g., Hadjistavropoulos et al., 1998; LeResche and Dworkin, 1988; Prkachin, 1992). For instance, Hadjistavropoulos et al. (1998) studied patients undergoing venipuncture and found that although both self-reported pain and facial activity showed expected increases from a calm, baseline period to a venipuncture period, the two types of indices were not significantly correlated. Prkachin (1992), who also did not find significant correlations between FACS and self-reported pain, studied clearly manifested facial reactions to a variety of pain-inducing stimuli (electric shock, pressure, cold and muscle ischemia). It appears that FACS taps the more immediate, reflexive aspects of the pain experience whereas, self-report measures can often be construed as being almost retrospective (i.e., in the Hadjistavropoulos et al., 1998 they were obtained immediately after the venipuncture period and in this study immediately after the painful exercises) and more likely to be affected by factors such as social desirability and patient affective states (Craig et al., 2001; Green et al., 2000). Although scores on facial pain do not seem to correlate strongly with verbal report, they correlate with physiological indices (Johnston et al., 1995) and facial displays diminish when analgesics are applied in randomized controlled trials (Guinsburg et al., 1998; Taddio et al., 1997). It is possible that facial expressions might often provide the better index of the pain experience,
given that self-report can be subject to situational demand (Craig et al., 2001).

It is certainly the case that not all facial actions are indicative of painful distress. It has been suggested that the association of specific facial displays with specific internal states is due to bioevolutionary adaptive consequences (Darwin, 1872/1965). For example, the physical threat is often associated with pain should provoke protective actions. Lowering of the brows to narrow the eye orbit, for instance, could reflect efforts to protect the eyes while maintaining vision in order to engage in protective behaviour (Craig et al., 2001). Moreover, despite cross-situational consistency in many features of the facial pain response, several specific facial actions tend to vary as a function of the nature of the noxious stimulus. This appears to be the result of situational influences, psychosocial factors (e.g., the presence of tolerant models) and the severity of distress (Craig et al., 2001). As such, the combination of pain-related AUs does not show perfect consistency across studies (i.e., not all pain-related AUs are found to be pain-relevant in all studies).

The reflexive nature of facial reactions of pain increases the likelihood of these reactions being available among elders with dementia and impairments in verbal communication. Past research has confirmed that ability to provide self-report of pain varies as a function of cognitive ability (e.g., Parmelee et al., 1993) although dementia does not seem to result in reductions in facial activity (e.g., Hadjistavropoulos et al., 1998). Our sample, however, was not specifically selected for the presence of dementia and there were only six participants whose MS scores were suggestive of cognitive impairment. Thus, it was not possible to examine the relation between clinically significant variations in cognitive status and scores on our dependent measures. Nonetheless, we did not find any evidence of a significant relation between cognitive ability and pain scores among our cognitively intact participants. Since research of acute, phasic pain has already demonstrated that the facial reactions of seniors with cognitive impairments do not diminish (Hadjistavropoulos et al., 1998), FACS could potentially prove to be a very promising measure in the study of seniors who suffer from dementia and chronically unremitting pain.

ACKNOWLEDGEMENTS

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Acute pain management after surgery or in the emergency room in Switzerland: a comparative survey of Swiss anaesthesiologists and surgeons

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Nociception Research Group, Bern, Switzerland, bMedical Department, Serono International SA, Geneva, Switzerland, aMedical Department, Giaclo Wellcome AG, Schönbühl, Switzerland

The treatment of acute pain remains unsatisfactory despite advances in pain research and the publication of numerous guidelines. The aim of this study was to survey postoperative and emergency room acute pain treatment in Switzerland, particularly regarding compliance with practice guidelines on therapeutic responsibility, treatment algorithms, pain documentation, quality control and education.

A representative sample of anaesthesiologists and surgeons (general and orthopaedic) was selected from all Swiss hospitals with regular surgical activity and sent a 256 point questionnaire on acute pain management.

Five hundred and seventy five doctors were contacted in 98 hospitals, 44% of doctors (covering 89% of hospitals) returned fully completed questionnaires. Half the respondents work in a hospital with an acute pain service. For postoperative pain management, only 10% of prescription is by algorithm, less than a third of respondents regularly determine pain scores, only 15% perform any statistical analysis of pain management, less than one third regularly meet to discuss management problems, and half claim not to have received—or be receiving—formal (i.e. structured/accredited) pain education. The situation is even less satisfactory for emergency room analgesia. Respondents accept the contribution of postoperative and emergency room analgesia to reduced costs and improved medical outcomes. Asked to highlight their major concerns in acute pain management, lack of education and inadequate organisation are listed in first and second positions.

This survey suggests that publication of published practice guidelines for acute pain management can be improved, and highlights the need for continuing organisational and educational development in acute analgesia, particularly for the emergency room. © 2002 European Federation of Chapters of the International Association for the Study of Pain. Published by Elsevier Science Ltd. All rights reserved.

KEYWORDS: postoperative pain, emergency room pain, pain documentation, pain education, quality management, comparative survey.

INTRODUCTION

The adequate treatment of acute pain after surgery and trauma is a humanitarian obligation for health care professionals. Analgesia plays an important role in speeding the patient’s recovery, in reducing and limiting morbidity, as well as probably improving clinical outcomes (Yeager et al., 1987; Rawal, 1995; Follin and Charland, 1997; Ballantyne et al., 1998; Capdevila et al., 1999). Despite progress in understanding pain mechanisms and advances in analgesic therapy, satisfactory postoperative control of pain remains a challenge. A large UK hospital survey showed over 80% of patients experiencing significant pain after surgery, with pain present all or most of the time.
the time in one third of patients (Bruster et al., 1994). Sixty percent of respondents in a US survey considered postoperative pain their primary concern before surgery, with about three-quarters experiencing significant postoperative pain (Warfield and Kahn, 1995).

The unsatisfactory situation of postoperative analgesia is less due to lack of analgesic drugs and technologies and more the result of problems in the system of delivering postoperative pain management (Miaskowski et al., 1994; Rawal and Berggren, 1994). Thus guidelines for the management of acute postoperative pain have been published during the last decade in various countries (Wulf and Neugebauer, 1997), including the UK (Royal College of Surgeons of England and College of Anaesthetists, 1990), United States (Carr et al., 1992; American Pain Society, 1995; American Society of Anesthesiologists, 1995) and Germany (Bund Deutscher Anaesthesisten und Bund Deutscher Chirurgen, 1992; Wulf et al., 1997). These guidelines on acute pain management include the following recommendations: (1) define responsibilities (establishment of acute pain services), (2) use therapeutic algorithms, (3) assess and document regularly, (4) institute quality control measures, and (5) provide for regular education.

