Bologna in Medicine Anno 2012: Experiences of European medical schools that implemented a Bologna two-cycle curriculum – An AMEE-MEDINE2 survey

MADALENA PATRICIO[1], CLAIRE DE BURBURE[2], MANUEL JOÃO COSTA[3], CHRISTIAN SCHIRLO[4] & OLLE TEN CATE[5]

[1]University of Lisbon, Portugal, [2]Université Catholique de Louvain Health Sciences, Belgium, [3]University of Minho, Portugal, [4]University of Zurich, Switzerland, [5]University Medical Center Utrecht, The Netherlands

Abstract

Background: The 1999 Bologna Agreement implies a European harmonization of higher education using three cycles: bachelor and master before doctorate. Undergraduate medical programmes were restructured in only seven of the 47 countries.

Aim: Given the debate about a two-cycle system in undergraduate medical education, providing an overview of experiences in medical schools that applied this structure was the purpose of this investigation.

Methods: In 2009, an AMEE-MEDINE2 survey was carried out among all the 32 medical schools that applied the two-cycle system in medicine. At the end of 2011, a member-check validation using a draft manuscript was carried out to complete an accurate up-to-date impression.

Results: All the 32 schools responded initially; 26 schools responded to the second round. All schools had implemented the two-cycle system (all but one in a 3+3 year model) with hardly any problems. All reported smaller or larger curriculum improvements, often triggered, but not caused, by the two-cycle system. No school reported that introducing the system interfered with any desired curriculum development, particularly horizontal or vertical integration.

Conclusion: In 32 of the 442 medical schools in Bologna signatory countries, introducing a two-cycle model for basic medical education was successfully completed. However, harmonization of medical training in Europe requires further international collaboration.

Introduction

In 1999, the EU ministers of education signed the Bologna Declaration and started a European-wide reform to make higher education competitive and ready for the future.

Major objectives, already widely being implemented, included the restructuring of higher education in multiple cycles – bachelor, master and doctorate – the mutual recognition of credits following the European Credit Transfer System (ECTS). Among the aims to be reached ultimately in 2010 were harmonization of education, including the adoption of easily readable and comparable degrees, increased international mobility of both staff and students, greater employability of graduates with bachelor and master degrees (Davies 2010) and the promotion of European co-operation in quality assurance (EHEA 2010–2012, www.ehea.info).

Medical studies are not among those that were readily reformed in any of the signatory countries of the Bologna Process. The proposed restructuring of current undergraduate medical education into two cycles, designated as a 'two-cycle system' or a 'bachelor–master system', is a hotly debated issue in Europe (Christensen 2004; Patricio et al. 2008, 2010; Patricio & Harden 2009, 2010, Kuks 2010; Pfeilschifter 2010, AMEE/EMSA/AMEE 2010) and the majority of Bologna signatory countries had not applied the two-cycle Bologna model to medicine in 2007 nor developed intentions to do so. Reasons for not complying include concerns about horizontal and vertical curriculum integration, specifically with respect to early clinical training, and the perceived lack of any employment, possibility for bachelors in medicine (Pfeilschifter 2010).

Practice points

- Thirty-two of the 442 medical schools in Bologna signatory countries adopted a two-cycle model.
- None of these schools report substantial negative consequences.
- Reported benefits often focus on triggering unrelated improvements that were already foreseen.
- The two-cycle model does not appear to prohibit an integrated curriculum.
- There is an urgent need to further harmonize medical education across Europe.

Correspondence: Th.J. ten Cate, Centre for Research and Development of Education, University Medical Center Utrecht, PO Box 85500, 3508 GA Utrecht, The Netherlands. Tel: +31 88 7557010; fax: +31 88 7553409; email: t.j.tencate@umcutrecht.nl

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On the one hand, fears are voiced that the cyclic model is a retrograde step to the great divide between basic sciences and clinical medicine (Gordon et al. 2009), but others argue that it could bring clarity to a historically confused area in medical training as well as encourage clinical integration at all stages of the student's journey (Cumming 2010).

In 2007, the AMEE-MEDINE group, an EU-funded project, investigated the implementation of the two-cycle model for medical training among the countries that signed the Bologna Declaration. Only seven of the 46 Bologna signatory countries appeared to have implemented this Bologna model in medicine (Patricio et al. 2008). Clearly, despite a European agreement, there is much resistance in medicine to abide by this rule. Evidently, concerns in many countries overwhelm the task to harmonize the structure of medical curricula.

However, given the fact that in seven countries all medical schools did implement the two-cycle model in medicine, it is more than useful to report on their experiences. These can be of interest for other medical schools which wish to implement the system.

The present survey was conducted in 2009–2011 by AMEE-MEDINE2 (www.medine2.com), in all medical schools of the seven countries that implemented the two-cycle Bologna model in medicine. Its aims were to clarify how institutions operationalized the two-cycle requirements and how they reconciled such adaptations with the general trend in medical education to develop towards an integrated curriculum (Harden et al. 1984).

Method

In 2009, programme directors of all medical schools of the seven Bologna signatory countries identified by the 2007 AMEE-MEDINE survey to be implementing the two-cycle system in medicine were asked to share their experience by means of a new questionnaire. An explanatory AMEE-MEDINE2 letter accompanied the questionnaire, with background information on the Bologna Declaration and study objectives.

The questionnaire was initially designed by MEDINE2 work package 6 'Integration of the Bologna Process within medical schools in Bologna countries' and commented on by other authors and other MEDINE2 members. It contained questions on background, the process of implementation, specifics of the first and second cycles and lessons learned from the implementation process. The questionnaire contained closed- and open-format questions (Appendix).

