

Implementation of evidence-based practice: outside the box, throughout the hospital

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ABSTRACT

Background: Evidence-based practice (EBP) is a generally accepted means to improve healthcare quality. However, not all healthcare professionals and managers apply EBP in daily practice. We investigated EBP attitudes, knowledge and the perceived barriers and facilitators to practising EBP, to define tailor-made interventions for improving evidence-based behaviour.

Methods: In this cross-sectional survey, doctors and nurses from five major specialities of a university hospital were invited to complete the McColl and Barriers questionnaires. **Results:** Response rates were 70% (305/435) for doctors and 74% (396/537) for nurses. They were welcoming towards EBP, but considered time constraints, knowledge gaps and poor availability of evidence as major barriers to implement EBP. They also mentioned contradicting results (75%) and flawed methodology (69%), while nurses frequently mentioned unawareness of (75%), or difficulty in reading and interpreting research papers (70%). Regarding EBP knowledge, 6/8 common EBP terms could be explained by 54% of doctors but by only 15% of nurses. Facilitating factors among doctors concerned the availability and accessibility of high-level evidence and communication of evidence during various clinical meetings and handovers for clinical decision making. Among nurses, promoting factors involved more teaching and instances to incorporate EBP in clinical practice. Both groups desired more managerial support in terms of motivation and opportunities.

Conclusions: Doctors and nurses have embraced the EBP paradigm as an important means to improve quality of clinical patient care, but its application is still cumbersome. This paper offers a tailored programme for implementation and sustainment of EBP, corroborated by professional and managerial role-models.

KEYWORDS

Evidence-based practice, implementation, patient care management, quality assurance, quality of healthcare, questionnaires

INTRODUCTION

Societal and patients' demands for professional and resource accountability have fostered the introduction of evidence-based practice (EBP) in healthcare and education.^{1,2} Hospital executive boards and insurance companies stress the use of EBP to prevent practices that are unsafe or lack empirical support, to reduce unacceptable individual variance, and ultimately to increase efficiency and quality in healthcare.³

However, reality proves that healthcare professionals have been unresponsive to embrace EBP in daily practice. Implementation by doctors might be hampered by a perceived lack of time, knowledge or resources,^{4,5} while in the nursing realm the body of knowledge is still burgeoning. A joint venture of role-modelling teachers, doctors, nurses and managers is desirable yet missing to really make EBP work and to enhance the quality of care for patients.^{6,7}

Randomised trials or systematic reviews may be scarce and available evidence may merely stem from bias-prone study designs, or be lacking altogether.⁸ Nevertheless, it is important to be aware of this level of evidence behind the interventions we offer our patients,⁹ as it guides the strength of our recommendations and can help clinical decision making.¹⁰ Hence, the question emerges as to how to overcome possible limitations of, and reluctance to implement EBP.

Improvements in evidence-based behaviour can only be realised if awareness of, and a positive attitude towards,

EBP are secured first.¹¹ Moreover, promoting change in clinical practice is more likely to be successful if a change strategy is based on the specific barriers and facilitators perceived by the professionals involved.¹²

Therefore, the aim of this study was to determine the attitude towards and awareness of the EBP principle among doctors, nurses and managers within a university hospital and the barriers experienced in practising EBP, in order to define a tailor-made intervention programme to structurally facilitate and sustain evidence-based behaviour.