The situation is more problematic regarding the treatment of acute pain in the emergency room (Ducharme and Barber, 1995). Few data are available on present standards of practice and organisation of analgesia in this setting, and no guidelines specific to acute pain in the emergency room are available to date.

The aim of this study was to survey postoperative and emergency room acute pain treatment in Switzerland. To this end we surveyed the three main and largest medical specialties managing pain in both the postoperative and emergency room context in Switzerland, i.e. anaesthesiologists, general surgeons and orthopaedic surgeons (there is no separate emergency room physician or traumatology specialisation in Switzerland).

The major concern of the investigation was to investigate how well present practice fulfils acute pain management guidelines on therapeutic responsibility, treatment algorithms, pain documentation, quality control and education. In addition, we explored actual practice, attitudes and opinions, as well as perceived needs of practitioners regarding acute pain management.

METHODS

Population

All hospitals in Switzerland with regular general and orthopaedic surgical activity and more than 50 beds (n = 219) were identified using the 1997/8 Swiss Yearbook of Medicine (Schweizerisches Medizinisches Jahrbuch, 1997). All staff anaesthesiologists, general surgeons and orthopaedic surgeons (total n = 1302; anaesthetics: 556 = 43%, general surgery: 483 = 37%, orthopaedic surgery: 254 = 20%) practising at these hospitals (university: 230 = 18%, cantonal: 295 = 22%, regional: 280 = 22%, district: 300 = 23% or private: 197 = 15%) were entered on a computer database, and a computer-generated random sample drawn (predetermined as about half of the total population), directly proportional to the total number in each speciality and hospital category. This procedure permits results directly representative of the surveyed target population to be easily obtained. Sampling was performed by a professional institute not otherwise involved in the study (Department of Social and Preventive Medicine, Berne University, Switzerland).

Questionnaire mailing

A total of 618 questionnaires were mailed to the sample population (43% anaesthesiologists, 37% general surgeons and 20% orthopaedic surgeons) in 98 hospitals (23% university, 24% cantonal, 22% regional, 19% district, 12% private hospitals) in March 1997. Details of the 256 point questionnaire are given in Appendix 1. Either French or German versions of the questionnaire were mailed according to the region of Switzerland (French, German or Italian-speaking) which the hospital was situated in. The physicians contacted were asked to return the questionnaires within 2 weeks of receipt. If the questionnaire was
not returned within 3 weeks, a mail reminder, again asking for an answer within 2 weeks, was sent out. Questionnaires remaining unanswered 3 weeks later were followed up by a telephone reminder. All questionnaires returned by 3 months after the initial mailing were included for analysis.

Statistics

Analysis of the questionnaire answers was performed on anonymised data, and only questions with a response rate of over one half were evaluated. Descriptive statistical analysis was performed for the whole sample and for the medical specialties individually. Where appropriate, subgroup analysis was also carried out according to hospital category. Comparative statistical analysis was done according to medical specialties, for hospital category where appropriate, and for emergency room vs postoperative analgesia in the presence of matched question pairs. Statistical comparison was performed using ANOVA with post-hoc Tukey’s or Kruskal-Wallis ANOVA with post-hoc Bonferroni-corrected Mann Whitney U testing as appropriate. Statistical significance was set at \( p < 0.05 \).

RESULTS

Response characteristics

Of the total of 618 questionnaires sent out, 43 (7%) represented changes of address or replacements, leaving 575 evaluable questionnaires. Of these evaluable questionnaires, 252 (44%) from 87 hospitals (89%) were returned completed (university: 21%, cantonal: 26%, regional: 25%, district: 18%, private: 10%; n.s vs proportion sent out). Seventy seven questionnaires were returned blank (refusals, 13%) and 246 (43%) were not returned. The distribution of responses (i.e. completed, refused or not returned) was similar regarding type of hospital (university, cantonal, regional, district or private) and hospital position of responding doctor (Chefarzt, Leitender Arzt, Oberarzt or Belegarzt). There was no significant difference in the number of responders from each hospital type. Anaesthesiologists (A) returned significantly more questionnaires (number of complete returns = 130) than general surgeons (GS; \( n = 79 \)) or orthopaedic surgeons (OS; \( n = 43 \)) (percentage return rate within each group for A: 57%, GS: 32%, OS: 30%, \( p < 0.00001 \) for A vs OS/GS; percentage of all responses for A: 52%, GS: 31%, OS: 17%, \( p < 0.05 \) for A vs OS/GS). There were fewer male anaesthesiologists (80%, \( p < 0.05 \) vs GS/OS) than general (95%) or orthopaedic (98%) surgeons. No differences were present between the groups regarding mean time since medical (20 years) or specialist (11 years) qualification. The distribution of hospital positions was similar in the three groups of specialists.

Using a scoring system (0 = minimum, 10 = maximum), the median perceived difficulty of the questionnaire was 4 (interquartile range: 2-5) and its median perceived relevance to everyday practice 5 (interquartile range: 3-6). The mean completion time was 27 minutes (SD: 15).

Therapeutic responsibility

About one third (\( n = 28; 32\%) \) of the 87 hospitals surveyed have a formal acute pain service\(^1\), which was in service since 4 ± 3 years (mean, SD). Forty-seven percent of respondents work in a hospital with an acute pain service (university hospital: 81%, cantonal: 52%, regional: 28%, district: 28%, private: 50%; \( p < 0.05 \) for all vs university). Responsibility for the prescription of acute analgesia is evenly divided between surgeons and anaesthesiologists on the ward postoperatively and in the emergency room (Table 1).

---

\(^{1}\) University = hospital directly attached to a university; Cantonal = large, tertiary care hospital covering an entire canton; Regional = medium-sized, secondary care hospital covering a part of a canton; District = small, primary care hospital covering part of a region; Private = privately-owned hospital not part of the state hospital system.

\(^{2}\) Chefarzt = head of department; Leitender Arzt = vice-head of department; Oberarzt = staff member of department; Belegarzt = external hospital-associated specialist.

\(^{3}\) Defined as a separate service with designated responsibilities and personnel, and a regular ward round dedicated to providing and monitoring postoperative analgesia.

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European Journal of Pain (2002), 6
TABLE 1. Therapeutic responsibility for pain management.

<table>
<thead>
<tr>
<th>Hospital type</th>
<th>Postoperative: pacu</th>
<th>Postoperative: ward</th>
<th>Emergency room*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anaesthesiologist</td>
<td>Surgeon (G + O)</td>
<td>Anaesthesiologist</td>
</tr>
<tr>
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</tr>
<tr>
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<td>97</td>
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<td>56</td>
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</table>

Results are percentages of respondents. ‘Surgeon’ includes both general and orthopaedic surgeons. * = significant (p < 0.05) overall difference between hospital categories. † = p < 0.05 vs university. There were no significant differences between the answers of medical specialties within individual hospital categories.