All 32 medical schools in the countries that had been identified as applying the two-cycle system in medicine were approached at the end of 2009 to take part in the study, representing about 7% of the 436 medical schools of the 46 Bologna signatory countries (Patricio et al. 2008), in 2012, 442 and 47, respectively. The questionnaire was distributed and collected electronically. One contact person was identified in each country to act as a facilitator for the study, who was to remind the programme directors and collect and review the completed questionnaires. Answers were summarized per country. If they were ambiguous or difficult to interpret, respondents were contacted personally to provide clarification. Respondents were informed that presented data would not be attributable to particular schools. However, in Armenia and Iceland, countries with just one medical school, specific authorization was requested to present data that might be traceable to their schools. All facilitators were asked to write a country report summarizing the experiences within their country.

Open questions were analysed using '*a posteriori* content analysis technique (Bardin 1998). Responses were analysed without a prior conceptual framework, to extract the maximum information from the corpus of analysis.

Initial results, including country reports, were presented at the 2010 AMEE conference as short overviews. Results of this meeting and its discussion were used to give perspective to the discussion in the first version of this article.

In November 2011, this draft manuscript was sent to all original 2009 respondents with two pertinent questions: (1) read the text and indicate whether it gives a valid description of the situation in your country and institution and (2) please give us an update of recent developments related to the items in the questionnaire. This information was added to this article, if it added to our findings, to make sure this article reflected the current situation in the countries at stake. This procedure can be viewed a so-called 'member checking' procedure often used to validate findings in qualitative studies (Creswell 2002). Country reports were also updated.

Results

Background Information

We received responses from all the 32 schools in the 2009–2010 round, after extensive attempts to identify a suitable respondent for each school and several reminders, and from 26 schools in the 2011 validation round, using two reminders.

All respondents had significant functions and responsibilities in their medical school, often cumulative: deans or vice deans ($n=10$), directors or members of medical education department ($n=9$), programme directors ($n=8$), presidents of pedagogical council ($n=3$), coordinators of external or international affairs ($n=3$), president of a scientific council ($n=1$), head of a quality assurance programme ($n=1$) and administrator of a master's programme ($n=1$).

The first schools to implement the two cycles were from the Netherlands and Belgium (2003). Implementation was completed in 75% of the 32 medical schools by 2007. The last date of implementation found was in Iceland in 2010 (Table 1).

At the time of the survey (2010), 15% of the schools had completed a full curriculum reform. In December 2011, when respondents were requested to update recent developments, over 60% of medical schools had completed the full introduction of the two-cycle system.

All but one school reported 'full recognition of the Bologna process'. The justification given for partial recognition was that *the bachelor-part does not fulfil the requirements of the Bologna regulations* and *the transition from bachelor to master is a purely administrative process, as clinical training starts already in the bachelor years, and the curriculum is*

Table 1. Implementation years of the two-cycle system in medicine.

Year	Country	Universities with medical schools that introduced a two-cycle model
2003	Belgium	Faculty of Medicine, Université Libre de Bruxelles; Katholieke Universiteit Leuven
	The Netherlands	University Medical Center Groningen
2004	Belgium	Faculty of Medicine, Universiteit van Antwerpen; Faculty of Medicine, Université de Liège; Faculty of Medicine and Health Sciences, Universiteit Gent; Faculty of Medicine and Pharmacy, Vrije Universiteit Brussel; and Faculty of Medicine and Dentistry, Université Catholique de Louvain
2005	Denmark	Faculty of Health Sciences, Southern Denmark University; Faculty of Health Sciences, Aarhus University and Faculty of Health Sciences, Copenhagen University
	The Netherlands	Radboud University Medical Center and Free University Medical Center
	Switzerland	Faculty of Biology and Medicine, University of Lausanne and Faculty of Medicine, University of Geneva
2006	The Netherlands	Faculty of Health Medicine and Life Sciences, Maastricht University and University Medical Center Utrecht
	Armenia	Yerevan State Medical University
	Switzerland	Faculty of Medicine, University of Basel and Faculty of Medicine, University of Bern
2007	The Netherlands	Erasmus University Medical Center and Leiden University Medical Center
	Portugal	Abel Salazar Institute of Biomedical Sciences, Porto University; Faculty of Medical Sciences, New University of Lisbon; Faculty of Medical Sciences, Beira Interior University; Faculty of Medicine, Lisbon University; Faculty of Medicine, Porto University; and School of Health Sciences, Minho University
	Switzerland	Faculty of Medicine, University of Zürich
2009	The Netherlands	Academic Medical Center, University of Amsterdam
	Portugal	Faculty of Medicine, Coimbra University
2010	Iceland	Medical Faculty, Iceland University

built on an integrated concept, with a continuous development of knowledge, skills and attitudes. Legally speaking, however, all surveyed schools fully complied with the two-cycle system.

Structure of curriculum

Twenty-two medical schools (69%) reported to have retained an integrated curriculum with basic medical sciences and clinical medicine across both first and second cycles, whereas other schools reported to have kept a more traditional curriculum, with a first basic science cycle followed by a second clinical cycle. In other words, the introduction of two cycles did not appear to have fundamentally changed the integrated or not-integrated nature of the curricula. In Armenia and Belgium, a further restructuring of the length of the cycles was reported to be underway. Armenia may move from a 5 + 2 to a 4 + 2 years structure but decisions had not yet been made in January 2012; Belgium has reduced the length of undergraduate education from 7 to 3 + 3 years starting September 2012.

First cycle (bachelor). The duration of the first cycle is three years for all medical schools except in Armenia, where a reform to harmonize the system with other Bologna countries is reportedly underway, but the first cycle may remain four years.

