NEW
MAASTRICHT CURRICULUM

FACULTY OF MEDICINE
INSTITUTE OF MEDICAL EDUCATION
MAASTRICHT 2001

PATIENT BASED LEARNING
PRACTICE CENTRED EDUCATION
PROBLEM ORIENTED RESEARCH
PROJECT
THE NEW MAASTRICHT CURRICULUM

BEST EVIDENCE-BASED MEDICAL EDUCATION

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Maastricht 2001
PREFACE

Ever since the start of the Faculty of Medicine in Maastricht, its curriculum has received national and international attention. Meanwhile, many universities and other institutes for higher professional education have introduced various forms of problem-based learning. Within the Maastricht Faculty itself, new ideas to further improve the curriculum have been raised over the years. The Blueprint New Curriculum Committee specified these ideas and drew up the proposal presented in this document.

The Faculty Board believes that this proposal contributes to educational innovation. The concept of problem-based learning is retained. The patient plays a more central role. In addition, more attention is paid to theoretical education in the clinical phase and to scientific education and professional conduct. The programme is more attractive for both students and faculty because it offers a larger variety in instructional and assessment formats.

The Board subscribes to the importance the Committee attaches to extensive consultation with those involved in order to elaborate the proposal and develop a good curriculum.

Prof. G. Kootstra, MD, Dean
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INTRODUCTION

In September 1999 the Scientific Director of the Institute of Medical Education established the Blueprint New Curriculum Committee. The Committee consists of H.F.J.M. Crebolder (General Practice), M.J.A.P. Daemen (Pathology), J.L. Damen (Institute of Medical Education), G.A.J. Dunselman (Vice-Dean for Education), P.B. Farla (student), H.F.P. Hillen (Internal Medicine), L.F.J.Th.M. Kolle (Institute of Medical Education), T. Leiner (student/PhD research assistant), V.R.M.P. Moolaert (student), J.G. Nijhuis (Obstetrics/Gynaecology), I. Oosterhof (student), J. Rosing (Biochemistry), A.J.J.A. Scherpber (Institute of Medical Education), J.J.P. Schrander (Paediatrics, Institute of Medical Education), H.A.M. Snellen (Dept of Educational Development and Research), L.H.E.H. Snoeckx (Physiology), G.M. Verwijnen (Skillslab), C.P.M. van der Vleuten (Dept of Educational Development and Research) and G.J. Wesseling (Pulmonology).

It is common knowledge that testing has a strong impact on the students' learning behaviour. However, in curricular reforms assessment and examination come too often at the bottom of the list and consequently receive very little attention. The Director of the Institute of Medical Education has therefore assigned an Assessment Committee in addition to the Blueprint New Curriculum Committee. The Assessment Committee consists of J.-J. Rethans (Skillslab), E. Coolen (student), A.M.M. Muijtjens (Project team ‘student assessment’), G.M. Verwijnen (Skillslab), S.J. van Luijk (Project team ‘student assessment’), J.F.M. Smits (Chairman Assessment Committee), L.W.T. Schuwirth (Project team ‘student assessment’), L. van Knapen (student) and C.P.M. van der Vleuten (Project team ‘student assessment’). The report issued by the Assessment Committee has been accepted by the Blueprint New Curriculum Committee and is incorporated in this proposal.1

This proposal only describes the outlines of the new education and examination programme. The Committee has consciously left space for comments and innovative ideas. The new curriculum will imply many changes and can only be successful if the reform is a joint project with
the different department and hospitals. Consultation with departments, the university hospital, affiliated hospitals, research institutes and project teams was started in April 2000. Eventually, planning groups and committees have started to work out the details.

This document explains the ideas and plans of the Blueprint New Curriculum Committee. It begins with a short summary, followed by a description of the background of the reform. Finally, the theoretical ideas are translated to a proposal for a new curriculum. The appendices contain proposals for the content of the first-year and second-year programme as well as a list of conditions and requirements for the curriculum reform.
SUMMARY

This document describes the blueprint for a new curriculum. The content and structure of the curriculum are based on insights in cognitive psychology and educational theory. Experts and beginners have been found to differ from each other because experts make use of well-functioning knowledge networks. In order to develop a good knowledge network, a beginner should be trained to solve problems in a situation that is as close as possible to real life. It is also shown that knowledge is better memorized when acquired in the same context it will be applied in later. In the new curriculum this is translated into a Z-shaped curriculum, in which students already gain some practical experience at an early stage and continue to gain more in-depth theoretical knowledge later in their studies.