Therapeutic algorithms

About 10% of postoperative analgesia is prescribed according to therapeutic algorithms, the figure is less than 5% for the emergency room (Table 2). Details of the therapeutic algorithms are shown in Table 2, with the most frequently included factor being pain intensity.

Pain documentation

Postoperatively, about a third of respondents document pain scores or similar regularly, about a quarter document nothing (Table 3a). Documentation rates are better postoperatively and for universities, the most commonly recorded factor is analgesic consumption.

Quality control

Quality control measures are evenly spread across hospital types, with these measures being more prevalent in the postoperative context than in the emergency room (Table 3b).

Pain education

Regular continuing pain education is received by 47% of respondents for postoperative pain, and 41% for emergency room pain. Forty seven percent have undergone no formal pain education (i.e. structured and accredited instruction, e.g. in a university or in an accredited course) in the past, with the proportion differing significantly according to hospital type (university hospital: 45%, cantonal: 60%, regional: 50%, district: 22%, private: 55%; p < 0.05 for university). Most respondents have received their education during specialisation (42%; A: 63%, GS: 18%, OS: 32%; p < 0.05 for both surgeons vs anaesthesiologists), with only 8% receiving pain education as undergraduates (A: 3%, GS: 16%, OS: 13%; p < 0.05 for general surgeons vs anaesthesiologists) and 12% after specialisation (A: 20%, GS: 3%, OS: 5%; p < 0.05 for general surgeons vs anaesthesiologists). Further details are given in Table 4.

Acute pain practice

Morphine is the most frequently used opioid postoperatively and in the emergency room (44% vs 41%; n.s.), followed by nicomorphine and pethidine. Morphine is used with similar frequency postoperatively and in the emergency room for visceral pain (postop = 68%, emergency room = 69%; n.s.), but less frequently postoperatively than in the emergency room for bone pain (25% vs 63%; p < 0.05). Propacetamol and ketorolac are the most frequently used intravenous non-opioid analgesics postoperatively and in the emergency room (26% of respondents for both drugs and for both situations). Further details are given in Table 5. Most respondents
### TABLE 2. Algorithm use and factors.

<table>
<thead>
<tr>
<th>Hospital type</th>
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<th>Postoperative: ward</th>
<th>Emergency room&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No algorithm</td>
<td>Algorithm</td>
<td>No algorithm</td>
</tr>
<tr>
<td></td>
<td>Anaesth</td>
<td>Surgeon</td>
<td>Doctor</td>
</tr>
<tr>
<td>a. Algorithm use and who prescribes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALL</td>
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<td>11&lt;sup&gt;i&lt;/sup&gt;</td>
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</tr>
<tr>
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<td>2&lt;sup&gt;i&lt;/sup&gt;</td>
<td>6&lt;sup&gt;i&lt;/sup&gt;</td>
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<tr>
<td>Distinct</td>
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<td>5&lt;sup&gt;i&lt;/sup&gt;</td>
<td>0&lt;sup&gt;i&lt;/sup&gt;</td>
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<td>0</td>
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<table>
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<th>Postoperative: ward</th>
<th>Emergency room&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pain intensity</td>
<td>Type of pain</td>
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<tr>
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<td>33</td>
<td>50</td>
</tr>
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</table>

Results are percentages of respondents. 'Surgeon' includes both general and orthopaedic surgeons. <sup>a</sup> = significant (p < 0.05) overall difference between hospital categories; <sup>i</sup> = p < 0.05 vs emergency room. There were no significant differences between the answers of medical specialties within individual hospital categories for both algorithm use and factors included.
### TABLE 3. Documentation and quality control in acute pain therapy.

<table>
<thead>
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<th>Hospital type</th>
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<th>Emergency room</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nothing</td>
<td>VAS</td>
</tr>
<tr>
<td>a. Documentation of analgesic therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALL</td>
<td>24†</td>
<td>30†</td>
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<td>53†</td>
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</thead>
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<td>Meetings</td>
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<td>32†</td>
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</tbody>
</table>

Results are percentages of respondents. VAS—pain intensity visual analogue score or similar. Statistics—statistical analysis of results; Meetings—meetings to discuss problems and suggestions for improvement; Education=post-graduate education meetings on pain and related problems. † = significant \( p < 0.05 \) overall difference between hospital categories; * = \( p < 0.05 \) vs university; † = \( p < 0.05 \) vs emergency room. There were no significant differences between the answers of medical specialties within individual hospital categories, except for orthopaedic surgeons vs anaesthesiologists in regional hospitals regarding continuing postoperative pain education.
consider certain specific analgesics to be more effective than others for treating specific types of pain, both postoperatively (81% agree) and in the emergency room (87% agree).

Forty-one percent of the physicians surveyed discuss pain preoperatively with their patients (A: 53%, GS: 31%, OS: 15%; $p < 0.05$ for A vs GS/OS), but another 41% undertake nothing preoperatively with regard to postoperative pain (A: 35%, GS: 48%, OS: 46%; n.s.; hospital category: n.s.). 85% of the respondents work in institutions offering patient-controlled analgesia (universities 100%, $p < 0.05$ vs cantonal [81%] and regional [77%] hospitals); 78% in hospitals
offering postoperative epidural analgesia (universities 81%, \( p < 0.05 \) vs district hospitals (50%). Fewer of the respondents’ institutions offer continuous intravenous infusion (43%) or continuous peripheral blocks (38%) for postoperative analgesia (n.s. for hospital category).

83% of respondents (A: 85%, GS: 87%, OS: 72%; n.s.) treat pain after ambulatory surgery differently than for inpatients. 54% use loco-regional anaesthesia more frequently for ambulatory patients (less = 29%, never = 17%). 64% give fewer opioids after day surgery (more = 2%, never = 34%), with 68% using shorter-acting analgesics for ambulatory than for inpatient procedures (longer = 32%).

**Attitudes and opinions**

The quality of analgesia is felt to improve outcome or reduce costs by more respondents in the postoperative than in the emergency room context (outcome: 93% vs 83%; costs: 66% vs 56%; \( p < 0.05 \) for both; hospital category or specialisation: n.s.). A majority of anaesthesiologists consider patients’ choice of hospital to be influenced by the availability of modern postoperative pain management methods (epidural, patient-controlled analgesia) (agree: A: 63%, GS: 34%, OS: 39%; \( p < 0.05 \) for A vs GS/OS; hospital category: n.s.). Respondents are generally more satisfied with postoperative than emergency room acute pain therapy (Table 6). There is a high degree of satisfaction with the analgesic drugs available (satisfied by opioids: 93%, non-opioid analgesics: 83%, local anaesthetics: 80%).

