

# BMJ Open Current pain education within undergraduate medical studies across Europe: Advancing the Provision of Pain Education and Learning (APPEAL) study

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## ABSTRACT

**Objectives:** Unrelieved pain is a substantial public health concern necessitating improvements in medical education. The Advancing the Provision of Pain Education and Learning (APPEAL) study aimed to determine current levels and methods of undergraduate pain medicine education in Europe.

**Design and methods:** Using a cross-sectional design, publicly available curriculum information was sought from all medical schools in 15 representative European countries in 2012–2013. Descriptive analyses were performed on: the provision of pain teaching in dedicated pain modules, other modules or within the broader curriculum; whether pain teaching was compulsory or elective; the number of hours/credits spent teaching pain; pain topics; and teaching and assessment methods.

**Results:** Curriculum elements were publicly available from 242 of 249 identified schools (97%). In 55% (133/242) of schools, pain was taught only within compulsory non-pain-specific modules. The next most common approaches were for pain teaching to be provided wholly or in part via a dedicated pain module (74/242; 31%) or via a vertical or integrated approach to teaching through the broader curriculum, rather than within any specific module (17/242; 7%). The curricula of 17/242 schools (7%) showed no evidence of any pain teaching. Dedicated pain modules were most common in France (27/31 schools; 87%). Excluding France, only 22% (47/211 schools) provided a dedicated pain module and in only 9% (18/211) was this compulsory. Overall, the median number of hours spent teaching pain was 12.0 (range 4–56.0 h; IQR: 12.0) for compulsory dedicated pain modules and 9.0 (range 1.0–60.0 h; IQR: 10.5) for other compulsory (non-pain specific) modules. Pain medicine was principally taught in classrooms and assessed by conventional examinations. There was substantial international variation throughout.

**Conclusions:** Documented pain teaching in many European medical schools falls far short of what might be expected given the prevalence and public health burden of pain.

## Strengths and limitations of this study

- This is a comprehensive cross-sectional analysis of pain education within undergraduate medical school curricula across Europe, including 97% of all medical schools in 15 representative European countries.
- Recommendations are provided to responsible authorities to improve undergraduate pain medicine education.
- The overall findings cannot necessarily be applied to countries not included in the survey.
- Limited information was available for some aspects of pain education and it could be argued that curricula might not fully or accurately represent the actual teaching and learning around pain.

## INTRODUCTION

A fifth of European adults suffer from unrelieved chronic pain,<sup>1</sup> the most common form of which—low back pain—is the leading global cause of years lived with disability.<sup>2</sup> Chronic pain is among the most common reasons for primary care consultations,<sup>3</sup> and has been estimated to annually cost economies in Europe an amount equivalent to 3–10% of the gross domestic product.<sup>4 5</sup> In the USA, the total costs associated with persistent pain in adults are reported to exceed those estimated for heart disease, cancer and diabetes.<sup>6</sup> Substantial and unnecessary burdens also result from suboptimal management of other types of pain. For example, unrelieved pain is widespread among patients with cancer<sup>7</sup> and remains a common problem in the postoperative setting.<sup>8</sup> Pain is therefore a leading public health concern that can be expected to increase as the population ages.

Knowledge deficits among health professionals are a principal barrier to optimal pain management.<sup>9</sup> For example, many primary care physicians find chronic pain challenging to treat. Areas of low confidence include, for example, the appropriate use of opioid analgesics.<sup>10</sup> These deficits reflect the variation and deficiencies in undergraduate pain education identified in medical schools in the UK,<sup>11</sup> Finland<sup>12–13</sup> and North America.<sup>14–16</sup> Central to the strategic actions recommended to improve pain management is the improvement of pain education within undergraduate medical curricula.<sup>9</sup> This measure would also be in line with an international consensus call for medical schools to adjust their educational aims to address societal needs and challenges.<sup>17</sup>

Efforts to improve undergraduate pain education should be based on a robust, comprehensive understanding of how it is currently delivered. Until recently, no European-wide assessment of pain education had been performed and, to the best of our knowledge, published data were limited to studies in Finland and the UK.<sup>11–13</sup> The Advancing the Provision of Pain Education and Learning (APPEAL) study aimed to determine current levels and methods of undergraduate pain education in medical schools across Europe. The study was guided by an expert task force of pain and education specialists under the leadership of the European Pain Federation (EFIC) and with representation from the Association of Medical Schools in Europe and medical students. We report a comprehensive cross-sectional analysis of undergraduate medical school curricula in 15 representative European countries. Specifically, the objectives were to determine: where pain featured in curricula (eg, within modules dedicated specifically to pain, or within other modules on other areas of medicine); whether pain teaching was compulsory or elective (and the number of students enrolled on elective pain modules); the extent of pain teaching in terms of the number of hours or credits; pain topics covered; and the teaching and assessment methods used in pain education.