Basic medical education takes up a relatively short period in the educational continuum. In their future professional lives as a medical doctor, the students should be able to judge in which areas they need further education. In order to train this ability, the new curricular structure allows increasing responsibility and independence to direct one’s own learning. At the end of the curriculum, the student provides patient care under supervision as a junior doctor (for a period of five months). In practice, doctors need to be able to cooperate and provide as well as receive feedback on their professional performance. The curriculum will therefore include training in this aspect of professional life.

As it appears that the content and method of testing have a large impact on the students’ actual study and learning behaviour, the assessment programme will also be revised. Assessment is considered an essential part of the education programme. The new assessment programme aims to test all areas of a medical doctor’s competence. The programme conforms to the Blueprint 1994: training of medical doctors in the Netherlands and the Dutch Individual Health Care Professions Act (BIG).
The professional performance of doctors is also based on their ability to judge the value of results of scientific research. Therefore, scientific education (as well as dealing with evidence-based medicine) constitutes a main thread throughout the curriculum. A five month period to participate in research is scheduled at the end of the curriculum. The full curriculum includes:

- **Blocks in the first and second year** consisting of problem-based, patient-based and project-based education. These blocks are basically similar to the blocks in the present curriculum. The differences are: there is more variation in instructional formats; the tutorial group has a central role; assessment is related to a particular block and serves an educational purpose; the context of doctor-patient encounters will receive more attention. The aim is to spend approx. 5% of the time on field contacts and patient encounters.

- **Blocks in the third year**, in which, in addition to the changes mentioned for the blocks in the first two years, field contacts and patient encounters will be extended to approximately 30% of the available time. These will take place in the university hospital and regional extramural institutes.

- **Combination of clerkship and theory in the fourth year** of which approx. 40% will be dedicated to practice and 60% to theory.

- **Clerkships and intermediate weeks in the fifth year**, which take place at affiliated hospitals, particularly in outpatient clinics and general practices. Each clerkship starts with a preparatory week in which a number of important subjects related to the clerkship are discussed and revived. In addition, assignments are set that have to be completed during the clerkship. Another intermediate week is planned after each clerkship to exchange experiences and discuss the assignments. The intermediate weeks are meant to explore the relationship between practice and basic medical knowledge on the basis of patient problems in order to deepen the students’ pathophysiological reasoning. Present interclerkship education, addressing issues surpassing the clerkship, is also scheduled during these intermediate weeks.

- **Participation in research during five months in the sixth year**. During this period the students participate actively in research and report on it in writing. Throughout the curriculum more attention will be paid
to scientific education. Skills of particular importance for this period will be trained. The research institutes are mainly responsible for this research elective. It is also possible to do a research elective abroad at an institute collaborating with the university.

- Participation in patient care in the sixth year. In order to attain part of the final objectives, students must - under supervision - take the responsibility for a number of patients and work in a team. This can be done either in the university hospital or in one of the affiliated hospitals. It is possible to combine this period of participation in patient care with the above mentioned period in research.

- Electives and tracks. In the second year, the students have to do a six-week elective. They can choose from a limited number of fixed programmes. The university aims to exchange groups of students with associated Faculties in Europe during this period. Also, a ten-week elective is scheduled in the fourth year. Students are expected to spend this period abroad. They can also use this period to study a non-medical subject or follow an elective track. The following tracks have been suggested so far: a medical research track, an education track and an international track. Students who opt to pursue a track also spend time on it outside their regular programme, as in the present medical research track.

The curricular development and design are based on best-available-evidence-based medical education. Because a lot of evidence is still missing, the impact of the new curriculum on the students’ learning will be scientifically studied.