METHODS

This survey was conducted at the five largest departments (Internal Medicine, Surgery, Obstetrics & Gynaecology, Paediatrics and Neurology) of the Academic Medical Center, a 1000-bed university hospital in Amsterdam, the Netherlands. Approval for the survey was obtained from the medical and nursing managers of each of these departments. Ethical approval was deemed unnecessary. To assess the attitudes towards and knowledge and barriers of the EBP principle, we combined two questionnaires, i.e. the Barriers scale and the McColl questionnaire.^{5,33} The Barriers scale addresses the perceptions of barriers to the utilisation of research findings in clinical practice. This five-point scale of 29 items has been validated in various settings worldwide to assess EBP implementation barriers.^{14,15} The McColl questionnaire addresses attitude (on a 10 cm visual analogue scale), awareness and actual use of EBP, and has also been applied widely.¹⁶⁻¹⁸ Both questionnaires were translated into Dutch by means of forward-backward translation,¹⁹ and distributed as paper or electronic versions. To assess EBP knowledge among doctors and nurses a list of common EBP terms relevant to their clinical practices was provided. We added two non-existing dummy terms to these lists to gauge any socially desirable answering.²⁰ For doctors, these were 'Fixed event rate' and 'Random benefit ratio', and for nurses 'Dosage chance' and 'Absolute treatment increase'. All clinical specialists, trainees and nurses, including those with managerial tasks, of the five departments were invited to complete the questionnaires. Respondents' general characteristics, including their age, gender, level of education, working experience, previous EBP training and literature search facilities were also recorded.

DATA ANALYSIS

The answers to the 29 possible barriers were dichotomised, i.e. items scored as 'barrier' or 'large barrier' were counted as barriers. Means and standard deviations (SD) or medians and inter-quartile ranges (IQR) were

calculated, depending on the distribution of the parameter. Differences were expressed as mean differences with 95% confidence intervals (CI). To compare the means of the attitude scores towards EBP between different subgroups, the Student's t-test was used. Differences between median values were analysed using the Mann-Whitney U test. Statistical analysis was performed using IBM-SPSS version 18.0 (SPSS Inc., Chicago, Illinois, USA).

RESULTS

A total of 305 doctors and 396 nurses responded (response rates of 70 and 74%, respectively). Characteristics of the respondents are summarised in *table 1*.

McColl questionnaire

About two-thirds of the doctors and nearly half of the nurses stated to have had some training in literature searching (*table 1*). About a quarter of the doctors and less than 10% of the nurses had attended a formal EBP course in the past. These data did not differ substantially among the five departments. Doctors regularly searched for evidence in the literature, which contrasted sharply with the nurses. Doctors had easy access to PubMed, both at home and at work. In contrast, nurses did not always realise they could access PubMed at home, despite having internet facilities.

When asked which competences they considered essential to change from experience-based to evidence-based practice, the majority of doctors stated a combination of searching and critical appraisal skills, finding and applying evidence-based summaries, and using evidence-based guidelines. The same question was repeated for perceived future needs, showing a small shift towards the exclusive use of evidence-based guidelines. For now and for the future, the majority of the nurses preferred to rely entirely on evidence-based guidelines and protocols.

The EBP principle enjoyed a welcoming attitude (*table 2*). This was more so among doctors (72 on a scale of 100) than among nurses (55; mean difference 16.5, 95% CI 13.8 to 19.2). Neurologists and internal medicine nurses had the most positive attitudes (scores of 77 and 71, respectively). The same was true for the perceived EBP attitude of their colleagues.

Both doctors and nurses considered research findings to be very useful in daily practice and they very much agreed with the statement that EBP improves patient care (*table 2*). Surgeons tended to find practising EBP rather demanding (score of 56), but not all were convinced about the purported limitations of EBP that it would be time-consuming for busy professionals or that evidence would be frequently lacking. For instance, this was not so among the neurologists (score of 35), who also felt that

Table 1. Respondents' characteristics, EBM proficiency and literature search facilities