## METHODS

### Methodology and sampling

Publicly available curriculum information was sought from all medical schools in Belgium, Bulgaria, Denmark, France, Germany, Ireland, Italy, the Netherlands, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the UK. The sampled countries were purposefully selected from the four European regions (Eastern, Northern, Southern and Western) as defined by the United Nations classification.<sup>18</sup> In each region, 3–5 countries were selected to ensure variations in demographic and economic profiles and achieve the largest sample of medical schools and students. Schools providing undergraduate medical courses during the academic year 2012–2013 were included.

## Information collection

Between April and September 2013, undergraduate curricula and additional information (panel 1) were obtained from publicly available recognised medical school websites (ie, schools' own websites, government websites, student forums, newspaper websites, and independent university guides and literature). Online supplementary information was gained by follow-up contact by telephone or email. Initial contact was made with administrative staff with referral to the relevant academic staff member (most often a course leader).

## Analysis

Schools for which no curriculum information was publicly available were excluded. Available information was collated and analysed descriptively using Microsoft Excel. Analyses of pain education provision were performed on all schools for which some curricula elements were available. Pain teaching provision was categorised as a 'dedicated pain module' if a module specifically focused on pain was documented on the curriculum. The category of 'pain teaching within other module' applied where a module was not focused specifically on pain, but included some element of pain teaching within it. These categories were non-exclusive and schools could fulfil both. The category 'Pain included in broader curriculum only' (either as a specific theme or not) included vertical or integrated approaches to pain teaching. Vertical study topics are typically relevant to all specialties and are usually taught through other subjects rather than as separate subjects in their own right. Integrated learning refers to a non-compartmentalised approach, where individual departments or subject areas contribute to learning in a holistic manner. By this process, links are made between the different subject areas and learning is assisted by the connections and inter-relationships being made explicit.

Analyses of hours or credits spent on pain teaching, and teaching and assessment methods used, were performed on all schools for which information on these aspects was available. Definitions and sources for terms for teaching and assessment methods can be found in the online supplementary appendix to this article.

## RESULTS

### Sample

A total of 249 medical schools were identified in the 15 countries and curriculum elements were publicly available from 242 schools (97%). Seven schools (3%) for which no curriculum information was publicly available were excluded; these included one school in each of France, Germany, the Netherlands, Poland and the UK, and two schools in Romania. All information sought (panel 1) was available for 66 schools (27%), with partial information being available for the remaining 176 (71%).

### Provision of pain teaching

In 133 of 242 schools (55%), pain was taught only within compulsory non-pain-specific modules (table 1). Pain was most commonly taught in pharmacology, anaesthesiology, physiology/pathology, emergency medicine and palliative care compulsory modules. The next most common approaches were for pain teaching to be provided wholly or in part via a dedicated pain module (74/242; 31%) or via a vertical or integrated approach to teaching through the broader curriculum, rather than within any specific module (17/242; 7%). The curricula of 17/242 schools (7%) showed no evidence of any pain teaching. These proportions varied between countries (table 1).

Where dedicated pain modules were provided, they were compulsory in only 44 schools (18% of all schools; figure 1). For 37 schools (15%), pain teaching was documented only within such a dedicated pain module (ie, and not within other compulsory modules). Dedicated pain modules were most common in France (27/31 schools; 87%). Excluding France, only 47/211 schools (22%) provided a dedicated pain module and in only 18/211 (9%) was this compulsory. Five schools with available information enrolled a mean of 22 students (range 15–50) in elective dedicated pain modules, representing 4–11% of the schools' students in that year group.