The blueprint described in this document implies a complete reform of the curriculum of the Maastricht Faculty of Medicine. The implementation will demand a lot from faculty, departments and hospitals. The reform is not feasible without paying attention to professionalization and career prospects of faculty. Since substantial changes are about to be launched and the proposal still needs to be worked out in detail, consultation with the people involved is part of the implementation. Together we should be able to start the new curriculum on 1 September 2001.
BACKGROUNDs AND RESEARCH FINDINGS
CURRICULAR IMPROVEMENT

The Faculty of Medicine of the University of Maastricht has always considered the quality of education of vital importance. Because even programmes that are carefully designed do not always appear to work well in practice and because every programme can always be improved, many documents on curricular innovation have been produced in the Faculty’s relatively short history. The first four years of the programme were thoroughly revised between 1988 and 1992 (‘Nota rode draad III’).4 A problem that could not be solved in that review was the integration of theory and practice. In the years following the review, several committees studied possibilities to improve this integration. In 1993, it was proposed to revise the entire curriculum and schedule the clerkships earlier in the curriculum.5 This proposal received insufficient support from the Faculty.6 Subsequently, a committee was established to improve the integration in the first four years of the curriculum (Practical Medical Training (PMT) 1-4) as well as a committee to improve the quality of training during clerkship (PMT 5-6). The number of field contacts were increased, practical medical training (PMT) was improved and an attempt was made to improve the integration of theory and practice.7 In practice, however, it remained a problem that theory and practice were like two different streams, showing that even successful improvements are often only temporary. Therefore, permanent improvement can probably only be effected if the streams are integrated right from the beginning of the curriculum.

TRANSITION FROM THEORY TO PRACTICE

Students still experience the transition from the first four years to their clerkships as a substantial change,8-10 sometimes referred to as ‘the shock of practice’. Due to this shock, students seem to forget the acquired knowledge or to be unable to apply this knowledge and it takes them quite some time to interpret the clinical concepts correctly. In addition, their knowledge is not structured correctly: they see a patient with
complaints and symptoms, but their knowledge is organized in diagnoses. This is a striking finding in a problem-based curriculum, because the reverse is aimed for. Some argue it can be explained by the fact that tutorial groups do not function adequately and that the assessment system is too limited, focusing on memorized little facts. In the beginning of the clerkships, students go through the 'professional socialization process'. Although there are only few detailed research data about this process, it is clear that it takes the students time to adapt themselves, time they cannot spend on 'learning' during their first clerkships.

CLERKSHIP

Although everyone subscribes to the importance of education during clerkship, little is known about how the students' learning actually takes place. It means that practical training, such as during clerkship, is basically still a black box. Recently, more research has been conducted into learning during clerkship, or 'dual learning', and articles about clerkship have been published in medical educational literature. These recent studies have shown that the clerkship phase constitutes a rather unstructured learning situation. Some important findings are:

- The number of independent patient encounters is much smaller than assumed. On average the students encounter 8 to 9 patients per week during their clerkships.
- Quite some time is spent on activities of little value to the students.
- There are large differences between the activities of individual students.
- Educational contacts take place mainly with residents or other students and to a lesser extent with medical specialists.
- There are large differences in the nature and quality of student supervision.
- Students are rarely observed directly during patient encounters.

Since clerkship did not result in sufficient profundity, it was suggested a number of years ago to introduce a general clinical training period (similar to the system of house officers in Great Britain) for postgraduates. Some
objected that an extension of the curriculum would not necessarily be an improvement. Furthermore, there were many complaints in other countries about the quality of similar training programmes. It was decided to first try to improve the present clerkships. Until now no substantial improvement has been achieved.

PROGRAMME OBJECTIVE

In 1994 the Dutch generic programme objectives were established in the Blueprint 1994: training of medical doctors in the Netherlands. All Dutch Faculties accepted this blueprint as a ‘directing’ document. In 1997 the general objectives and problem list in the blueprint were also included in the Dutch Individual Health Care Professions Act (BIG). One of the visitation committee’s conclusions was that in all Medical Faculties in the Netherlands the general objectives were insufficiently met and that the student’s final level was too dependent on his or her own dedication and coincidental circumstances. The committee therefore concluded that a review of the clinical phase was necessary. The same problem occurs in other countries as well. According to the visitation committees, the clinical programme should not merely consist of separate clerkships. The fact that a number of essential aspects, such as attitude and ethics, are not sufficiently dealt with during clerkship has already been recognized at our Faculty and has resulted in, for instance, the introduction of an interclerkship training programme, which addresses subjects surpassing the individual clerkships.