**Perceived needs**

The most important problem for respondents is effective organisation of the system for delivering acute pain treatment (respondents agreeing for postop 52%, emergency room 56%). Next most urgent need is insufficient staffing (39% agree), followed by inadequate personal knowledge for postoperative analgesia (35% agree), and drug side-effects (38% agree) and insufficient personal knowledge for emergency room analgesia (37% agree).

For both postoperative and emergency room analgesia, the highest-ranked response to the question ‘which areas of postoperative or emergency room analgesia most need improving?’ is ‘better pain education’ followed by ‘better organisation of acute analgesia’ (specialties taken together and separately). Third-ranked wishes are ‘better staffing for postoperative pain management’ and ‘better analgesic drugs for the emergency room’, for all specialties taken together. The analysis is similar for the specialties taken separately, except that ‘better drugs for postoperative analgesia’ is in third position for both surgical specialties, and ‘more staff for the emergency room’ for anaesthesiologists.

Together and separated into specialties, the physicians surveyed consider progress in acute analgesic management to be best achieved by better pain education (respondents agreeing for postop: 66%, emergency room: 76%). Better organisational forms (postop: 56%, emergency room: 62%) and better quality control measures (postop: 56%, emergency room: 49%) take second and third places. Ranking desired progress regarding

**TABLE 6. Satisfaction with acute pain therapy.**

<table>
<thead>
<tr>
<th></th>
<th>Postoperative</th>
<th></th>
<th></th>
<th>Emergency room</th>
<th></th>
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<tr>
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<td>ALL</td>
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<td>General</td>
<td>Orthop.</td>
<td>ALL</td>
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<tr>
<td>Adult pain</td>
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<tr>
<td>Paediatric</td>
<td>73†</td>
<td>65</td>
<td>87*</td>
<td>74</td>
<td>58</td>
<td>38</td>
</tr>
<tr>
<td>pain</td>
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<tr>
<td>therapy†</td>
<td>74†</td>
<td>65</td>
<td>88</td>
<td>84</td>
<td>66</td>
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<tr>
<td>therapy†</td>
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</tbody>
</table>

Results are percentages of respondents. † = significant \( p < 0.05 \) overall difference between specialisations \* = \( p < 0.05 \) vs anaesthesiologists; †† = \( p < 0.05 \) vs emergency room.

*European Journal of Pain (2002), 6*
analgesic drugs, 'fewer side effects' tops the list, followed by 'new and better analgesic mechanisms of action' and 'better drug combinations' for respondents overall and separated into specialities.

DISCUSSION

The results of this respondent-based survey of acute pain management in Swiss hospitals, based on subjective self-assessment, suggest that there remains room for improvement in the areas addressed by recent published guidelines. A formal acute pain service is present in one third of hospitals surveyed; about half the physicians surveyed work in a hospital possessing one. Less than 10% of postoperative pain therapy is prescribed using standardised therapeutic algorithms. Under a third of all respondents document postoperative pain intensity scores, and a quarter does not document anything regarding pain. Only one in eight respondents perform audit or statistical analysis of postoperative pain management, less than a third meet regularly to discuss such results or to provide a forum for improving pain treatment. Almost half the physicians involved in postoperative analgesia have never received any formal pain education (i.e. at university or in an accredited postgraduate course), and less than half participate regularly in continuing pain education. Of particular note is the fact that almost three quarters of surgeons claim to have received no pain education. The situation is even less satisfactory regarding acute pain management in the emergency room.

Critique of methods

We performed randomized proportional sampling by medical speciality according to the number present in each hospital category, an accepted and standard method for this kind of survey (Backstrom and Hursch-Cesar, 1981) resulting in equal weight per medical speciality in each hospital category. The overall response rate of 44% of physicians from 89% of hospitals can be considered adequate for this type of survey (Backstrom and Hursch-Cesar, 1981) and is unlikely to have been accompanied by responder selection bias in this size of sample. We suggest that the sample can therefore be considered representative of physicians involved in acute pain management in Switzerland. Bias regarding hospital category or doctor position selection is further unlikely due to equal distribution of response rates across these factors. Anaesthesiologists did, however, have a significantly higher response rate than surgeons. As it is the anaesthesiologists who are most frequently involved in acute pain therapy anyway, this is unlikely to affect the accuracy of the results pertaining to the overall practice, management and organisation of acute pain treatment. Responders in this study are likely to be the physicians interested in pain management, and any bias in the responses is thus likely to err on the positive side of reality.

The fact that this survey is respondent- (not institution-) based and that the answers depend on subjective self-assessment needs to be taken into account when interpreting our results. Different medical specialities might have had incomplete knowledge of organisational or therapeutic aspects of their institution. However, this is unlikely to be the case in the present survey as answers regarding such institutional aspects did not differ significantly between medical specialities within the five types of hospital surveyed.

Therapeutic responsibility
(acute pain service)

There is consensus amongst the guidelines cited that the presence of an acute pain service is the most effective way of assuring and organising postoperative pain treatment. In fact, effective and safe use of modern analgesic techniques such as patient-controlled or epidural analgesia is dependent on the existence of such a formal framework (Coleman and Booker-Milburn, 1996; Stacey et al., 1997; Zenz 1997) and may improve outcome (Brodner et al., 2000). Our Swiss results reporting the presence of an APS for 32% of hospitals compare with recently reported acute pain service penetration figures of 34% of hospitals in Europe overall (Rawal and Allvin, 1998).
43% in the UK (Windsor et al., 1996), 19% in New Zealand (Merry et al., 1997), and 52% (Warfield and Kahn, 1995) and 62% (Carr et al., 1998) in the US. These figures are, however, not directly comparable due to differences in sampling dates and techniques. Responsibilities for the prescription of acute pain therapy on the ward are about equally divided between surgeons and anaesthetists in both our Swiss and a recent US sample (Carr et al., 1998).

Therapeutic algorithms

All acute pain management guidelines strongly recommend the use of formal therapeutic algorithms. Introducing these contributes to improved postoperative pain control, reduced nausea and vomiting, as well as a slightly decreased complication incidence (Harmer and Davies, 1998). Algorithm use in our survey was low, with a usage rate of under 10% of respondents. In comparison, preprinted orders for postoperative pain management programmes were used by nearly all hospitals (97%) in a recent US survey (Carr et al., 1998).

Pain documentation

Measuring and documenting pain regularly is an essential prerequisite for effective pain management (Rawal and Berggren, 1994). The introduction of regular pain intensity measurement (scores, scales) into postoperative acute pain management improves both pain and other outcomes (Campianese, 1996; Harmer and Davies, 1998). A recent European survey has found that 40% of surveyed hospitals use a visual analogue pain score or other methods for assessment of pain intensity (Rawal and Alving, 1998), close to the 30% of respondents scoring pain intensity in the present study. Carr et al. (1998) report that 72% of US institutions surveyed had implemented numeric pain rating scale use, with the scale being used 'very frequently' only for 40% of cases.