Overall, considering all approaches to teaching delivery, the curricula of 88% (214/242) of all schools documented some form of compulsory pain medicine teaching. This varied from 40% in Bulgaria to 100% in Denmark, Poland, Sweden and Romania (see online supplementary appendix figure S1).

### Hours spent teaching pain

Limited data were available on hours dedicated to pain teaching and there was substantial international variation (table 2). Overall, the median number of hours spent teaching pain was 12 (range 4.0–56.0 h; IQR 12.0; data from 25 schools) for compulsory dedicated modules and 9 (range 1.0–60.0 h; IQR 10.5; 43 schools) for other compulsory modules (summing all applicable courses). Seven schools documented compulsory pain teaching using credits, with a median value of 3 credits (range 1–7 credits).

### Pain topics

Of the schools with a compulsory dedicated pain module or pain within other compulsory modules, 143 of 197 (73%) documented pain-specific topics within their curricula (ranging from 50% in the UK to 100% in Bulgaria, Ireland, the Netherlands, Portugal and Switzerland). Other schools did not publicly document topics at all. The level of detail documented for pain topics was too variable to allow a meaningful analysis. Table 3 illustrates this variation by showing the content from medical schools in two different countries.

### Methods of teaching and assessment

Information on methods used in pain teaching were available from 174 (72%) of the 242 schools. Of these, 95% (166/174) used classroom teaching, while 48% (84/174) used placements, and 26% (45/174) used case-based learning (figure 2A; online supplementary appendix table S1). Some schools used only one teaching modality, but most used two or more. Information on assessment methods used were available from 193 (80%) of the 242 schools. These schools mainly assessed pain learning using examinations (179/193; 93%). Almost a quarter (24%) used assignments, while placements, practical assessments, attendance, presentations, group work, clinical methods or problem-based learning was each used by <10% of schools (figure 2B; online supplementary appendix table S1). Schools generally used one to two assessment modalities. While classroom teaching and examinations were widely employed in all countries, variations existed in the usage of other teaching and assessment approaches.

## DISCUSSION

### Principal findings

Despite the high prevalence and public health burden of pain, pain education is viewed as a marginal topic and non-essential part of undergraduate medical teaching across Europe. Eight out of 10 medical schools in the selected representative countries had no compulsory dedicated teaching on pain evident in their curricula. Overall, pain medicine was taught most commonly within compulsory modules in other areas of medicine, although this was highly variable between countries. Only 31% of schools had a dedicated pain module and this was compulsory in only 18%, most of which were in France. There was no evidence of pain teaching whatsoever in 7% of curricula. The fact that two-thirds of medical schools in France provided compulsory, dedicated pain modules reflects a national policy to prioritise pain education. An increase in the number of such compulsory modules may be expected in Germany, where education on chronic pain became compulsory within federally defined medical school curricula in 2012.<sup>19</sup> Of the 133 schools in which pain teaching was only in compulsory non-pain-specific modules, 38 were in Italy, where pain medicine is recognised as a specific teaching module within the emergency medicine integrated course in the national standard medical degree curriculum (D Batelli, personal communication, 2014). The optimal organisation of pain teaching is unclear. Compulsory vertical (or 'longitudinal') pain curricula have been successfully implemented where core elements of pain medicine are addressed separately and the topic is integrated into other subject areas.<sup>19</sup> Nevertheless, there remains a need for dedicated pain teaching that addresses the topic thoroughly in a planned, progressive and competency-based manner.