	DOCTORS (n=305)						NURSES (n=396)					
	Internal medicine	Surgery	Paediatrics	Neurology	Obs&Gyn	Total	Internal medicine	Surgery	Paediatrics	Neurology	Obs&Gyn	Total
N respondents/total (%)	98/142 (69%)	29/43 (67%)	80/128 (63%)	36/55 (65%)	62/67 (93%)	305/435 (70%)	31/54 (57%)	84/122 (67%)	192/255 (75%)	46/53 (87%)	43/53 (81%)	396/537 (74%)
Males	45%	62%	42%	74%	29%	46%	27%	23%	9%	24%	12%	15%
Mean age (SD)	38 (9)	38 (8)	41 (9)	36 (11)	38 (11)	39 (10)	33 (11)	37 (13)	40 (10)	40 (13)	41 (12)	39 (12)
Senior staff ^a	42%	52%	73%	37%	48%	52%	29%	18%	19%	24%	19%	20%
Median working experience in years (IQR)	7 (4-16)	9 (4-17)	10 (6-17)	5 (2-10)	8 (4-19)	8 (4-17)	6 (2-13)	13 (4-27)	19 (8-28)	17 (5-28)	16 (7-30)	16 (6-27)
Previous literature search training	56%	69%	69%	75%	76%	67%	55%	41%	45%	52%	47%	45%
Previous critical appraisal training	62%	62%	73%	67%	53%	64%	45%	33%	41%	39%	40%	39%
Previous EBM training	10%	28%	29%	19%	36%	23%	4%	5%	9%	11%	12%	8%
Median number of searches last year (IQR)	100 (50-300)	30 (20-125)	100 (50-200)	200 (100-425)	100 (50-300)	100 (50-300)	4 (0-15)	0 (0-2)	1 (0-4)	1 (0-10)	0 (0-3)	1 (0-4)
Current way ^b of using evidence	57% all	62% all	69% all	81% all	58% all	64% all	46% guide-lines	68% guide-lines	66% guide-lines	60% guide-lines	68% guide-lines	64% guide-lines
Future way ^b of using evidence	58% all	72% all	67% all	83% all	66% all	66% all	39% all; 22% guide-lines	26% guide-lines; 22% all; 18% skills + guidelines	23% all; 24% search + guidelines; 23% guide-lines	24% all; 20% skills; 20% guide-lines	24% guide-lines; 21% all; 17% skills	23% all; 23% guidelines
Most suitable way ^c of using evidence for own specialism	26% all; 25% guidelines; 23% EB summaries	32% all; 32% guide-lines	37% all; 28% guide-lines	51% all; 14% skills; 11% guide-lines	40% all; 39% guide-lines	36% all; 28% guide-lines	29% guide-lines; 25% all	40% guide-lines; 28% all	42% guide-lines; 25% skills + guidelines	46% guide-lines; 22% skills + guidelines	44% guide-lines; 21% all	40% guide-lines; 20% EB summaries
PubMed access at home	97%	86%	95%	100%	90%	94%	46%	22%	38%	56%	35%	38%
PubMed access at work	100%	100%	100%	100%	100%	100%	96%	84%	87%	93%	82%	88%
Internet at home	100%	97%	98%	100%	100%	99%	96%	89%	97%	98%	91%	95%
Internet at work	100%	100%	100%	100%	100%	100%	86%	100%	78%	91%	100%	79%

^aSD = standard deviation; ^bI.e., medical specialists and senior or head nurses; ^cIQR = inter-quartile range; ^d(Combinations of) a. searching and critical appraisal skills; b. use of evidence-based summaries; c. using evidence-based guidelines or protocols.

Table 2. Current attitudes towards EBP; scores can range from 0 to 100

	Doctors mean (SD)	Nurses mean (SD)	Difference (95% CI)	P-value (Student t-test)
Your current attitude towards EBP Least positive (0) ↔ Extremely positive (100)	71.5 (15.7)	55.0 (21.6)	16.5 (13.8 to 19.2)	<0.001
Attitude of your colleagues towards EBP Least positive ↔ Extremely positive	73.3 (13.5)	48.1 (19.2)	25.2 (22.8 to 27.6)	<0.001
How useful are research findings in daily practice? Useless ↔ Extremely useful	70.0 (15.4)	62.0 (18.4)	8.0 (5.5 to 10.6)	<0.001
What percentage of your clinical practice is evidence-based? 0% ↔ 100%	50.2 (18.1)	43.8 (20.6)	6.4 (3.5 to 9.3)	<0.001
Practising EBP improves patient care Completely disagree ↔ Fully agree	79.0 (13.8)	74.3 (17.6)	4.7 (2.4 to 7.1)	<0.001
EBP is of limited value in clinical practice, because a scientific basis is lacking Completely disagree ↔ Fully agree	41.6 (23.7)	48.6 (20.7)	-7.0 (-10.4 to -3.6)	<0.001
Implementing EBP, however worthwhile as an ideal, places another demand on already overloaded doctors/nurses Completely disagree ↔ Fully agree	44.3 (24.9)	55.2 (23.2)	-10.9 (-14.5 to -7.2)	<0.001

scientific evidence was broadly available in their speciality (score of 28) (data from each separate speciality not shown in tables).