All medical schools award a bachelor's degree after successful completion of the first cycle. Some report to award a Bachelor of Science degree (BSc) and other countries a Bachelor of Arts (BA). Portugal uses the term 'Licenciado' instead. One Portuguese school awards a 'License in Basic Health Sciences' upon request, but this has not happened to date.

The additional survey revealed that in January 2012, about two-thirds of the schools had learning objectives for the entire bachelor programme available, either locally or nationally, and one-third had only objectives per unit or module or simply none.

Three medical schools in two countries reported to have a formal assessment at the end of the bachelor programme, and one respondent explained that this pertains to the defence of a bachelor thesis. In all other cases, it appears that the bachelor diploma is awarded after completion of all bachelor units with their exams. The defence of a bachelor thesis was neither labelled as an examination nor a requirement by other schools. No school reported that a comprehensive written examination at the end of the bachelor programme is in place.

The second cycle (master). The duration of the second cycle is three years in all countries, except in Belgium (4 years) and Armenia (2 years). However, the two countries are currently in the process of revising the medical curricula in order to harmonize with a 3 + 3 (Belgium) or 4 + 2 (Armenia) year structure.

Upon successful completion of the second cycle, most schools award a Master of Medicine degree. Denmark, Belgium and the Netherlands explicitly award a Master of Science (MSc) degree. Iceland calls this 'Candidatus medicine'. All Dutch and Belgian schools award the MD degree in conjunction with the master's degree. All other countries provide the MD degree and access to postgraduate medical training after additional requirements, such as a national examination.

All but five schools (three French-speaking medical schools in Belgium, one in Portugal and one in Armenia) report that they have defined learning outcomes to be achieved at the end of the master's phase.

Table 2. Most significant examples of changes reported by medical schools associated with the implementation of the two-cycle curricula.

Changes across both cycles	• Full curriculum revision • Transition from a traditional to an integrated two-step spiral curriculum • Curriculum reorganization into organized modules and sectors • Definition of standard competencies at the end of each cycle • General redesign of objectives, such as a curriculum-wide implementation of the CanMEDS competency framework • Follow international trends, allowing student exchange • Aligning block periods with other university schedules to enable electives • Introduction and reform of clerkships • Introduction of ECTS credit system • Attention to Dublin Descriptor objectives, such as ethics and humanities • Renewal of teaching and learning approaches (student centred) • Enhancing research of education in both cycles
Changes in the first cycle	• Reorganization of the first three years into a coherent medical bachelor programme • More professionalism, evidence-based medicine and early patient contact • Introduction of a competency-based bachelor programme • Focus on basic medical sciences in thematic blocks • Introduction of early elective courses • Introduction of specific topics, such as medical humanities • More attention to e-learning
Changes in the second cycle	• Major reform of lectures, assessment and clerkships in the master programme • Structured assessment of students in clerkships • Clinical clerkships with preparatory classes and reflective weeks afterwards • Allocation of second-cycle theme blocks: diagnosis, DD and therapy • Linking students with supervising tutors over a two-year period • Redesign of final year: senior and elective clerkships and research project • Final master year organized as professional training • New final year tools: fostering self-evaluation and personal clinical expertise
Changes in assessment	• New assessment with increased accountability towards stakeholders • Introduction of a master-proof assessment at the end of the course • Improvement of documentation of student progress • Revised exam timeframe to suit the use of semesters • Master's thesis: writing, presenting and discussing it at the end of sixth year
Changes in quality control and research	• More systematic evaluation system • Adapted quality assurance and accreditation process in medical schools • International comparative evaluation of medical and BSc curricula • Increased opportunities for education research: curriculum design and delivery

At the end of the second cycle, seven schools report to administer a formal examination or thesis defence, whereas in the other schools just report that satisfactory completion of every module during the master programme is sufficient to graduate.

Two schools report to only accept their own graduates into the second cycle. All other schools theoretically accept bachelors from other medical schools, depending on availability of places, which are limited, and only after additional requirements for these candidates. Nine schools in theory also accept students from other health-related areas and require additional courses, usually following a detailed comparison review. Six Dutch medical schools require the completion of a transitional course (a 'pre-master course'); lasting up to one year, directed at the acquisition of clinical knowledge and clinical skills included in the bachelor programme of medicine, similar to a third bachelor year. One Portuguese and two Dutch medical schools also offer a four-year graduate-entry medical master programme for students with a biology or health-care bachelor degree as a separate track. The aim of both Dutch schools is to train clinical researchers with this course.

Language barriers sometimes prohibit the entry to the master's course, when local language fluency is considered required for clinical training. In Belgium, French-speaking medical master programmes only accept students with a bachelor degree from French-speaking medical schools in Belgium.

Related to the introduction of two cycles of undergraduate medical education, the Flemish part of Belgium has chosen to add a two-year 'second master' phase for medical graduates who start postgraduate medical training. This is called the 'Master after Master' ('Manama').

Structure changes as a result of the two-cycle implementation

Almost all medical schools report curricular changes in conjunction with the Bologna Process, which can be divided into five categories (Table 2).

Changes in the curriculum across the two cycles were mentioned by 24 schools, such as the introduction of integrated modules of basic science and clinical teaching. Major changes in the first cycle, such as the introduction of early clinical exposure, were reported by seven medical schools. Substantial changes in the second cycle, such as the introduction of research projects in the final year, were

reported by 10 medical schools, changes in assessment by nine schools (e.g. the introduction of a master's thesis) and the implementation of quality assurance procedures and educational research by four medical schools.

In recent years, legislation in several countries enforced what is called an 'absolute separation' of bachelor and master programmes in any higher education study. This means that students can no longer start a master's programme with remaining study obligations in the bachelor phase. The bachelor diploma is an entrance requirement for the master programme. This has changed the purely cosmetic nature of the bachelor diploma in the medical course.