**Table 1** Provision of undergraduate pain medicine education in medical schools in 15 European countries

Category, n (%)*	Total schools (N=242)† n (%)	Belgium (N=10) n (%)	Bulgaria (N=5) n (%)	Denmark (N=4) n (%)	France (N=31) n (%)	Germany (N=35) n (%)	Ireland (N=6) n (%)	Italy (N=40) n (%)	The Netherlands (N=7) n (%)	Poland (N=11) n (%)	Portugal (N=7) n (%)	Romania (N=10) n (%)	Spain (N=36) n (%)	Sweden (N=7) n (%)	Switzerland (N=5) n (%)	UK (N=28) n (%)
Evidence of pain teaching on curriculum	225 (93)	7 (70)	3 (60)	4 (100)	31 (100)	34 (97)	5 (83)	40 (100)	6 (86)	11 (100)	7 (100)	10 (100)	36 (100)	7 (100)	5 (100)	19 (68)
Pain taught only in other compulsory† (non-pain) modules	<b>134 (55)†</b>	<b>7 (70)</b>	<b>1 (20)</b>	<b>4 (100)</b>	<b>4 (13)</b>	<b>18 (51)</b>	<b>5 (83)‡</b>	<b>31 (78)</b>	<b>3 (78)</b>	<b>11 (100)</b>	<b>5 (71)</b>	<b>4 (40)</b>	<b>27 (75)</b>	<b>4 (57)</b>	<b>1 (20)</b>	<b>9 (32)</b>
Dedicated pain module+pain teaching in other modules	<b>37 (15)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>6 (19)</b>	<b>10 (29)</b>	<b>0 (0)</b>	<b>3 (8)</b>	<b>3 (43)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>4 (40)</b>	<b>6 (17)</b>	<b>2 (29)</b>	<b>0 (0)</b>	<b>3 (11)</b>
Pain module compulsory/other module(s) compulsory	16 (7)	0 (0)	0 (0)	0 (0)	6 (19)	2 (6)	0 (0)	2 (5)	1 (14)	0 (0)	0 (0)	0 (0)	4 (11)	0 (0)	0 (0)	1 (4)
Pain module elective/other module(s) compulsory	19 (8)	0 (0)	0 (0)	0 (0)	0 (0)	7 (20)	0 (0)	1 (3)	2 (29)	0 (0)	0 (0)	3 (30)	2 (6)	2 (29)	0 (0)	2 (7)
Pain module elective/other module(s) elective ±compulsory	2 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (10)	0 (0)	0 (0)	0 (0)	0 (0)
Dedicated pain module only	<b>37 (15)</b>	<b>0 (0)</b>	<b>1 (20)</b>	<b>0 (0)</b>	<b>21 (68)</b>	<b>4 (11)</b>	<b>0 (0)</b>	<b>3 (8)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>1 (14)</b>	<b>1 (10)</b>	<b>2 (6)</b>	<b>0 (0)</b>	<b>4 (80)</b>	<b>0 (0)</b>
Compulsory	28 (12)	0 (0)	0 (0)	0 (0)	20 (65)	3 (9)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	1 (10)	1 (3)	0 (0)	2 (40)	0 (0)
Elective	9 (4)	0 (0)	1 (20)	0 (0)	1 (3)	1 (3)	0 (0)	2 (5)	0 (0)	0 (0)	1 (14)	0 (0)	1 (3)	0 (0)	2 (40)	0 (0)
Pain included in broader curriculum only§	<b>17 (7)</b>	<b>0 (0)</b>	<b>1 (20)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>2 (6)</b>	<b>0 (0)</b>	<b>3 (8)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>1 (14)</b>	<b>1 (10)</b>	<b>1 (3)</b>	<b>1 (14)</b>	<b>0 (0)</b>	<b>7 (25)</b>
As a specific theme	8 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	4 (14)
Not as a specific theme	9 (4)	0 (0)	1 (20)	0 (0)	0 (0)	2 (6)	0 (0)	3 (8)	0 (0)	0 (0)	1 (14)	1 (10)	0 (0)	1 (14)	0 (0)	3 (11)
No evidence of pain teaching	<b>17 (7)</b>	<b>3 (30)</b>	<b>2 (40)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>1 (3)</b>	<b>1 (17)</b>	<b>0 (0)</b>	<b>1 (14)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>9 (32)</b>
Total	<b>242 (100)</b>	<b>10 (100)</b>	<b>5 (100)</b>	<b>4 (100)</b>	<b>31 (100)</b>	<b>35 (100)</b>	<b>6 (100)</b>	<b>40 (100)</b>	<b>7 (100)</b>	<b>11 (100)</b>	<b>7 (100)</b>	<b>10 (100)</b>	<b>36 (100)</b>	<b>7 (100)</b>	<b>5 (100)</b>	<b>28 (100)</b>

Rows in bold indicate principal rows.