Doctors estimated that only half of their clinical practice was evidence-based, which was even lower (44%) according to the nurses (table 2). The respondents of the obstetrics/gynaecology department estimated their practice was most evidence-based (doctors 58%, nurses 53%), while the paediatrics department regarded their practice as least evidence-based (doctors 39%, nurses 42%). This might be related to the barriers paediatricians noted that available evidence cannot easily be extrapolated to children and that clinical trials in children are scarce.

Specialists estimated a slightly but significantly lower percentage of their practice to be evidence-based (47.8%) than their trainees did (52.9%); mean difference 5.1%, 95% CI 1.0 to 9.3%. However, their attitude to EBP was not different from the trainees. Furthermore, EBP attitude among the oldest quartile of specialists (51 to 65 years) was not significantly different from the youngest quartile (aged below 37). There were also no meaningful differences in attitude between male and female doctors. Senior nurses showed a more positive attitude towards EBP than non-senior registered nurses (scores of 67 vs 52, respectively; mean difference 14.9, 95% CI 10.3 to 19.5), and were more convinced that EBP improves patient care (79 vs 73, respectively; mean difference 6.0, 95% CI 2.2 to 9.8). Doctors and nurses with a managerial role (i.e. heads of department, nursing managers) did not give conspicuous responses.

Figure 1 shows the proportion of common EBP terms the doctors and nurses said they understood. Half of the doctors had (some) understanding about all of the eight terms provided. The two dummy terms were least known, but still 39 and 49% of the doctors, respectively, claimed

Figure 1. Doctors' (top panel) and nurses' (bottom panel) knowledge of common EBP terms; terms with an asterisk are meaningless dummy terms