A significant development is the increasing possibility to start a medical master programme without a medical bachelor's diploma from the same institution. In the Netherlands, next to the four-year medical master's programme offered at two schools, other schools offer non-medical applicants a tailored transitional programme to enter the regular three-year medical master's programme. In other countries, such arrangements are being discussed.

Another novelty is that one Dutch school offers a bachelor programme for foreign students, most of which are expected to follow the master's programme elsewhere. A second Dutch school with a foreign medical bachelor's programme offers a master's programme using clerkships in other countries, but still leading to a Dutch master's and MD diploma.

Armenia temporarily considered to name Bachelors in Medicine 'physician assistants' but this proposal was not turned into legislation.

In 2011, Switzerland installed a national licensing examination on knowledge and clinical skills for all medical masters, to allow entry into postgraduate medical training.

The BaMa-associated shortening of the Belgian medical curriculum into a 3+3 year structure has increased the pressure on French-speaking schools in the country to introduce an entrance examination for the bachelor phase in 2013, as the Flemish-speaking schools had done before.

Iceland struggles with the master's degree level, as comparability with both European and North American models is sought after in this mid-Atlantic nation. The master's diploma is considered too low level for the MD license and this terminology has therefore not (yet) been adopted in Iceland; instead, its final degree is called 'candidatus medicine'.

Facilitating factors when implementing the two-cycle system

Factors we identified for the survey that apparently had facilitated the reform were fourfold.

Recent curricular innovations. A recent or current curricular renovation was mentioned by the majority of the schools in Belgium, the Netherlands, Portugal and Switzerland. Two schools reported that a previously introduced ECTS currency facilitated the transition to the two-cycle system.

Top–down decision making. Ten schools reported that a political decision or a federal or state law played a major role in the adoption of the Bologna Process. Six medical schools reported an institutional, academic decision supported by the dean as the main facilitating factor.

Existing need for reform. Another facilitating factor mentioned was an existing need for curriculum development and innovation, particularly in clinical training. Support came from faculty, students and central administration. University symposia were organized in Iceland, Portugal and the Netherlands, along with teacher training and working sessions.

Available support infrastructure. Financial and logistic support was provided in one Swiss medical school to allow for a Bologna coordinator, a research assistant and the development of a students' database programme. Quality assurance and a limited number of content experts taking the lead were also mentioned. Facilities for training of teachers, to organize symposia and working sessions, with formal and informal support from students, all served to further enhanced reforms, as was mentioned by the respondents.

Strategies used by medical schools to involve faculty in the curricular reform

Reported implementation strategies can be classified into five categories.

Involvement of the academic community. This key strategy was reported by 20 medical schools through working sessions, open discussions, communication via school commissions or BaMa coordinators, intensive discussion and feedback rounds with staff, frequent plenary discussions or a formal survey of teachers' views on the medical curriculum.

Institutional and stakeholder support. Institutional support was reported by seven medical schools, including strong leadership and specific initiatives from their school or university. Other stakeholders included affiliated hospitals, in a process of definition of objectives, context, appropriate education strategies and methods, revision of skills training, clerkships and assessment.

Student support. Student involvement in the decision-making process was mentioned by seven medical schools, as related to the definition of objectives and curriculum revisions at various stages, prior to the Bologna Process, in open discussion sessions, and in education committees.

Using legislative requirement. Schools in Belgium, Denmark and Switzerland reported that communicating the legal necessity to change was used as a strategy to convince faculty.

Other facilitating factors. Further internal strategies mentioned by 11 medical schools were the designation of coordinators, investment in active committees, the use of key ambassadors, the involvement of heads of departments and the designation of a group of professors as a sounding board, and additional personnel investments by both school and university to prepare and support the transitions, as reported in Belgium and Switzerland. One Swiss university mentioned

involvement of administrative and secretarial staff. Teacher training was mentioned by one Dutch and two Belgian universities, stressing its benefits, particularly the early identification of future medical clinical or teaching staff and potential researchers. Other change agents mentioned were monitoring and quality control (four schools), regular evaluations with public accountability and setting up a quality assurance system.

Examples of significant initiatives are the structured implementation proposed by a Belgian university, including the identification of new goals, contents, desired outcomes, perspectives of each study and a structured reformation; a completely redesigned curriculum by a Dutch university, evolving from a 2½-year subject-based curriculum to an integrated 3-year learning outcome-based programme with 12 modules; and the introduction of a bachelor graduation ceremony in another Dutch university.

Potential advantages and benefits mentioned related to the two-cycle model

The two-cycle model was reported by some Swiss schools to act as a trigger for curriculum revision as well as for a school dialogue about harmonization of medical education. Extensive discussions about the third doctorate cycle resulted. Two Belgian schools also reported that 'for the first time, medical schools came together to discuss competencies', as Bologna gave the opportunity to re-think the curriculum in terms of integration of basic and clinical sciences and discipline-independent topics like ethics and humanities. Other curricular beneficial changes associated with a curriculum restructuring mentioned were a more rational programme, a better evaluation in the clinical years and a decrease in time dedicated to lectures, and for some, the introduction of a new curriculum.

Increased and facilitated mobility was reported by eight medical schools as potential opportunities, because of a greater transparency, with comparability of curriculum and ECTS, considering the increased possibility of building bridges between all health-care systems and hopefully lead to a '*greater standardisation of the medical curriculum and higher education standards*'.

Twelve medical schools reported various other opportunities, such as flexibility to stop or start a master's course in another domain or place, and an expected optimization of student selection overall and for the master's course in particular.