Quality control

An effectively organised system for acute pain treatment collects data on pain management, analyses it and establishes mechanisms to continuously assure and improve quality (Ferrell et al., 1995; Campionese, 1996; Wulf and Neugebauer, 1997). Similarly low rates of quality control measures as in our study have been observed in a pan-European study (Rawal and Alving, 1998), with a higher rate (44% of respondent's hospitals with quality improvement programmes) being quoted in a recent US study (Carr et al., 1998).

Education

The introduction of formal (i.e. structured and accredited) education programmes has a positive impact on postoperative analgesia (Coleman and Booker-Milburn, 1996; Harmer and Davies, 1998). Studies continue to show clear deficits of knowledge regarding acute pain management for doctors as well as nurses in Europe (Gould et al., 1994; Cambitzi, 1996; Pöyhä and Kalso, 1999) and North America (Brunner et al., 1995; Knowles, 1996). Only about half the physicians surveyed in our study claim to have been formally educated (i.e. to have followed structured and accredited courses) in pain management in the past, and only half claim to be receiving regular continuing pain education at present. This compares with 77% of respondents receiving acute postoperative pain management instruction in the US (Carr et al., 1998), albeit mainly targeted at nursing staff.

Practice

In the practice of acute postoperative analgesia, the use of opioids (75%) and drug combinations (61%) is adequate and well established. The same holds true, albeit to a lesser extent, for emergency room analgesia. Respondents recognise the need to treat acute pain differently for ambulatory surgery, with clear preferences for more locoregional anaesthesia and fewer and shorter-acting opioid analgesics in accordance with published guidelines. In the already-cited US study (Carr et al., 1998), parenteral opioids are used 34%, patient-controlled analgesia 29%, and epidural analgesia 15% of the time for postoperative
analgesia. An area in which progress is possible regards preoperative planning of perioperative analgesia, with some 40% physicians in the present study undertaking nothing preoperatively regarding surgical pain. In comparison, Carr in his US study (Carr et al., 1998) reports that 48% of the time the plan for postoperative analgesia is made preoperatively.

Attitudes, opinions, perceived needs

The physicians responding to this study are as aware of the importance of acute analgesia as they are of the difficulties they have with it. In a recent survey of European acute pain services over 50% of anaesthesiologists were dissatisfied with acute postoperative pain therapy on the surgical ward (Rawal and Allvin, 1998), a figure similar to our study. A small Swiss study of five hospitals (Cummins et al., 1999) found staff in 40% of the hospitals to be dissatisfied with postoperative pain management. In all three surveyed specialties involved in acute analgesia management, respondents are particularly concerned with adequate organisation of acute analgesia provision and their lack of education and knowledge in this area. Interestingly, the emphasis regarding analgesic drugs lies with the achievement of fewer side effects, be it via new mechanisms of action or better drug combinations. However, in accordance with other studies (e.g. Gould et al., 1994; Wulf and Neugebauer, 1997; Zenz, 1997; Harmer and Davies, 1998), the respondents’ major and foremost request of the medical system is more education and guidance regarding pain management and its organisation.

Emergency room

As already mentioned, data covering acute pain management in the emergency room are much more difficult to come by. In the present study, all aspects of acute pain management in the emergency room—be it use of therapeutic algorithms, pain measurement or documentation, quality control measures or education—are less developed than for postoperatively. We have not found any comparisons of postoperative and emergency room acute pain management in the published literature. A prospective and blinded Canadian observational study of 42 patients presenting with pain to an academic emergency department found that in none was pain—or changes in pain—formally documented, that adequate treatment for pain was rare, and that 11 out of 38 patients sent home had severe pain on discharge (Ducharme and Barber, 1995).

Group differences

We have found no published comparisons of surgeons and anaesthesiologists regarding acute pain therapy. In the present study, general and orthopaedic surgeons are less likely to have undergone or to be undergoing formal acute pain education (i.e. to have followed accredited and structured courses), and are more likely to be satisfied with acute analgesia. Orthopaedic surgeons particularly emphasise their lack of knowledge about acute analgesia and their wish for more education.

Hospital type or size might influence the provision of acute pain therapy, and this is so in our study in keeping with other reports (Warfield and Kahn, 1995; Merry et al., 1997; Carr et al., 1998). It is surprising, however, that while university hospitals—data are available from all 5 in Switzerland—have a higher acute pain service penetration and a better pain intensity VAS documentation rate, their performance in many other areas under discussion (use of therapeutic algorithms, quality control, education) is no better than in other hospital categories in our study. The fact that district hospital doctors have the most pain education is also surprising; we have no obvious explanation for this result.

A decade after the publication of the first acute pain management guidelines, this survey identifies the continuing need for improved guideline compliance. Tackling organisational and educational deficits in acute pain management remains a major priority, particularly for emergency room analgesia. Physicians managing acute pain need to be motivated and educated regarding ongoing collection and analysis of data for the research,
development and quality improvement programmes which are the foundation for future adequate acute analgesia provision in hospitals.

ACKNOWLEDGEMENTS

We would like to thank Dr Marianne Müller (Institute for Preventive and Social Medicine, Berne University, Switzerland) and Dr Paul Dolin (Principal Epidemiologist, Glaxo Wellcome Research & Development, Greenford, United Kingdom) for statistical support and epidemiological advice, and Mrs Rachel Rubin for her competent secretarial support. The study was supported by an educational grant from Glaxo Wellcome AG.

REFERENCES


APPENDIX 1: DETAILS OF QUESTIONNAIRE

The questionnaire contained 256 points, each one to be answered either by ticking one of a choice of answers or by filling in a number.

The questionnaire was organised as follows:

I. Demographic Data (25 data points)
   • Personal
   • Department
   • Hospital

II. Postoperative Pain (157 data points)
   • Opinions
   • Pain practice
   • Pain organisation
   • Acute pain service
   • Wishes

III. Emergency Room Pain (71 data points)
   • Opinions
   • Pain practice
   • Pain organisation
   • Wishes

IV. Comments
   • Space provided for writing in comments

V. Questionnaire quality control (3 data points)
   • Difficulty, relevance, time to fill out.
Unexplained severe chronic pain in general practice

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*Netherlands Institute for Health Services Research, The Netherlands, †Faculty of Social Science, University of Utrecht, The Netherlands

The aim of this study was to estimate the prevalence of unexplained severe chronic pain (USCP) in general practice and to report medical as well as psychological descriptions of patients suffering from this condition.