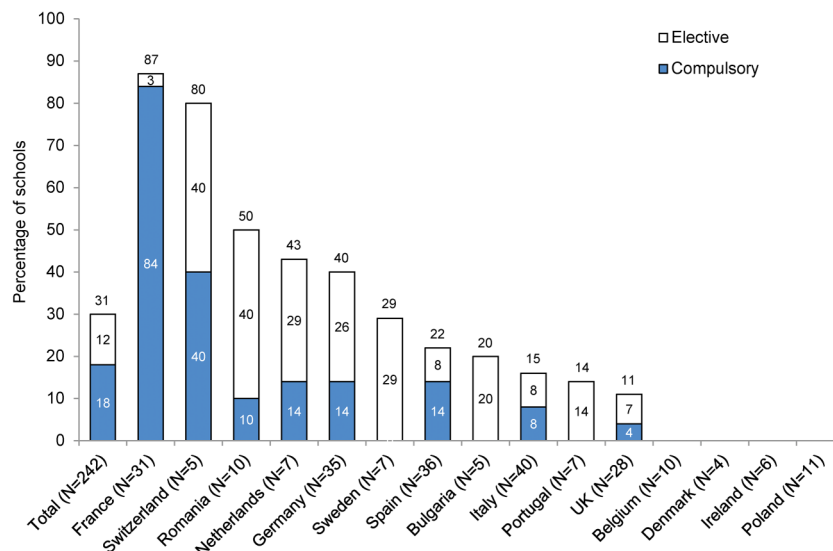
\*See Methods section for definitions.

†Number of schools for which some or all elements of the curriculum were available.

‡One school in Ireland taught pain as part of an elective (non-pain-specific) module. In all other cases, pain was taught within compulsory modules.

§Pain covered via a vertical or integrated approach to teaching through the broader curriculum, rather than within a specific module.

**Figure 1** Percentage of medical schools with a dedicated pain medicine module (compulsory or elective) documented on the undergraduate curriculum in 15 European countries\*.



\*Where a dedicated module appeared on the curriculum either as the sole provision of pain education or in addition to pain teaching within other modules.  
N, number of medical schools for which elements of the curriculum were available.  
Totals may not equal sum of mandatory or elective bars owing to rounding errors.

Even where dedicated modules were provided, there were limitations in terms of the number of hours devoted to pain education and the methods used for teaching and assessment. Where data were available, compulsory dedicated pain modules and pain teaching delivered within other modules accounted for a median of 12 and 9 h, respectively. Each of these represent approximately 0.2% of the minimum total teaching hours provided throughout an undergraduate medical degree (set at 5,500 h by a European directive).<sup>20</sup> These findings suggest that the extent of pain teaching is disproportionate to the medical relevance and societal burden of pain. We are not aware of outcome data that could help to define a specific minimal number of hours that should be dedicated to undergraduate pain teaching. In the absence of such data, we recommend that pain teaching be structured according to required competencies conveyed in the EFIC core curriculum.<sup>21</sup> Medical education on a complex biopsychosocial phenomenon such as pain must move beyond the conventional focus on knowledge acquisition towards educational approaches that comprehensively improve understanding, skills, attitudes and ultimately competence in pain management.

The highly variable and often poor documentation of pain topics taught on curricula prevented a meaningful assessment of the content of courses. Indeed, 27% of schools with compulsory pain teaching did not document any of the pain topics taught. Limited information from the UK,<sup>11</sup> Finland,<sup>12 13</sup> the USA<sup>15</sup> and Canada<sup>16</sup> suggest that pain prevalence, mechanisms and pharmacology may be covered well, while education may be particularly lacking in pain definitions and assessment, pain

research, psychosocial issues, non-pharmacological, interventional and multidisciplinary approaches, monitoring, and pain in children, older people and patients with cognitive impairment. Although recommended curricula have been published for many years, previous studies have suggested that they are underused.<sup>11 12 15</sup> The APPEAL Taskforce recommends that the EFIC core curriculum for pain management should be used as a template in European medical schools.<sup>21</sup> Experts in the USA have also recently recommended a new pain curriculum and core competencies.<sup>22 23</sup>