A value of having two degrees in medicine was mentioned by schools in Belgium, Iceland, Portugal and Switzerland, recognizing values of each with its credits towards possible market employment. One school mentioned how this could be particularly useful for women.

Most schools reported various added benefits and advantages gained from implementing the two-cycle model or occurring in relation to it. Two schools reported minimal or modest advantages that could be subsumed under the various categories previously identified, such as opportunities, curriculum, mobility and value of bachelor and master diplomas. Two other medical schools reported experiencing no advantage and a third school stated it expected that benefits would be more visible in the future. Two medical schools did not answer the question.

Difficulties and obstacles encountered with the two-cycle model implementation

Twelve medical schools stated they had encountered no difficulties at all or no major difficulties when implementing the system. Ten schools mentioned difficulties unrelated to the two-cycle model, which can be summarized as lack of human and financial resources to implement changes in view of increased demands. This was particularly reported in Portugal and Switzerland, and caused by administrative barriers, high workload, high numbers of students and lack of school personnel to follow students' progress, clinical placement difficulties, pressure to increase clinical work and research, having internal organizational and structural difficulties linked to conservative tendencies, increased costs, lack of time to introduce ECTS, modules and a new curriculum, in addition to legal administrative obstacles.

Difficulties intrinsic to the two-cycle model were also reported by 10 schools, mainly with regard to conceptual definitions of the bachelor and the master profiles. A need was mentioned for clear learning outcomes and competency profiles for the bachelor programme. Most programmes have now defined these (Table 3). Unclear advantages for bachelor competencies, lack of integration, communication difficulties between bachelor and master curricula and practical difficulties in allowing students with no medical background to apply for the second cycle were mentioned, as well as the combination of the master's degree with a traditional doctor's thesis.

Four schools in Belgium reported an added difficulty of curricular time constraints, as time allocated to the second cycle is to be reduced while equal amounts of theory knowledge is expected, in view of the current major curricular reduction in Belgium of the seven-year curriculum to six years. This led to proposals for the possible introduction of an anonymous non-constraining orientation test at bachelor entry to French-speaking Belgian medical schools.

Four medical schools reported difficulties related to the attitude towards the Bologna Process as a whole. It was felt that the two-cycle system was imposed as a top–down process, inducing a lack of ownership and commitment. The '*need to convince teachers to change again after a recent renewal of curriculum*' led to opposition of professors, as '*some teachers seemed afraid of losing their power if they did not keep their own previous curricular area and students assessment*'.

Concerns related to the implementation of the two-cycle model

We asked the respondents if there were concerns related to the implementation of the two-cycle model.

Eight medical schools reported no concerns and five medical schools did not reply, which we carefully interpreted as having no major concerns.

Concerns about mobility focus on a lack of curriculum harmonization between schools, due to different bachelor

Table 3. Administrative data of all 32 medical schools.

Country	School	Cycle 1: BACHELOR (BA)			Cycle 2: MASTER (MA)			MA entry possible with BA completed in: a: own medical school b: any medical school c: any health profession	Additional requirements for MA entry for outsiders?
		Years	Title awarded	Learning outcomes defined	Years	Title awarded	Learning outcomes defined		
Armenia	AM1	5	BS Medicine	Yes	2	MA Medicine	Yes	ab	
Belgium	BE1	3	BA Medicine	Yes 4[a]		MD	Yes	ab	Yes
	BE2	3	BA Medicine	Yes 4[a]		MD	Yes	ab	Yes
	BE3	3	BA Medicine	Yes 4[a]		MD		ab	Yes
	BE4	3	BA Medicine	4[a]		MD		ab	Yes
	BE5	3	BA Medicine	Yes 4[a]		MD	Yes	abc	Yes
	BE6	3	BA Medicine	Yes 4[a]		MD	Yes	ab	Yes
	BE7	3	BA Medicine	Not 4[a]		MD	Not	ab	Yes
Switzerland	CH1	3	BA Medicine	Not 3		MA Medicine	Yes	ab[c]	
	CH2	3	BA Medicine	Not 3		MA Medicine	Yes	ab[c]	
	CH3	3	BA Medicine	Not 3		MA Medicine	Yes	ab[c]	
	CH4	3	BA Medicine	Yes 3		MA Medicine	Yes	ab[c]	
	CH5	3	BA Medicine	Yes 3		MA Medicine	Not	ab[c]	
Denmark	DK1	3	BSc Medicine	Yes 3		MA Medicine	Yes	ab	
	DK2	3	BSc Medicine	Yes 3		MA Medicine	Yes	ab	
	DK3	3	BSc Medicine	Yes 3		MA Medicine	Yes	ab	
Iceland	IS1	3	BSc Medicine	Yes 2		Candidatus Medicine	Yes	a	
The Netherlands	NL1	3	BSc	Yes 3[b]		MSc and MD	Yes	abc[d]	Yes
	NL2	3	BSc	Yes 3		MSc and MD	Yes	abc[d]	Yes
	NL3	3	BSc	Yes 3		MSc and MD	Yes	abc[d]	Yes
	NL4	3	BSc	Yes 3[b]		MSc and MD	Yes	abc[d]	Yes
	NL5	3	BSc	Yes 3		MSc and MD	Yes	abc[d]	Yes
	NL6	3	BSc	Yes 3		MSc and MD	Yes	ab	
	NL7	3	BSc	Yes 3		MSc and MD	Yes	ab	Yes
	NL8	3	BSc	Yes 3		MSc and MD	Yes	abc[d]	Yes
Portugal	PT1	3	Lic. Bas. H Sc	Yes 3		MA Medicine	Yes	a	
	PT2	3	Lic. Bas. H Sc	Yes 3		MA Medicine	Yes	abc	Yes
	PT3	3	Lic. Bas. H Sc	Yes 3		MD	Yes	ab	
	PT4	3	Lic. Bas. H Sc	Not 3		MA Medicine	Yes	abc	Yes
	PT5	3	Lic. Bas. Med. Sc	Not 3		MA Medicine		abc	
	PT6	3	Lic. Bas. H Sc	Not 3		MA Medicine	Yes	ab	
	PT7	3	Lic. Bas. H Sc	3		MA Medicine	Yes	ab	Yes