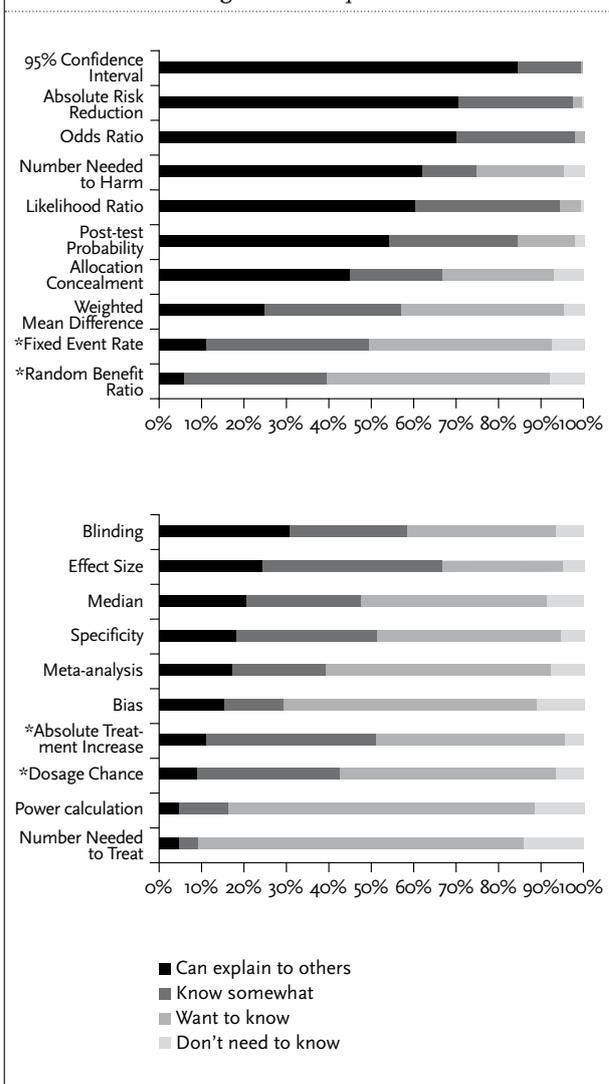


Table 3. Doctors' and nurses' awareness of common sources of evidence

Source	Unknown	Familiar	Read	Used
DOCTORS				
ACP (American College of Physicians) Journal Club ¹	70.0%	17.7%	6.8%	5.5%
CBO (Dutch Institute for Healthcare Improvement) ²	19.3%	16.2%	18.6%	45.9%
Cochrane library ³	0.0%	6.3%	22.0%	71.7%
Evidence-based medicine ¹	37.0%	38.0%	12.5%	12.5%
National Guideline Clearinghouse ²	60.7%	18.6%	6.8%	13.9%
TRIP database ³	70.6%	15.0%	7.2%	7.2%
NURSES				
CBO (Dutch Institute for Healthcare Improvement) ²	62.9%	19.5%	8.7%	8.9%
Cochrane library ³	49.1%	28.9%	11.5%	10.5%
Evidence-based nursing ¹	36.9%	41.5%	18.1%	3.6%
CINAHL (Cumulative Index to Nursing & Allied Health Literature) ³	70.6%	14.8%	9.0%	5.6%
LEVV (Netherlands Centre of Excellence in Nursing) ²	56.8%	21.7%	15.0%	6.5%
Verpleegkunde (Dutch-Flemish Scientific Nursing Journal) ³	23.2%	36.7%	34.9%	5.2%

¹Source offering pre-appraised evidence; ²Source offering (evidence-based) guidelines; ³Source offering evidence from various study designs and aggregation levels.

to have some knowledge about their meaning. Half of the nurses had (some) understanding of three out of the eight terms. Real and dummy terms were known equally well among nurses (suggesting socially desirable answering to this part of the questionnaire), while 'power calculation' and 'number needed to treat' were virtually unknown. The respondents' familiarity with sources of evidence are summarised in *table 3*. Databases with systematic literature reviews (Cochrane) and national guidelines (CBO) were most widely used for clinical decision making (by 72 and 46% of the doctors, respectively). This was also true for nurses, but to a much lesser extent (10.5 and 8.9%, respectively). Sources offering pre-appraised evidence (e.g. ACP Journal Club, Evidence-based Medicine) were not (yet) used habitually.

BARRIERS SCALE

The top-five barriers as perceived among doctors and nurses are shown in *table 4*. For over 75% of the doctors, inconsistent literature results were the biggest hurdle. Time constraints to read and unawareness of literature results were considered to be the major impediments by more than 75% of the nurses, but also by many doctors. Nurses in particular had difficulties with reading papers in a foreign (English) language.

The major facilitating factors as reported by doctors and nurses (*table 5*) could be summarised as: constant involvement by colleagues, staff and management in learning and applying EBP in daily clinical practice, structural promotion and facilitation of EBP activities by the management, and clear and easily accessible protocols and guidelines.

Table 4. Top-five barriers to applying EBP as stated by doctors and nurses

DOCTORS	
The literature reports conflicting results	75.3%
The research has methodological shortcomings	69.4%
The doctor has insufficient time to read research	66.3%
The doctor is unaware of the research	61.9%
The doctor feels the results are not applicable to his/her situation	58.4%
NURSES	
The nurse has insufficient time to read research	76.5%
The nurse is unaware of the research	75.4%
The research is not reported clearly and readably	70.2%
Statistical analyses are unintelligible	69.9%
Insufficient time to implement new ideas at the workplace	69.5%

Table 5. Major facilitating factors to apply EBP as stated by doctors and nurses

• Dedicated time to learn and practise EBP
• Management support
• Promotion and integration of EBP among all disciplines involved in patient care
• Communication of (new) evidence at various meetings, rounds or handovers
• Easily accessible sources of evidence-based guidelines and protocols
• Role-modelling EBP experts and managers
• Availability of pre-appraised or aggregate evidence
• Promotion of EBP by spreading successes of evidence-based interventions
• More well-designed and well-performed, clinically relevant research

DISCUSSION

The majority of healthcare professionals and staff in the larger clinical specialities within our university hospital appear to be quite EBP-minded. They appreciate that research findings are useful for daily clinical practice and consider the EBP paradigm an important tool to improve the quality of patient care. However, important barriers are still obstructing the implementation of EBP in daily clinical practice.