ASSESSMENT

Over the past few years a number of changes have been introduced into the assessment system and examination regulations. These changes were supposed to make the examinations more ‘severe’ and increase the number of study hours, which, in retrospect, they did not effect. Above all, the present type of assessment allows study behaviour that does not comply with the aim of our programme. The present system is strongly focussed
on the reproduction of factual knowledge. Other important objectives, such as learning to solve problems, working in a team, gaining insight, practising writing and presentation skills, are not evaluated.

**LEARNING TO SOLVE (PATIENT) PROBLEMS**

When the Faculty of Medicine of the University of Maastricht was founded, it was decided to design a curriculum based on the principles of problem-based self-directed learning, following the Medical School of McMaster, Hamilton, Canada. At the time, this educational approach was not very widespread and there was little evidence to prove that it was a good choice. By now, problem-based learning (PBL) has been applied in different ways in many places and educational institutes. Therefore, a lot of knowledge has been gained by experience in the meantime, which can be of benefit to our reform. Also, a lot of research has been carried out in cognitive psychology into the differences between experts and beginners and into the way students learn.23-25 The results can be used to determine the content and design of the new curriculum and are therefore briefly discussed below.

Several years ago, problem solving was regarded as a separate skill that could be trained without a specific relation to content or context. Cognitive psychological studies, however, have shown that this is a misconception. Skillful problem solving appears to be highly dependent on the content of the problem.23-25 This means that a student is able solve a particular problem because he has dealt with similar problems before and has sufficient knowledge of the content, whereas he has more difficulty solving a problem that is completely new to him. It has also been discovered that there are differences in problem solving between experts and beginners. Experts are better able to apply acquired knowledge than beginners, because they have developed highly accessible ‘knowledge networks’ in their memories.23-25 Consequently, the knowledge of experts is readily available when it needs to be applied. Beginners still have to develop their knowledge networks. In education this implies that new information needs to be stored in a right place in this ‘developing network’.
If, however, the education and assessment systems still focus on isolated facts and skills, the students will not develop effective networks. The information is not stored correctly and can therefore often not be retrieved in practice. Education programmes emphasizing factual knowledge in isolation only result in short-term learning effects and good scores on the tests concerned. It is now also known that students need to practise using the ‘old’ information in their networks, because practising makes the information sink in better, improves the functioning of the networks and, provided the students are well-coached, brings misconceptions to light.

LEARNING IN CONTEXT

Storing and retrieving information appears to be linked with context. Therefore, students need to practise in different situations that correspond increasingly to the real situation in which they eventually have to be able to solve the problem. The context in which medical students are to solve problems is that of doctor-patient encounters. So, doctor-patient encounters should be a main thread of the curricular structure. At the beginning of the programme, there should be more learning situations that resemble doctor-patient encounters and at the end of the programme the students should function as doctors. Between the beginning and the end, students encounter practical problems and patient problems, which gradually become more realistic and more complex. At the end of the programme, students should of course possess well-functioning knowledge networks. This means that doctor-patient encounters should be evaluated in sufficient depth, while paying attention to pathophysiology and trying to detect misconceptions. Another significant part of the context is that in practice doctors do not work alone but in a team. Also, doctor-patient encounters will be increasingly based on cooperation between doctor and patient. In addition, doctors will often consult with colleagues, managers, insurances, collaborate with other disciplines, et cetera. Students therefore need to learn to work with other people as part of their medical training.
FINALLY

Based on the considerations and findings mentioned above, a group of university teachers, who met on their own initiative and called themselves the Z-side committee, has drawn the conclusion that the only solution is to completely reform all six curriculum years. The committee’s report was well received by the Educational Committee and the Faculty Board. Subsequently, the Faculty Board has asked the Scientific Director of the Institute of Medical Education to draw up a proposal for a complete reform of the curriculum.
STARTING POINTS FOR THE NEW CURRICULUM

Based on the information described before, the Blueprint New Curriculum Committee has formulated a number of starting points for the new curriculum.

PATIENT-CENTRED, PROBLEM-BASED AND PROJECT-BASED

The main objective of medical education can be summarized as learning how to analyse, identify and solve the problems of patients. This is sufficient to justify a central position of the patient in every medical curriculum. Other arguments are the insights described before about learning to solve problems and the importance of context in the process of building knowledge networks. Since primarily doctors are to solve the problems of patients, it is obvious to opt for a problem-based approach. The preparation as well as in-depth evaluation of patient encounters can be based on problems on paper. It is important to select a variety of problems and to choose problems based on real cases. Some problems can also be tackled as a project by a group of students.