[a]Full course currently being reduced in from seven years to six (3 + 3) years, starting with the cohort of 2012–2013.
[b]Additional four-year research master course offered leading to MSc and MD degrees; health profession related BSc required.
[c]Admittance limited to medical bachelors from Switzerland; admittance of other Swiss bachelors currently in discussion.
[d]Limited number of master places available for non-medical bachelors.

programmes, on the fact that many Bologna signatory countries have not implemented the two-cycle system or work on local solutions, and on language problems in a patient-focused curriculum such as medicine. Swiss medical schools reported how intra-curricular mobility was rather difficult to realize and Dutch medical schools reported how rarely students change universities for their master's programme and how master's programmes do not welcome incoming students, due to insufficient clinical placements.

Concerns about infrastructure were mentioned by four schools. Increased administrative workload was noted as a concern, as well as insufficient clinical teaching staff per student in the main clinical areas. Securing sufficient clinical rotations and facilities for all students when implementing new educational approaches for increasing numbers of students were also mentioned as concerns.

Further concerns related to the two-cycle model, including a lack of interest in the bachelor years in some schools, a concern about the artificial separation of basic and clinical cycles, about transitional problems and about an inadequate first cycle graduate preparation for areas outside the medical field. Although the two-cycle model at first sight is more compatible with the more classical approach of 'basic vs. clinical' cycles, one respondent wrote *'I do not share the fear often put forward by others that the integrated nature of the curriculum as a whole may suffer'.*

Key messages for other institutions envisaging implementing Bologna

Key messages are summarized in Table 4. These regard individual opinions about the Bologna Process, advice about practical requirements, about curricular changes needed, about communication transparency, about curriculum team management and the advice to '*Keep what works well'*. Three medical schools stressed the need for harmonization and continuity, proposing domain-specific learning outcomes at

Table 4. Key messages received related to implementation of the Bologna Process.

Opinions on the two-cycle model	• A chance for curriculum revision, upgrade and refinement • An opportunity to re-think the sequence of learning outcomes • Two cycles can serve to distinguish graduates' academic excellence and assure quality of health-care providers • Advantages of Bologna are modest, but it offers more possibilities for students to study abroad • I would advise not to implement the two-cycle model, unless it is required by the government
Practical requirements	• Take time to plan and prepare, self-reflect, have extensive discussions and introduce it progressively • Integration takes time; some teachers do not have enough of it • Choose gradual, incremental change and implementation of the model; use one-year steps • Make sure that the financial framework is clear before you start
Curricular changes needed	• Decrease lectures while increasing learning hours through different approaches • Work out a common framework; make it compatible with other faculties of your country! • Break up your curriculum into modules and add specific elective modules of excellence; fields of expertise in your own university • Implementation should consider which good candidates can apply to second cycle • Integrate basic science teaching and clinical training from first bachelor year • Integrate teaching and assessment in different curricular areas • Give special attention to ethics and humanities • A worldwide standardization of medical education is badly needed
Communication and transparency	• Improves transparency and permits/facilitates comparisons between universities • Ensure good coherence and communication between BA and MA programmes • Clear definition of competencies students must fulfil at the end of two cycles • Talk to all involved in the process, define goals, contents, international possibilities • Give special attention to ethics and humanities • A worldwide standardization of medical education is badly needed
Curriculum team management	• Strong leadership of Dean • Involve all students • Employment of academic coordinators • Divide responsibilities for both programmes • Organize and train the administrative, secretarial and computer scientists
Keep what works well	• Strong leadership of Dean • Be cautious not to change from integrated to separated curriculum • No compromise with quality/coherence/integration of principal pedagogical axes and content • Do not compromise your curricular philosophy • Change everything, but keep what works well!

European level, thus facilitating exchanges, and improving the continuity between master and residency training. Two schools recommended internal and external quality assurance systems.

Country reports

Part of this study was the establishment of more detailed country reports. These give a brief overview of the matter in each country and are available as web appendices I–VII with this article on the website of *Medical Teacher* (http://informahealthcare.com/toc/mte).

Discussion

This report provides a snapshot of current history of the undergraduate medical education structure in European countries. The Bologna Declaration of 1999, signed by the governments of 47 countries over 12 years, including Kazakhstan in 2010, implied the restructuring of higher education in three cycles. The first two, bachelor and master, were not forced upon medical education in 40 of these countries, but was so in seven countries, leading to changes in 32 medical schools. Given the debate on the benefits and drawbacks of a two-cycle model in undergraduate medical education (Patricio et al. 2008), the authors of this article attempted to describe the experiences in these 32 schools and draw conclusions on the usefulness and feasibility of introducing a two-cycle model in undergraduate medical education and on its consequences.

Based on a questionnaire survey and subsequent 'member check' with the respondents about a first draft of this manuscript, we hope to provide a reasonably accurate picture of the 2012 situation. We cannot avoid making interpretations of what respondents have provided as information. This clearly is one limitation of our procedure and the member-check validation was executed to minimize this interpretation bias. While the majority of respondents agreed with the draft text of this article, one respondent had a strong impression that the authors indeed had been led by an overly favourite view of the two-cycle model. The text was therefore scrutinized to avoid such unintentional formulations. A second limitation is the fact that in the past decade, virtually all 32 schools showed curriculum changes, many of which were not a direct consequence of the introduction of two cycles. However, these changes were often reported as associated with this introduction, as if new legislation seemed to have facilitated changes that

were foreseen anyway. We adapted any sentences that could be interpreted as a direct causal relationship between the introduction of the two-cycle model and these general curriculum changes.