According to the present survey, pain medicine was principally taught in classrooms. While classroom teaching is valuable in developing knowledge, ideally it should be complemented by locally suitable, active, student-centred approaches that maximise engagement, provide opportunities for student–patient interaction, and help develop the skills necessary to apply knowledge in clinical situations. Dedicated pain modules of a modest duration but featuring patient interaction, small-group sessions and expert-led sessions can significantly improve clinical understanding, knowledge, skills and attitudes with respect to assessing and managing pain.<sup>24–26</sup> Surveyed Finnish<sup>13</sup> and Canadian<sup>24</sup> students favoured small-group, clinically focused and expert-led sessions, and self-learning methods, rather than lectures. Innovative web-based pain education programmes have also shown promise in terms of knowledge improvement and student satisfaction.<sup>27 28</sup> Similarly, while it is a positive finding that most universities in this survey assessed pain learning, conventional examinations are not optimal (in isolation) to assess the necessary competencies.



**Table 2** Compulsory hours spent on undergraduate pain medicine education in medical schools in 15 European countries

Variable	Total schools (N=242)*	Belgium (N=10)	Bulgaria (N=5)	Denmark (N=4)	France (N=31)	Germany (N=35)	Ireland (N=6)	Italy (N=40)	The Netherlands (N=7)	Poland (N=11)	Portugal (N=7)	Romania (N=10)	Spain (N=36)	Sweden (N=7)	Switzerland (N=5)	UK (N=28)
Compulsory dedicated pain modules, N with available data	25	–	–	–	20	3	–	–	1	–	–	–	–	–	1	–
Median hours (range) (IQR)	12.0 (4.0–56.0) (12.0; Q1: 8.0, Q3: 20.0)	–	–	–	12.0 (4.0–33.0)	2.0 (9.0–56.0)	–	–	4.0 (4.0–4.0)	–	–	–	–	–	27.5 (27.5–27.5)	–
Other compulsory modules, †, N with available data	43	6	–	–	3	8	–	2	2	1	4	5	11	–	1	–
Median hours (range) (IQR)	9.0 (1.0–60.0) (10.5; Q1: 5.0, Q3: 15.5)	7.0 (4.0–10.0)	–	–	7.5 (6.0–7.5)	9.5 (1.0–60.0)	–	4.0 (2.0–6.0)	14.0 (10.0–18.0)	39.5 (39.5–39.5)	14.5 (5.0–30.0)	4.0 (4.0–17.0)	11.5 (3.0–3.0)	–	16.0 (16.0–16.0)	–

\*Number of schools for which some or all elements of the curriculum were available.

†Represents the sum of all applicable courses for which pain hours were available. Hours spent teaching pain in the dedicated pain modules and in other non-pain-specific compulsory modules are mutually exclusive (schools may have both compulsory dedicated pain courses and pain teaching in other modules).

**Table 3** Examples of pain curriculum content from two medical schools in separate countries

Swedish medical school example	Polish medical school example
<ul style="list-style-type: none"> <li>▶ Anaesthesiology</li> <li>▶ Chronic pain</li> <li>▶ Acute pain</li> <li>▶ Cancer pain</li> </ul>	<ul style="list-style-type: none"> <li>▶ Diagnosis and treatment of cancer pain</li> <li>▶ Elements of the nervous system</li> <li>▶ Modern pain therapy</li> <li>▶ Nociceptive pain (somatic, visceral)</li> <li>▶ Neuropathic, psychogenic</li> <li>▶ Pathophysiology</li> <li>▶ Analgesic ladder for the treatment of chronic pain</li> <li>▶ Pharmacotherapy: narcotic analgesics</li> <li>▶ Non-steroidal anti-inflammatories</li> <li>▶ Opioids in clinical practice</li> <li>▶ Local anaesthetics</li> <li>▶ Treatment of acute and chronic pain</li> <li>▶ Treatment of back pain</li> <li>▶ Differential diagnosis of common childhood symptoms: headache, abdominal pain, vomiting, anaemia, convulsions, joint pain, bone pain</li> <li>▶ Patients with idiopathic and symptomatic headache</li> <li>▶ Classification of rheumatic diseases</li> <li>▶ Interpretation of musculoskeletal pain</li> <li>▶ Orthopaedics and traumatology: spinal pain syndromes</li> <li>▶ Medical rehabilitation</li> </ul>