MULTIDISCIPLINARY APPROACH

A patient problem is rarely monodisciplinary at first. A multidisciplinary approach is therefore an important starting point for the educational design of the curriculum. However, it should be prevented that this starting point is applied as a dogma in the implementation of education. For instance, subjects that appear to be unrelated to students should not be discussed within one block period just because of the multidisciplinary character of the block. Conscious choices will have to be made on the basis of the objective and content of education. Practicability also plays an important role in these choices. For instance, it is only useful to look for a multidisciplinary approach to apply to clerkships if there are clear links between the disciplines in health care. Examples are oncology, palliative care and diabetic complications of the foot. As patients pass through different levels of health care, transmural educational activities should be extended as well.27
ADAPTING TO HEALTH CARE DEVELOPMENTS
In the specification of the curriculum, issues related to the ageing population or chronic diseases should be taken into account. It should also be noted that health care is increasingly provided in outpatient clinics or extramural institutes. During the present clerkships, however, students spend approximately 80% of their time in hospital wards. In order to tie in with the developments in health care, students should spend more time in outpatient clinics or extramural institutes. It is also an advantage that the students thus become familiar with the ‘primary’ problems doctors are presented with.

The shift towards outpatient and extramural health care does not imply that hospital wards are no longer suitable for medical training. Activities such as bedside teaching will still take place in hospital wards. In order to implement these changes, the Faculty of Medicine needs to consult with hospitals and institutes about the organization of care, for instance the organization and planning of outpatient clinics in a way that will enable the students to see new patients.

STUDENT-CENTRED
The students’ learning takes a central position in the curriculum, which is therefore student-centred as opposed to teacher-centred. The students should have sufficient time to compile information themselves, to study and to practice. Therefore, educational activities (tutorial groups, lectures) are only scheduled for a limited number of hours per week.

LEARNING TO LEARN
As professionals, doctors should continue to learn after medical school. The foundation for this attitude towards continuing education should be laid during medical school. This is nowadays termed ‘learning to learn’. This can be achieved by stimulating the students’ independence and responsibility. Responsibility is part of the learning process. For instance, education can be obligatory in the beginning, but not at a later stage. It means that during clerkship the students should take on an increasing
responsibility for their patients. It has been decided to introduce a period in which the students finally carry full responsibility for a number of patients. This is also necessary in order to meet the general objectives of the Blueprint 1994: training of doctors in the Netherlands.²

COLLABORATION
Students should also learn to work together. An example of this is working in tutorial groups. However, more attention should be paid to the attitude of the group members, the feedback on each other’s performance and, if necessary, the discussion of problems among students. When working in a group as well as during individual patient encounters and field contacts, the students need to display good communication skills and a professional attitude. These also have to be trained in a continuous learning process. One way to learn to collaborate in a team is to work together on assignments or projects. It should be studied how ‘multiprofessional education’ can be scheduled into the curriculum.²⁻⁸ A well-known example is ‘The Ward’ in Linköping, where students of different disciplines are responsible for a number of patients.²⁹

ADAPTING TO THE LEARNING PROCESS
Theory and practice should be integrated and be offered alternately. Since contextual learning is important, the students should be exposed to practice in an early stage. The nature and intensity of this field contact will vary throughout the curriculum. Integration of practice into the theoretical part of the curriculum can be enhanced if the discussion in tutorial groups is based on real patient problems. The relationships between the subjects that are being discussed should be clear to the students. This is important because the information should be stored somewhere in their networks and still be retrievable later.

In addition, clerkships or blocks (or parts of them) can be rescheduled. In blocks that are mainly dedicated to a certain specialization, for instance dermatology, theory and practice should be linked more clearly by combining clerkship with the block.
In order to optimize the learning process, it is also important to make sure that there is sufficient time and supervision to discuss patient problems in great depth. This is essential because it gives students an opportunity to link knowledge gained by experience with knowledge about diseases and pathophysiology, thus deepening and increasing their basic knowledge.