A total of 45 GPs in 35 different practices included patients throughout the year 1996. Patients were included according to the following criteria: between 18 and 75 years of age; pain which had lasted at least 6 months; pain is the most prominent aspect in the clinical presentation; pain is serious enough to justify clinical attention; pain has led to obvious discomfort and disability in daily life for at least for 1 month. Medical aspects were measured with the IASP taxonomy while psychological aspects were derived from the MPI.

The overall prevalence of USCP was 7.91 per 1000 enlisted patients. Estimates ranged between 1.87 in the youngest age group and 13.50 in the 55–59 age category. The lower back and lower limbs were most frequently affected and 31% of the patients had pain in more than three major body sites. Pain was most frequently associated by the musculoskeletal system and most often (nearly) continuous. Mean severity of current pain was 3.7 on a scale from 0 (indicating no pain) to 6 (indicating a lot of pain). Mean rating of 'average pain in the last week' was 4.1. Regarding the psychosocial and behavioural aspects of pain, 27% of the patients could be described as perceiving severe pain while gaining social support for it. Fourteen per cent felt in the category 'pain combined with affective and relational distress' and 10% was classified as ' coping well with pain intensities lower than those of the other groups'. The other half of the patients were on average or not classifiable on these aspects.

Unexplained severe chronic pain lasting more than 6 months had on overall prevalence of 7.91 per 1000 enlisted patients, ranging from 1.87 in the youngest to 13.50 in the oldest patients in these 35 general practices in The Netherlands. Our prevalence estimate of USCP is low compared to other studies on chronic pain. Probably for three reasons: Firstly, our study was confined to unexplained pain and not all chronic pain. Secondly, our inclusion criteria focused the attention of very severe chronic pain patients, and thirdly, we have defined 'chronic' as more than 6 months, while others have been using shorter time spans.

INTRODUCTION

Pain is a common presenting symptom in general practice and its relief is seen as an important task for health care professionals. In addition to its acute form, pain can be chronic and it is critical that both forms are considered as separate entities (Clifford, 1993). Acute pain is a collection of experiences and responses produced by tissue damage or acute disease. It is a precise and well-localized symptom, which generally resolves during the early stages of tissue healing. Chronic pain, on the other hand, is pain that persists beyond the normal time of healing (Bonacci, 1953). Healing time may vary with the tissue involved, with the injured body site and the extent of tissue destruction.
Unexplained chronic pain

In chronic pain a direct link with a nociceptive substrate is not always present. When there is no such link, we refer to unexplained chronic pain. The complex nature of unexplained chronic pain implicates that its prevalence cannot be measured by means of well defined diagnostic procedures. Unexplained chronic pain is a matter of exclusion, made reluctantly after a battery of appropriate investigations have yielded no results. Therefore, it is always relative to the state of art in medicine. For example, it now has been suggested that phantom pain can be related to a decreased blood flow in the residual limb (Sherman et al., 1992), where formerly no cause was considered for the spontaneous and evoked hyper excitability of neurons (Merskey, 1986). Unexplained chronic pain is a complex phenomenon, caused by many different factors and modulated by a variety of influences (Seers, 1992). It requires a multidimensional approach incorporating a number of dimensions such as the localization of pain, pain intensity, temporal characteristics, affective appraisal, coping, and grading of pain (see VonKorff et al., 1990; VonKorff, 1992; Turk and Rudy, 1992; Raspe and Kohlman, 1994). Such a multidimensional approach should incorporate medical assessments, as elaborated by the International Association for the Study of Pain, with the following five axes: (1) body region; (2) body system; (3) temporal characteristics; (4) pain intensity and time of onset; and (5) the presumed etiology. In addition to this psychosocial and behavioural aspects should be assessed. This approach is called the Multiaxial Assessment of Pain (MAP; Kerns et al., 1985; Lousberg et al., 1999).

On the basis of current knowledge and existing figures (derived from unidimensional, medical approaches), it is not possible to give a reliable estimate of the prevalence of chronic pain (Verhaak et al., 1998). Nevertheless, high costs have been attributed to the phenomenon of chronic pain. It has been reported that 10,000 patients who are unable to work because of pain are registered each year in the Netherlands (Lousberg, 1994). Aronoff et al. (1983) estimated that chronic pain costs America 40 billion dollars a year. Because of the lack of reliable figures, the Netherlands Organization for Scientific Research commissioned the Netherlands Institute for Health Services Research (Nivel) to estimate the prevalence of unexplained severe chronic pain among adults in general practice.

This has been done, using a multi-axial approach and general practice populations as the population at risk. This has been done, because GPs have a central position in the Dutch health care system. They are the first health professionals to contact in case of health related problems (Maarse, 1997). Most of the other health services, including medical specialists and physiotherapists are accessible only after a referral of a GP (Kerssens and Groenewegen, 1990). Besides that, patients are registered with a GP in a fixed list. More than 75% of the population see their GP at least once a year. For chronically ill people this percentage is even 94% (Rijken et al., 1999). It was therefore assumed that GPs were a good intermediary for the detection of cases of unexplained severe chronic pain (USCP).

We have formulated the following research questions:

- What is the overall and the age specific prevalence of USCP?
- What kind of body regions, body system are involved?
- What are the temporal characteristics of USCP?
- What kind of psychological, social and behavioural implications result from USCP?

METHODS

GPs

Since 1970, a number of Dutch GPs are participating in the Dutch Sentinel Practice Network (Claus et al., 1995; Moons et al., 1996; Bartelds, 1997). These sentinel stations have been requested to report each patient known to have chronic pain. Their practice population, counted every 2 years, is recorded in age-categories for both males and females. In our project, 45 GPs in 35 different practices agreed to take part. These sentinel stations covers 0.67% of the Dutch
population. In Table 1, a comparison is given for the age and sex distribution of the practice population and the Dutch population as a whole.

With the exception of the youngest and oldest groups, age categories are in 5-year intervals. The two right most columns ("total") reveal that the sentinel stations have slightly more people in the 18–24, 25–29, 30–34 age categories. The difference in the age category 25–29 is largest (compare 11.4% with 12.6%). This pattern is the same for both males and females. The percentage of males and females in the practice population is exactly the same as in the Dutch population (50%—data not in table). Although the differences between the age-distribution of the sentinel stations, compared with the Dutch population, are modest, prevalence estimates will be corrected for these age differences.

Patients

Patients were asked by their GPs in the period 1/1/1996 through 31/12/96 to cooperate with our project. The following criteria were used by the GPs to include patients:

(1) Patients between 18 and 75 years of age;
(2) Patients with pain which had lasted at least 6 months;
(3) Pain is the most prominent aspect in the clinical presentation;
(4) Pain is serious enough to justify clinical attention;
(5) Pain has led to obvious discomfort and disability in daily life for at least for 1 month.