The Bologna Process has been implemented in 32 of all 442 medical schools (https://imed.faimer.org) across Europe and other countries that signed the Bologna Declaration. This minority of medical schools have all provided us with the information on the implementation process and their first experiences.

The reported duration of the Bologna implementation in 32 medical schools spans over seven years, indicating both its flexibility not only in terms of respect for the schools' autonomy, but also in terms of obstacles mentioned that had to be overcome individually.

Our results do not support the published criticisms and warnings about the Bologna Process over the past 10 years (Pfeilschifter 2010). Evidence of a retrograde step, in which basic sciences would fill the first cycle and clinical practice the second was not observed, as 22 medical schools reported preserving or even introducing an integrated curriculum.

In fact, the practical key messages given by the 32 medical schools applying the Bologna structure do not warrant such concerns. This may be informative for those countries which consider to choose this path and confirm earlier reports by Patricio and Harden (2009, 2010) and Patricio et al. (2008, 2010).

Our study has limitations. We have tried to identify the most knowledgeable country respondents for our questionnaire, but cannot guarantee that all answers given would be fully shared with others in the same institution or country. We rather consider the information gathered to constitute the best possible view on the implementation process of the two-cycle system. Implementation of curriculum innovation is a complex and sometimes unpredictable process (McGaghie 2011), the success of which is undoubtedly coloured by the glasses of the perceiver.

A relative degree of harmonization was achieved in terms of duration and titles awarded for each cycle, mostly 3 + 3 years, leading, respectively, to a bachelor's and master's degree, with some variation in terminology. Most schools have defined specific learning outcomes to be achieved at the end of each cycle. A significant number of schools report to accept master students with a bachelor degree from other schools in theory, though many schools set additional requirements. There are still many differences in curricula and other practical obstacles hampering a significant increase in mobility, although the introduction of ECTS and the two-cycle model has facilitated this and may do so in the near future. Indeed, as one Dutch school reported, the '*benefits may only become visible in the future*'.

The Bologna two-cycle model, far from being a sterile exercise, has undeniably had an impact on the whole curriculum and assessment methodology as it acted as a trigger for change. The changes and trends reported are in line with the current medical education trends (Cumming 2010) with a move towards integrated curricula, vertical coherence, fewer lectures and increased clinical curricular components, the introduction of medical humanities, problem-based learning and competency-based education (Patricio & Harden 2009).

Having been through a recent curricular reform was reported to be a facilitating factor in applying Bologna. This suggests that the acceptance and implementation of changes paves the way for more changes, as medical schools incorporate mechanisms facilitating further curriculum reorganizations (e.g. curriculum committees). It must be noted that change can also lead to fatigue, as one school reports: '*after 16 years of reform a deep exhaustion and reform fatigue is noticed in the faculty specially among the teachers in charge of the implementation*'. The strategic importance of a strong and supportive leadership, stimulating particularly ownership through the involvement of all school staff (bottom–up process) and students seems of great relevance.

Interestingly, the external imposition of the Bologna two-cycle model – in most cases a top–down approach dictated by national governments – was viewed both as a facilitating factor because of its urgency and as an obstacle through a lack of ownership. This was also the case for several other factors such as the need to define bachelor and master competencies, both viewed as '*facilitating factors*' and as '*difficulties*', depending on the schools. Therefore, the different aspects of the Bologna Process cannot be simplistically labelled as 'positive' or 'negative', as every medical school must find and define its own path towards medical education progress depending on local resources and conditions.

The range of supporting factors varied from school to school, being a sign that Bologna harmonization does not prescribe a single format. Indeed, there was a broad range of reported supportive strategies that included developing quality assurance, competencies, sharing responsibility, identifying leaders and giving visibility or communication transparency to the process.

Over one-third of medical schools actively reported '*no concerns*' regarding the Bologna implementation, a reassuring notion. Most concerns expressed were in line with those reported earlier in the literature about mobility (van den Broek et al. 2010), a lack of interest regarding the bachelor curriculum (Christensen 2004) and a lack of prerequisites if the preceding bachelor degree was not in medicine (van Schravendijk & Mirecka 2007).

Almost half of all medical schools surveyed did not report any difficulty with the Bologna implementation. Practical difficulties that were mentioned are very much in line with those reported in the literature, both external and intrinsic to the two-cycle model, relating to lack of human and financial resources and attitude obstacles such as those reported in Spain as '*chronic apathy of national bodies in medical education*' (Lobato et al. 2010).

Only few medical schools reported no advantages in the Bologna two-cycle model, whereas a majority reported potential benefits in terms of flexibility, transparency, comparability of curriculum, increase in mobility, the possibility to stop with only bachelor degree in medicine, as well as 'real' or 'perceived' importance of being awarded a diploma at the end of both the first and second cycles.

The opportunity for key messages was used to reassure other institutions considering implementing the two-cycle

system: this requires time, deep reflection, transparent communication, coherence and institutional support, in fact all keys to success in any curriculum reform process.

Our findings highlight how the Bologna Process can be implemented while respecting the autonomy of medical schools and maintaining their freedom to decide on a curricular structure. In fact, implementation of the two-cycle system was independent of the various curriculum systems in place or any concurrent reform.