SMALL GROUP DESIGN
The growing numbers of students over the past few years have lead to increased anonymity. Considering the present demand for health care, the numbers are expected to rise even further. In the new curriculum, the committee has therefore chosen to apply several instructional formats in which students work together in small groups and to organize some parts of the curriculum in separate ‘tracks’, a solution that is also used in Harvard. It means that blocks are organized several times a year for small groups of students. Each group follows the same blocks but in a different order. The same applies to the sequence of the clerkships. The metaphor of a carousel is often used in this context: a rotation system in which each group of students starts at a different place and follows the programme in a different order. This system also means that patient encounters within a certain discipline can be organized throughout the year and peaks can thus be avoided.

THE CENTRAL ROLE OF FACULTY
The faculty fulfil many important functions in the new curriculum. Because of the larger variety of instructional formats, there is also a larger variety of tasks for the faculty members. Their role should be adapted to the student’s educational phase and the instructional format at hand. If, for instance, a problem in a tutorial group is presented by means of a real patient instead of on paper, it is useful to choose a tutor from a medical specialization. It is also possible that the same person tutors a group of students and supervises a patient encounter. In patient-centred education, the main task of a tutor will be at first to observe the student in patient encounters and to provide feedback. When, at a later stage, the student is
The quality of faculty is mainly determined by their motivation and enthusiasm. The most important external stimulus effecting these qualities is appreciation. As yet, education is less appreciated than research and patient care. In order to find a right balance between these areas and to maintain a high quality, they should be valued equally. Another factor influencing enthusiasm and motivation is whether a task fits the teacher’s individual qualities. It has been recognized that the suitability for the tasks varies, which means a selection of teachers for different tasks should be made within each department. In addition, the qualities should be evaluated and specific training should be offered.

The faculty involved in a curricular reform are usually enthusiastic, because they are pioneers. A prerequisite to stabilize the change and to have good quality teachers available also after the first year are a positive teaching climate and a faculty development policy which takes into account the suitability of individuals for certain tasks and offers specific training.

ASSESSMENT IS LEARNING

The format and content of exams appear to have a larger impact on the students’ learning process than the curriculum itself. Assessment should therefore be an integrated part of the curriculum or, in other words, it is essential that the assessment system ties in with the starting points of the curriculum. Until now, little attention has been paid to the formative value of assessment to students and the evaluative value to the curriculum. To determine the formative value, a ‘mentor system’ will be necessary. The students themselves will also be responsible for their own files, a ‘portfolio system’ (See ‘Assessment programme’). Some well-considered choices have to made, depending on the content and the objective of each part of the curriculum and taking into account the directive impact of assessment. It means, for instance, that a larger variety
of assessment formats is required than for the present block tests. Assessment data will be kept in the portfolios. The present assessment system in clerkships is also insufficient. From an assessment as well as an educational point of view, students should, for instance, be observed during patient encounters.

**SCIENTIFIC TRAINING**

The curriculum should pay sufficient attention to scientific training. The present research elective comprises a period of three months, in which the students gain experience in how to set up and execute a scientific study and write a report. Three months is very little time to participate in research and write a report about it too. Throughout the curriculum, students should be encouraged to look for literature and other information based on problems they meet in tutorial groups and daily practice. Learning how to interpret and value the information they find (also on the Internet) is an essential part of the discussions in tutorial groups. The ability to critically judge this kind of information is an academic skill students need when preparing presentations and when learning how to handle guidelines and contradicting findings. It is also important for an academically trained professional to learn how to handle evidence-based medicine, how to apply results found in groups of patients to the individual patient and how to find a balance between evidence and expertise. Students will be stimulated to create their own files with regard to evidence and expertise. The skills mentioned above therefore constitute a main thread of the curriculum.

**INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)**

ICT will have to take a central position in a new curriculum: as an educational tool as well as a preparation to professional life. Because of the rapid developments and increasing possibilities, the facilities should be up to date and enable the students and faculty to actually use ICT.
There should be sufficient central computer facilities, network facilities and Internet facilities, allowing students to be online with fellow students or faculty at any time. It has also been suggested to finance portable computers for students. A digital education forum (internet / intranet) will be developed for students and faculty. This forum will offer all relevant information about the policy, organization and process of education, including block sites, clerkship sites, study guide, enrolment for education and information about test results. In preparation to practice, students should learn to find useful and reliable information in a short time. Students should also be able to report on patient problems and projects ‘in writing’. In practice it is also important to have insight into patient information systems.