### Comparison with other studies

Our findings greatly extend and concur with previous data. In the UK, Briggs *et al*<sup>11</sup> performed a cross-sectional questionnaire survey of academics involved in planning, teaching or assessing pain content in courses for various health professionals in 19 higher education establishments. Only 15% of programmes provided dedicated pain modules, which were optional in three-quarters of cases. At 13 h (range 6–50 h), the median number of hours dedicated to pain in medicine courses was very similar to our finding. Other European data are limited to Finland, where surveys of medical university teachers in 1991 (n=135) and 1995 (n=130) found pain teaching to be inconsistent between institutions, with a lack of published curricula and limited application of the International Association for the Study of Pain

(IASP) curriculum.<sup>12</sup> According to a subsequent study, 27% of medical students graduating from five Finnish medical schools reported having received specific pain education in addition to that integrated within other courses.<sup>13</sup>

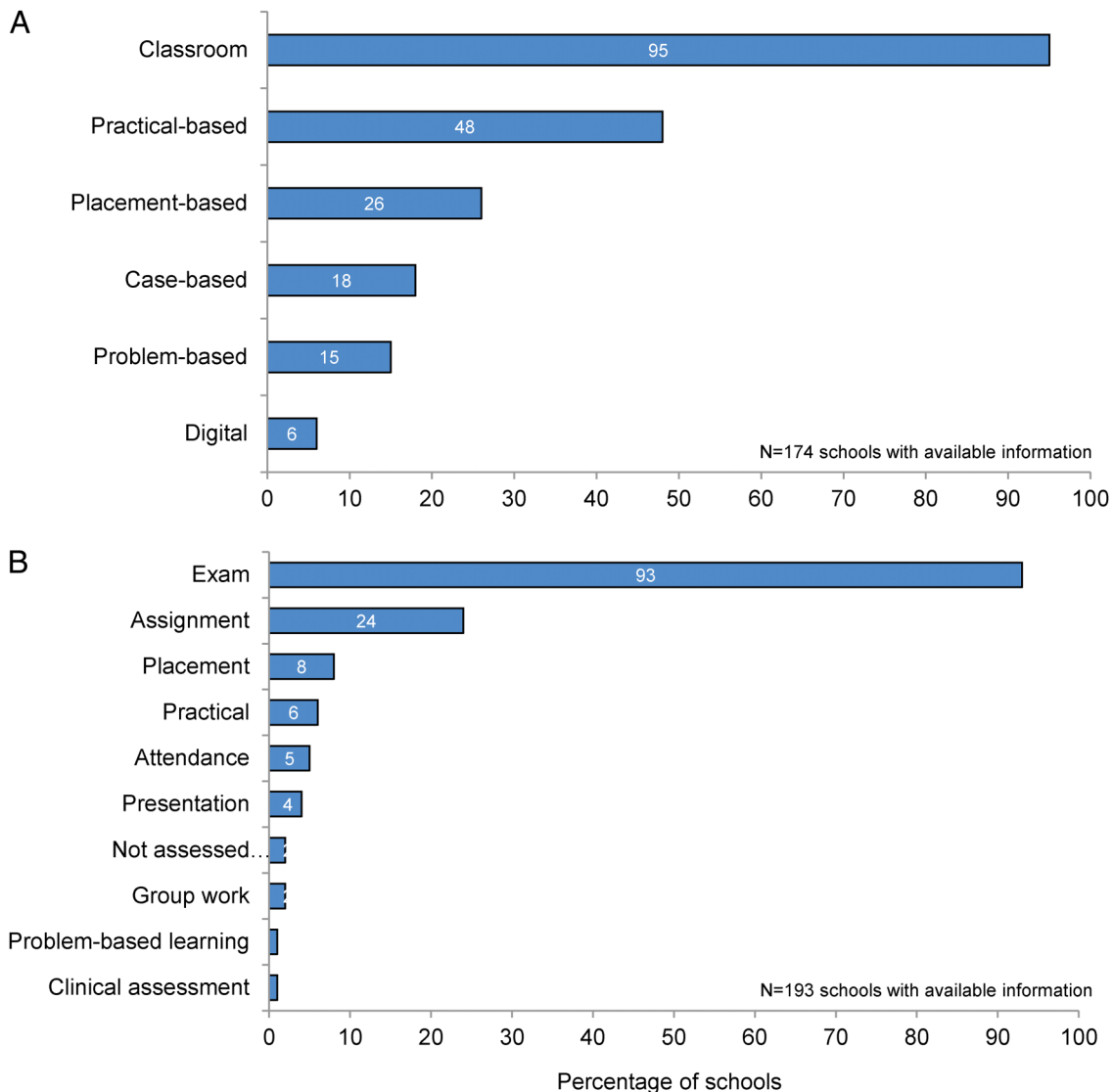
In the USA, the multistakeholder Pain Summit coalition concluded in 2010 that pain education is inadequate and fragmented,<sup>14</sup> while a systematic review reported significant deficits and gaps between North American medical school curricula and the IASP curriculum.<sup>15</sup> Only 4% of US schools offered a compulsory, dedicated pain course, 16% offered a designated pain elective, and the cumulative median number of hours of pain teaching was 9 (range 1–31).<sup>15</sup> In Canada, approximately 90% of surveyed schools<sup>15</sup> or health science programmes<sup>16</sup> included compulsory pain content. However, only a third of health science programmes evaluated in one study provided designated compulsory pain content as a separate module. Where data were available, the average total hours for designated compulsory formal pain content on medical courses was 16±11 h (range 0–38 h; median not stated).<sup>16</sup> Another study reported a median duration of pain teaching for medicine courses in Canada of 19.5 h (range 3–76).<sup>15</sup> Individual medical schools across North America have implemented and assessed undergraduate pain medicine curricula to improve education.<sup>23–25 29 30</sup> Information regarding pain education elsewhere is even more limited.<sup>31</sup> According to a survey of IASP chapter members in developing countries, 50% had received formal undergraduate courses relating to pain, but over 90% stated that the education was not sufficient to cover their needs on entering practice.<sup>32</sup>