These findings, in particular barriers such as time constraints, knowledge gap and poor availability of evidence, occur consistently among the various medical specialists and nurses alike and have also been signalled in many other specific settings and specialities throughout Europe.²⁰⁻²⁴ Moreover, observed barriers appear to be consistent over time and geographical region.¹⁵ These observations have prompted various single-focus teaching initiatives, e.g. teach-the-teacher modules.²⁵ However, available evidence is not convincing as to whether stand-alone teaching modules actually improve EBP skills, attitudes or behaviour.²⁶

Effective implementation strategies should take a broader approach and involve not only medical and nursing schools and residency educational programmes, but also management policy and health systems.^{27,28} Such implementation strategy should be a multifocal, comprehensive programme for all the professionals involved ('professional in the lead') and tailored to their desires and perceived barriers.²⁹ After all, excellent evidence-based patient care cannot be attained without the interaction of the different managerial, research, and healthcare professionals.

IMPLICATIONS

Based on the results from our and other groups, and considering the various challenges and opportunities for EBP implementation, we have summarised our suggestions for structural incorporation of EBP at various hierarchical levels in *table 6*. An EBP implementation programme should firstly be promoted and facilitated by the management, and epitomised by role models among the various specialities and professionals. Furthermore, EBP activities should be part of quality indicators, departmental audits, and certification. Second, it should include teaching modules for undergraduate students and (preferably integrated) postgraduate courses for nurses and doctors.³⁰ However, not every healthcare professional needs to be trained up to an expert level at which (s) he can find, appraise, implement as well as generate evidence.^{31,32} Rather, every department should at least have some EBP experts, doctors as well as nurses, to ignite and

Table 6. Structural incorporation of EBP at various levels

National	<ul style="list-style-type: none"> • Governmental enforcement of EBP in health-care and educational institutions • Professional societies' quality assurance and guidelines policy
Board of hospital directors	<ul style="list-style-type: none"> • Strategic aims • Five-year planning • Workplace visits and internal audits • Stimulation funds • Annual invitation of visiting professors on EBP related topics
Management	<ul style="list-style-type: none"> • Staff planning and recruitment of EBP-minded leadership and role-modelling personnel • Yearly performance interviews including EBP activities • Budgetary allowances for EBP education and EBP experts on every ward • Professional atmosphere that embraces EBP
Education	<ul style="list-style-type: none"> • Structural part of medical and nursing curricula • Structural postgraduate courses and e-learning modules • Collaboration and interaction between teachers and clinicians
Services	<ul style="list-style-type: none"> • Medical library facilities • Content management system allowing access to guidelines, protocols and condensed recommendations • Generally accessible database for critically appraised topics (CATs) • Help service for searching databases
Local workplace	<ul style="list-style-type: none"> • Journal clubs, grand rounds, handovers, regular (research) meetings • Dedicated time and personnel for EBP activities • Easy access to computers and databases • Research on yet unproven interventions

sustain the EBP approach, while every professional should have a critical attitude towards their clinical practice. Third, the programme should enable a local easy-to-use and easy-to-access database with updated evidence-based guidelines and protocols,³³ because awareness and use of internet sources of evidence is still imperfect.³⁴ Finally, it should make the most of opportunities during regular clinical meetings, such as handovers, grand rounds and journal clubs, to present and discuss available evidence. These discussions could help overcome the possible conflicting opinions about existing evidence and may help reach an agreement about the policy of choice. This requires an open culture in which feedback, communication prowess and respectful arguing are basic attitudes.