BEST EVIDENCE-BASED MEDICAL EDUCATION

The committee believes that the introduction and implementation of the new curriculum should be based on what we already know about education from research. Since many aspects of the impact of education and assessment are still unknown, research projects should be designed to study the effects of the reform. This would fit in with the international development to aim for best-available-evidence-based medical education.34
TRANSLATION TO THE CURRICULUM

In order to apply these insights, a very different curricular structure is required than the usual one. Most curricula are shaped like an H (on its side), showing a distinct line between the first four and the final two years. In general, the first four years include relatively few patient encounters and the final two years are almost exclusively dominated by patient encounters. In the new curriculum, field contacts and patient encounters take place earlier than in the present curriculum. Also, more attention will be paid to theoretical concepts and pathophysiology in later years of study than in the present curriculum. This is called a Z-shaped curriculum.

The committee has opted for a patient-based, problem-based and project-based curriculum in which theory and practice are tied in with each other as closely as possible. The curriculum is also student-centred in the sense that the student’s learning occupies a central position. Assessment is regarded as an essential part of education in the new curriculum.

Consequently, field contacts and patient encounters have to be brought forward in the new curricular structure. Integration and profundity should also be encouraged. Tutorial groups (learning groups) remain the central place where learning starts and where information is processed and integrated. These groups will not only focus on knowledge but on all areas of a medical competence. The definition of competence complies with the Blueprint 1994: training of medical doctors in the Netherlands. The blueprint describes medical competence as a profile including:

a. medical aspects
b. scientific aspects
c. personal aspects
d. social and health care aspects.
Medical aspects refer to medical knowledge and skills; scientific aspects include principles of scientific research and academic thinking; personal aspects refer to the relationships with patients and colleagues; and social and health care aspects focus on the student’s economic, administrative, legal and ethical knowledge and skills.

A variety of instructional formats are applied in the new curriculum. In these formats, the tutorial groups play a central role. The number of contact hours should remain limited to 30 to 40% of the available time to ensure the feasibility for the students to study the programme, for faculty to teach the programme and for the Medical Faculty to finance the programme.

THE CENTRAL ROLE OF TUTORIAL GROUPS

As a result of the decision to assign a central role to tutorial groups, separate (more or less block-independent) training lines, such as PMT-groups, skills training, clinical tutorial groups, adoption programme, introductory clerkships, practicals, et cetera, should be integrated into the educational/learning process where possible. The integration requires a careful planning of activities. It should be clear to the students, faculty as well as the organizers which tutorial group meeting fits in with a particular lecture or practical. For logistic reasons, the programme structure may not be the same for each tutorial group. It should also mean that it is necessary to analyse the strong and weak points of the present curriculum in order to decide whether it still fits the new curriculum. This applies to both content and format.

Personal aspects, such as learning to cope with insecurity, learning to apply feedback, learning to evaluate each other and oneself and learning to collaborate, can only be addressed in a safe environment. It is therefore desirable that students work together in the same tutorial group for a longer period than the present six weeks.
THE CENTRAL ROLE OF TUTORS

Tutors remain the central supervisors of tutorial groups, also when a group works together for a longer period. The students are responsible for the optimum development of all aspects of the learning process within their tutorial group. The supervision of this process should preferably be exercised by one person. The tutor is therefore, beside the students themselves, the most important person in the educational / learning process. In addition to dedication and motivation, special qualities are required that focus more on enthusiastic learning than on enthusiastic teaching! Some activities will demand specific expertise, for which a second supervisor will be called in beside the tutor.

POSSIBLE EDUCATIONAL ACTIVITIES

Not every part of medical competence can of course be addressed in each tutorial group meeting, but particular attention should be paid to the correct division of the parts over the curriculum. Medical and scientific aspects are covered through clear arrangements about learning objectives and careful report and presentation. There are several possibilities to teach skills, each with different logistic complications: a skills trainer can be invited to the tutorial group meeting, the group can sign up for a training or individuals can follow a training and record it in their own portfolio. It may seem less obvious that a student should report back to the tutorial group, but it can be considered too. For instance, a student follows a skills training and is asked to teach the acquired skill to the group afterwards (tutorial group training provided by students). It will sometimes only be useful to formulate the learning objectives for a certain skill when the learning objectives for the corresponding knowledge have been studied. This can be part of the reporting phase. All options require a good skills catalogue, including descriptive and illustrative documentation (multimedia) and available training sessions.