The present results can be considered an encouragement for countries and medical schools to apply the Bologna requirements in medicine, as is now considered by groups in Germany (Harendza & Guse 2009) and Hungary (Csóka 2009), and a boost for curricula that require more than simple cosmetic surgery (Lobato et al. 2010).

This report focused on the implementation of the two-cycle model in medical education, related to the Bologna agreement. Being a highly debated topic that requires attention, it should not be forgotten that there is an overarching aim of international harmonization of higher education that may particularly hold for medical education training, that is supporting quality improvement of education and competence of its graduates. The EU philosophy of an international community of professionals based on mutual trust of each other's educational quality is translated in the EU directive regulating mutual recognition of diplomas. This simple fact bestows far reaching obligations on medical schools to harmonize education and standards. Collaboration and debate is urgent, given the dynamics of EU regulation, as recently was shown in an European Commission proposal to change Article 24 of the Directive 2004/38/EC, and hence reducing the minimum length of basic medical training in the EU from six to five years (European Commission 2011). Medical educators and researchers must collaborate internationally to provide arguments for political decisions on content, length and structure of medical education.

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Notes on contributors

MADALENA PATRICIO, MA (Hons), is the President of the Association for Medical Education in Europe, Chair of MEDINE2 work-package 6 and an Assistant Professor at the Institute of Introduction to Medicine, Faculty of Medicine of the University of Lisbon, Portugal.

CLAIRE DE BURBURE, MB, BChir, PhD, is a Medical Education Advisor, Invited Lecturer and International Relations Coordinator to UCL Health Sciences, Université Catholique de Louvain, Brussels, Belgium.

MANUEL JOÃO COSTA, PhD, is an Associate Professor and Head of the Medical Education Unit at School of Health Sciences, University of Minho, Braga, Portugal.

CHRISTIAN SCHIRLO, MD, MME, is a member of the Steering Board of the German-speaking Association for Medical Education, Head office of the Dean and Office for Medical Education at the University of Zurich, Faculty of Medicine, Switzerland.

OLLE TEN CATE, PhD, is a Professor of Medical Education and Director of the Center for Research and Development of Education at University Medical Center Utrecht, the Netherlands, and an Adjunct Professor at the University of California San Francisco, USA.

Country reports

Country reports are available as Supplemental Material on http://informahealthcare.com/toc/mte

- Appendix I: Report from Switzerland
- Appendix II: Report from Belgium
- Appendix III: Report from Denmark
- Appendix IV: Report from Iceland
- Appendix V: Report from the Netherlands
- Appendix VI: Report from Portugal
- Appendix VII: Report from Armenia

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Appendix

Questionnaire for medical schools in the seven countries that implemented the two-cycle model in Medicine

Administrative questions. Country; Faculty and University; Name of the respondent; Respondent's function in the Institution; e-mail address; Telephone.

Implementation.

Q1 In your country, the Ministry of Education decided on the implementation of the two-cycle model in all medical schools. Does your school recognize such adoption? (a. Fully recognized; b. Partially recognized; c. Not recognized).

Q2 In which year was the two-cycle system introduced into your medical school curriculum?

Q3 Please identify which of the following options best describes the overall structure of the curriculum in your medical school: (a. Mainly basic medical science in the first cycle followed by a clinical second cycle; b. Integrated curriculum with basic medical sciences and clinical medicine addressed across both the first and second cycles; c. Other model. If yes, please describe).

The first cycle.

Q5 What is the formal terminology for the diploma awarded at the end of the first cycle?

Q6 Is there a formal statement or document of the expected learning outcomes to be achieved by the student at the end of the first cycle? If yes, please provide a reference.

Q7 Is there a formal assessment at the end of the first cycle on the basis of which the students are deemed to have satisfactorily completed their study programme? If no, what determines the completion of the first cycle?

Q8 Please indicate students' progression after completion of the first cycle either as a personal estimate or based on experience to date:

	0%	1–10%	11–50%	51–90%	91–99%	100%
a. Student continues with a second cycle in your medical school						
b. Student continues with a second cycle in another medical school						
c. Student continues with another non-medical programme of study						
d. Student seeks employment after the bachelor						
e. Information on employment						
f. Any other options students have						

The second cycle.

Q9 Assuming places are available at your faculty, please indicate how students can enter your institution for the second cycle with or without additional requirements or study programme (after completion of a first cycle programme a. in your medical school; b. in another medical school; c. in another health-care profession related area; d in any field of study).

Q10 Are additional requirements or study programme required for students entering from first cycle programmes in areas other than medicine? If yes, please specify.

Q11 How many years is the duration of your second cycle (master) programme?

Q12 What is the formal terminology for the diploma awarded at the end of the second cycle?

Q13 Is there a formal statement or document of the expected learning outcomes to be achieved by the student at the end of the second cycle? If yes, please provide a reference.

Q14 Is there a formal assessment at the end of the second cycle on the basis of which the students are deemed to have satisfactorily completed their study programme? If no, what determines the completion of the second cycle?

Conclusions.

Q15 What were the major changes *(curriculum content or other)* made in your faculty as a result of the implementation of the two-cycle model?

Q16 What facilitated the implementation of the two-cycle model within your medical school?

Q17 What strategies were used in your institution to involve faculty in the curriculum reform?

Q18 What do you see as the potential advantages and benefits to be gained from the introduction of the two-cycle model?

Q19 What were the major difficulties/obstacles in your faculty regarding the implementation of the two-cycle model in your curriculum?

Q20 Do you have any worries related to the implementation of the two-cycle model in your curriculum?

Q21 What key messages would you highlight for other institutions who are considering implementing the two-cycle model?

Q22 Any other comment/suggestion you want to make regarding this survey or the Bologna Process.