Exclusion criteria were: patients with pain caused by diagnosed malignancies, rheumatic or neurological disorders, such as cancer, rheumatoid arthritis and gout.

The second criterion served as a time frame to investigate the incidence of USCP. Six months is a conventional point of division between chronic and sub-acute pain. Only after having pain for at least 6 months were patients included in our database. During 1996, it became clear that a majority of the GPs were unable to apply the project's inclusion criteria on a day-to-day bases. Consequently, we visited all the practices at the beginning of 1997 to look for further USCP patients. Where the practice-computer system was compatible, we searched for appropriate ICPC codes (International Classification of Primary Care) or ATC codes (Anatomical-Therapeutical-Chemical). We looked for pain syndromes or pain medication. Where the practice-computer system was not useful in this respect, we went through a list of pain syndromes with the GP and the GP-assistant. This approach enabled us to estimate the prevalence, but not the incidence of USCP.

Table 1. Population of the Netherlands between 18 and 75 years of age by sex per 5 years age group compared to the practice population of the sentinel stations.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
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<tbody>
<tr>
<td>18–24</td>
<td>708649 (12.5)</td>
<td>4842 (12.7)</td>
<td>688100 (12.1)</td>
</tr>
<tr>
<td>25–29</td>
<td>657353 (11.6)</td>
<td>4506 (12.9)</td>
<td>631787 (11.2)</td>
</tr>
<tr>
<td>30–34</td>
<td>575644 (11.9)</td>
<td>4772 (12.5)</td>
<td>643094 (11.4)</td>
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<tr>
<td>35–39</td>
<td>638550 (11.2)</td>
<td>4312 (11.3)</td>
<td>618243 (10.9)</td>
</tr>
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<td>40–44</td>
<td>591425 (10.4)</td>
<td>3838 (10.1)</td>
<td>574814 (10.1)</td>
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<tr>
<td>45–49</td>
<td>593093 (10.4)</td>
<td>3856 (10.1)</td>
<td>570992 (10.1)</td>
</tr>
<tr>
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<td>506665 (8.9)</td>
<td>3017 (7.9)</td>
<td>484946 (8.6)</td>
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<td>55–59</td>
<td>398568 (7.0)</td>
<td>2579 (6.8)</td>
<td>390210 (6.9)</td>
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<td>60–64</td>
<td>340724 (6.0)</td>
<td>2277 (6.0)</td>
<td>354272 (6.3)</td>
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<tr>
<td>65–69</td>
<td>29409 (5.2)</td>
<td>1659 (4.9)</td>
<td>337506 (6.0)</td>
</tr>
<tr>
<td>70–74</td>
<td>278344 (4.6)</td>
<td>1846 (4.6)</td>
<td>372190 (6.5)</td>
</tr>
<tr>
<td>Total</td>
<td>5881269</td>
<td>38104</td>
<td>5667040</td>
</tr>
</tbody>
</table>
Measurement instruments

To obtain medical aspects of USCP, a registration form was developed on basis of the five IASP axes. This form was completed by the GP at the time of inclusion. Altogether a number of 586 patients fulfilled the inclusion criteria and had pain for at least six months. The five IASP axes mentioned earlier were all covered on the registration form.

On the moment of inclusion GPs also handed out consent forms and the Multidimensional Pain Inventory (MPI; Dutch Version), which the consenting patients completed at home and then returned to the Nivel. The group of patients that were selected during the practice visits got the consent form and the MPI by mail. Altogether a number of 344 patients (59%) returned their consent forms and the self-completed MPI (DV).

The Multidimensional Pain Inventory (MPI-DV) covers psychological, social and behavioural aspects of the chronic pain disorder; The MPI is a self-report questionnaire which measures patient’s appraisal of pain and the impact of pain on different domain of daily lives. The following scales are part of theMPI: Pain Severity; Interference; Life Control; Affective Distress; Support; Punishing Response; Solicitous Response; Distracting Response; Household Chores; Outdoor work; Social Activities; General Activities.

The self-assessment by the MPI leads to four distinct patient profiles; Dysfunctional patients, who perceive the severity of their pain to be high, report pain to interfere with their daily lives and have a low activity level. However, they experience more than average social support. Interpersonally distressed patients who have moderate pain and affective distress and have a common perception that significant others are not very understanding.

Adaptive Coping patients who experience much social support and relatively low levels of pain, affective distress and high levels of activity and perceived control. And finally the Average type of patient who has characteristics of all three types. Patients with contradictory values on different scales (a.o. because of missing values) are categorized as ‘anomalous’.

Statistics

Most statistics are descriptive, like means and percentages. Association between variables is computed with a non-parametric correlation coefficient (Spearman’s rho) with interval variables and Chi-square analyses with nominal variables.

RESULTS

Consent and non-consent

Already mentioned was the fact that 344 patients (59%) returned their consent forms. There were some differences between those who consented and those who did not. Consenterers were on average 3.5 years younger (p = 0.02) and had relatively more often pain on three major body sites or more (p = 0.004). With regard to gender and time of onset of pain there were no statistically significant differences.

Prevalence

Based on 586 included patients with unexplained severe chronic pain and because of the correction for age, a number of 604 cases were calculated out of a total of 76,367 enlisted patients between 18 and 75. So the prevalence estimate of USCP in general practice was 7.91 per 1000 patients.

The majority of the patients was female (71%). The age specific prevalence estimates are given in Table 2. Both sexes had the same distribution according to age.

Estimates ranged between 1.87 per 1000 in the youngest group and 16.95 in the age category 50–54 years. Next highest was 13.50 per 1000 in the 55–59 year category. The estimates were relatively low below the age of 34.

Medical aspects of pain

Table 3 shows the patients with USCP according to the major site of the body with pain.

The number of major sites exceeded the number of patients because more than one site
Unexplained Severe Chronic Pain

Table 2: Age specific prevalence estimates of USCP in general practice. Estimates are based on 344 patients.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Estimate per 1000 patients</th>
<th>Estimated number</th>
<th>Practice population</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>1.87</td>
<td>19</td>
<td>9989</td>
</tr>
<tr>
<td>25-29</td>
<td>1.59</td>
<td>15</td>
<td>9645</td>
</tr>
<tr>
<td>30-34</td>
<td>3.62</td>
<td>32</td>
<td>9196</td>
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<td>35-39</td>
<td>8.98</td>
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<td>40-44</td>
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<td>50-54</td>
<td>16.95</td>
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<td>55-59</td>
<td>13.50</td>
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<td>65-69</td>
<td>8.82</td>
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<td>70-75</td>
<td>11.26</td>
<td>48</td>
<td>4229</td>
</tr>
<tr>
<td>Total</td>
<td>7.91</td>
<td>604</td>
<td>78367</td>
</tr>
</tbody>
</table>

Table 3: Major sites of the body with pain (n=344).