The overall welcoming attitude towards EBP as found in our survey offers an excellent opportunity to improve the apparently deficient EBP knowledge, skills and facilities. Both our survey and the presently available evidence

have given input for more outside-the-box thinking and a wide-ranging, structured approach to improve and sustain the implementation of the EBP paradigm throughout and even beyond the hospital. Because it is clear that many other institutions face the same challenges, the proposed structural implementation programme is likely to be useful for wider implementation.

LIMITATIONS

The outcomes of our survey may show a flattering picture. First, the non-responders may have been less EBP-prone. On the other hand, the responders did relate many barriers to EBP implementation, indicating they had not swallowed EBP whole. Second, the survey was based on self-reported knowledge rather than actual EBP knowledge and behaviour, while the dummy terms revealed an inflated level of knowledge. Hence, the factual EBP level is probably lower. Third, at the time of this survey our institution was not virginal in terms of EBP education. Since the 1990s, our doctors and nurses have been ushered into the EBP principle. More than half of the doctors and about 40% of the nurses now stated to have had some training in critical appraisal. It is therefore likely that other, non-teaching hospitals will be much less familiar with EBP. This underlines the need for further improvement initiatives.

Finally, our finding that doctors outperform nurses in EBP proficiency may be due to the fact that nurses are lagging behind in EBP education and only a few of them have been educated at a master degree level. This explains to some extent why nurses have difficulties with reading scientific (mainly English) literature. Fortunately, the number of available undergraduate and postgraduate EBP modules is now growing on a national and international scale.³⁴ In our hospital the EBP knowledge level is likely to have improved in the mean time, after the educational efforts during recent years. Hence, some of the items in our ongoing EBP implementation programme that have been employed in our institution gradually seem to be bearing fruit. Thus, we are confident the proposed multifaceted approach will be even more helpful for a successful implementation and assurance of EBP activities in daily clinical practice. Future verification measurements are needed to confirm adherence to EBP behaviour and its effect on patient-relevant outcomes.³⁶

CONCLUSION

In our quest to clinical excellence of patient care, the adoption of the EBP paradigm through a tailor-made

structural programme in collaboration with all stakeholders appears to be pivotal to make a substantial contribution to this goal.

ACKNOWLEDGMENTS

We are thankful for the additional efforts put into this survey by Drs. Jolanda Maaskant, Arno Mank, Seddigheh Moallemzadeh and drs. Sanne Nissink.

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ANSWER TO PHOTO QUIZ (PAGE 84)

SLIPPED CAPITAL FEMORAL EPIPHYSIS AS MANIFESTATION OF A RARE ENDOCRINOLOGICAL DISEASE

DIAGNOSIS

Slipped capital femoral epiphysis (SCFE) can be a manifestation of the multiple endocrine neoplasia syndrome type 2 (MEN 2).¹ MEN 2 syndrome is subdivided into MEN 2a and MEN 2b and both have medullary thyroid carcinoma as the most common feature. However, hyperparathyroidism is characteristic for MEN 2a whereas patients with MEN 2b can be recognised by neurofibromas of the tongue and marfanoid habitus.²

The diagnosis of acute SCFE is easier than that of chronic SCFE.³ Both disorders present with pain in the hip or with referred pain in the knee. Patients with acute SCFE typically have a contracture by flexion, abduction and exorotation. However, in patients with chronic SCFE the only presenting symptom can be a mild limp.³

SCFE can be difficult to diagnose on anteroposterior radiographs.³ For chronic SCFE a lateral radiograph according to Lauenstein (hips in 90° flexion and maximal abduction) is advised.⁴ SCFE often occurs bilaterally, therefore bilateral imaging at presentation and also during follow-up is indicated.⁴ Treatment of acute and chronic SCFE is surgical.⁴

Awareness of the association between MEN 2 and SCFE could help to identify patients earlier. This is crucial in order to prevent metastatic medullary thyroid carcinoma. Pheochromocytoma can also be part of MEN 2 and could cause severe hypertensive crisis or arrhythmias perioperatively. Complications of SCFE are avascular necrosis, chondrolysis and coxarthrosis if the diagnosis is missed.

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