### Strengths and limitations

Our study has several limitations. Clearly, the overall findings cannot be applied to countries not included in the survey. However, the study included 97% of all medical schools within 15 European countries and hence should at least be considered a representative sample. Limited information was available for some aspects of pain education, such as the number of hours or credits dedicated to pain education, limiting the extent to which the data can be utilised. It could also be argued that curricula might not fully or accurately represent the actual teaching and learning around pain, resulting in an underestimation or overestimation of the extent of pain medicine teaching. The underdocumentation of pain teaching on curricula could itself be indicative of its underprioritisation within medical education, and might also reflect a general underestimation of the burden of pain and the necessity of teaching on proper pain management.

### Conclusions and policy implications

In conclusion, documented pain teaching in the majority of the European medical schools evaluated in this study falls far short of what might be expected given the



**Figure 2** Methods used by medical schools for: (A) teaching (N=174 schools with available information) and (B) assessment (N=193) of pain medicine education in 15 European countries.

prevalence and public health burden of pain. With respect to the demographic ageing of the European population in the next two decades, this information should give rise to European-wide and national actions (see panel 2) by all responsible authorities to improve undergraduate pain medicine education of the future generations of physicians in our national healthcare systems.

### PANEL 1: DATA EXTRACTED

Curriculum data extracted:

- ▶ Provision of pain teaching within a dedicated pain module, within other medical modules or within the broader curriculum (eg, as a theme, rather than in specific modules).
- ▶ Whether pain teaching was compulsory or elective/optional (and student numbers for elective dedicated pain modules).
- ▶ The number of hours or credits defined for pain teaching pain topics defined.

- ▶ Teaching and assessment methods used.

### PANEL 2: APPEAL AND RECOMMENDATIONS

The APPEAL Taskforce calls on medical schools, pain specialists, medical students and relevant policymakers to ensure that pain education for medical students across Europe is fit for purpose and addresses the current unmet public health need to adequately assess and manage patients in pain.

The Taskforce recommends:

1. The introduction of compulsory pain teaching for all undergraduate medical students in Europe, to enable them to acquire a defined minimum level of competency in up-to-date pain management.
2. The establishment of a European framework for pain education, developed jointly by pain specialists and educators and drawing on the EFIC Core Curriculum in Pain Management, to ensure consistency in pain teaching within undergraduate medical curricula and between medical schools in Europe.



### 3. Improved documentation of pain teaching within undergraduate medical curricula, with clearly stated teaching content and defined student competencies in pain.

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