<table>
<thead>
<tr>
<th>Site</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head, face and mouth</td>
<td>62</td>
<td>12.1</td>
</tr>
<tr>
<td>Cervical region</td>
<td>56</td>
<td>10.8</td>
</tr>
<tr>
<td>Upper shoulder and upper limbs</td>
<td>76</td>
<td>14.7</td>
</tr>
<tr>
<td>Thoracic</td>
<td>35</td>
<td>6.8</td>
</tr>
<tr>
<td>Abdominal region</td>
<td>30</td>
<td>5.9</td>
</tr>
<tr>
<td>Lower Back, lumbar spine, sacrum and coccyx</td>
<td>72</td>
<td>13.9</td>
</tr>
<tr>
<td>Lower limbs</td>
<td>66</td>
<td>12.8</td>
</tr>
<tr>
<td>Pelvic region</td>
<td>5</td>
<td>0.9</td>
</tr>
<tr>
<td>Anal, perineal, genital region</td>
<td>8</td>
<td>1.5</td>
</tr>
<tr>
<td>More than three major sites</td>
<td>106</td>
<td>20.4</td>
</tr>
<tr>
<td>Total</td>
<td>516</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4: Various body systems associated with pain (n=344).

<table>
<thead>
<tr>
<th>System</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nervous system</td>
<td>32</td>
<td>9.3</td>
</tr>
<tr>
<td>Respiratory and cardiovascular system</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Musculoskeletal system and connective tissue</td>
<td>184</td>
<td>47.7</td>
</tr>
<tr>
<td>Cutaneous, subcutaneous and associated glands</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Gastrointestinal system</td>
<td>6</td>
<td>1.7</td>
</tr>
<tr>
<td>Genito-urinary system</td>
<td>3</td>
<td>0.9</td>
</tr>
<tr>
<td>Other organs or viscera</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>More than one system region</td>
<td>117</td>
<td>34.0</td>
</tr>
<tr>
<td>Total</td>
<td>344</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 5: Temporal characteristics of pain (n=344).

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous or nearly continuous, nonfluctuating</td>
<td>57</td>
<td>16.7</td>
</tr>
<tr>
<td>Continuous or nearly continuous, fluctuating severity</td>
<td>132</td>
<td>38.3</td>
</tr>
<tr>
<td>Recurring, irregularly</td>
<td>70</td>
<td>20.4</td>
</tr>
<tr>
<td>Recurring, regularly</td>
<td>45</td>
<td>13.1</td>
</tr>
<tr>
<td>Paresthesia</td>
<td>12</td>
<td>3.6</td>
</tr>
<tr>
<td>Sustained with superimposed paresthesia</td>
<td>12</td>
<td>3.6</td>
</tr>
<tr>
<td>Other combinations</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>344</td>
<td>100.0</td>
</tr>
</tbody>
</table>

can be recorded. In fact 106 patients (31%) had pain in more than three major sites. The rest of the patients had pain in less than three sites, 1.7 sites on average. The lower back and the lower limbs were most frequently recorded, often in combination with each other. The upper shoulder/upper arms and the cervical region were also frequently recorded.

The various body systems associated with pain are shown in Table 4.

The pain was most often associated by the musculoskeletal system and connective tissue (in 48% of the patients). From the single systems, the nervous system was recorded in 9% of the patients. Another frequently recorded category was 'more than one system' (34%), most often a combination of musculoskeletal – and nervous system. The other body systems of Table 4 were rarely recorded.

The temporal characteristics of the pain (in terms of the IASP system) are depicted in Table 5.

Most often the pain was continuous or nearly continuous with fluctuating severity (38%) or irregularly recurring.

Subjective experience

On a scale from 0 (indicating no pain) to 6 (indicating a lot of pain) the mean rating of current pain was 3.7 (SD 1.7), while the mean rating of ‘average pain in the last week’ was 4.1 (SD 1.5).
There is a significant correlation between the pain ratings (Spearman’s rho 0.67 ($p < 0.001$)). The pain severity index—the mean of the two ratings is 3.9 (SD 1.5).

Pain severity is one aspect of the Multi-dimensional Pain Inventory. The other aspects (or dimensions) are in Table 6.

The aspect with the highest mean scale score was ‘support’, that is the appraisal of the amount of support received from spouse or a significant other. The next highest mean was associated with perceived ‘life control’, that is the perceived ability to solve problems and feelings of personal mastery and competence. The two lowest mean scales scores were ‘punishing responses’, which is the patient’s report of the negative (for instance irritability) responses by spouses of significant others (score 1.16) and ‘outdoor work’.

Each patient’s scores resulted in a profile, as explained in the Method section. The MPI program utilizes these scores to assign each patient one of three empirically-derived prototypic profiles. These prototypes are shown in Table 7.

The dysfunctional type was seen most often (27%). The interpersonally distressed and the adaptive copers were seen less frequently. Notice that about half of the profiles are ‘average’ or ‘anomalous’.

**DISCUSSION**

The prevalence estimate of unexplained severe chronic pain (USCP) in general practice is 7.91 per 1000 enlisted patients and for reasons stated above, we believe that this figure comes close to the prevalence of USCP (with pain that is serious enough to justify clinical attention and obvious discomfort and disability in daily life) in the open population.

Seventy percent of the patients with USCP is female and the prevalence estimates are highest between 50–54 years of age. Lower back, neck, and shoulder are the body areas most frequently affected. In USCP most patients are troubled by pain in several parts of their bodies, like patients with fibrositis. Apart from those, lower back pain is encountered about as equal as pain in the shoulder/arms, or pain in the legs. Pain is most frequently associated by the musculoskeletal system and most often (nearly) continuous. Mean severity of current pain was 3.7 on a scale from 0 (indicating no pain) to 6 (indicating a lot of pain). Mean rating of ‘average pain in the last week’ is 4.1.

About one third of the patients could be described as patients with serious pain who gained considerable social support as a result of their suffering. In about one sixth, pain seemed to be related to affective and interrelational problems.

Epidemiological studies in the open population, as well as in general practice have shown that chronic pain represents a major public health problem (Crocket et al., 1984; Andersen, 1987; Brattberg et al., 1989; Magni et al., 1990; Mäkelä and Heliövaara, 1991; Potter, 1992; Croft et al., 1993; Anderson, 1994; Elliot et al., 1999). One problem of these studies is that their estimates of the prevalence of chronic pain range from less than 1% (Potter, 1992) to 82% (James, 1991) which may be partly explained by differences in the definition of pain (Crombie, 1994; Purves...