As a start of an integral learning process, in which not only theoretical knowledge is explored but also medical and communication skills as well as attitude, real or simulated patients can play an important role in
the tutorial groups. It has been suggested to recruit real patients, for instance from patient associations, but also to use simulated patients, with increased emphasis on the simulation of physical disorders, and ‘LOTUS-victims’ (simulated casualties). The equipment needed to perform basic physical diagnostic examination should be available in the tutorial rooms. In addition, the possibility to record interactions on video during tutorial group meetings is important in order to stimulate the development of learning objectives with respect to attitude. Logistics and content may cause variations. Other ways to organize patient encounters are: patient demonstrations in a lecture for all students of one year or for some of the tutorial groups, video vignettes (central in a lecture or in each group via video, CD-ROM or Internet). It can also be considered to limit supervised patient interaction to one or two representatives of a number of tutorial groups, who then report back to their groups. The present simulated patient encounters in PMT could be organized in a similar way. The examples below illustrate the possibilities:

- A simulated patient with pain in his leg comes to the tutorial group meeting. The group has to work out what the problem could be and how they can find out what the problem is. Supervised by the tutor, the group (as a whole and/or individually) talks to the patient and formulates hypotheses about what may cause the problem, for instance muscular pain, aching joints, circulation problems or problems involving the nervous system. The group also discusses how history taking could provide further information and considers subsequently whether simple physical examination could provide further clues. The students are encouraged to examine the patient, for instance by palpating the pulsation of peripheral arteries and/or testing reflexes. By brainstorming and testing hypotheses in this way, the students discover learning objectives with regard to knowledge, skills and personal aspects. For instance, how do the arteries run through the legs, how do I test the function of the nerves in the legs, how do I find out what the pain means to this patient, why do I feel uncomfortable touching this patient’s leg. Social aspects can be addressed in a discussion about the consequences of pain.

- In a tutorial group meeting during the block about shock, a LOTUS-victim is wheeled in on a stretcher. The patient is visibly pale, clammy
with sweat and frightened. The group is invited to tell what they see, think of explanations, list what additional information they need and how to obtain these data and what needs to be done to prevent deterioration. Everything can be immediately performed on the patient. Depending on how the group deals with the problem, it can be simulated that the patient’s condition deteriorates, for instance that he loses consciousness. The group can then move on to practising reanimation on a phantom. A variety of learning objectives can thus arise in all areas of competence: how can pallor and clamminess be explained, how is blood pressure regulated, how do I take someone’s blood pressure, how do I palpate the carotid pulse, how do I apply an intravenous drip to a patient, how do people react in a crisis situation, why am I scared in this situation myself, how can I reassure someone.

- In tutorial group meetings of block 1.1, several LOTUS-victims will be presented during the block and the students should try to provide first aid. Several first aid trainings will be provided at the Skillslab and simulated accidents similar to the present block 1.7 will be scheduled throughout the year.

Another instructional format suited to apply in tutorial groups is project-based or assignment-based learning. The students work on projects or assignments as a group or in subgroups, maybe for a longer period of time (if necessary longer than one block period), and their work is assessed at end. The basic idea is that it is a group activity / product, that the group members collaborate, divide tasks and combine data from different angles. It is necessary to assess the products (as well as performance) to make sure all students participate. Not only tutors but also (perhaps even primarily) students can take part in the assessment of their peers. Tutorial group presentations can take place in plenary sessions, but for logistic reasons it has been suggested to do this in smaller groups consisting of, for instance, a certain number of tutorial groups. Measures should be taken to prevent longer projects (especially non-block related projects) becoming ‘second stream’ activities. In the planning of tutorial group activities and the education programme sufficient links to the projects should be created with regard to content and logistics. Some examples of assignments for group projects or individual students are given below.
- Designing a first-aid training for secondary schools (and providing the training).
- Preparing a station for a simulated accident (including an assessment form and means for useful feedback). Each tutorial group prepares one station, all groups do the entire simulation.
- Presenting clinical pathological patient evaluations to some or all students of one year. Each tutorial group presents an evaluation based on one case study, acting out the roles of various specialists (clinician, pathologist, physiologist, anatomist, microbiologist) themselves.
- Study assignments and presentations. Each tutorial group prepares to present a certain block-related subject to all students of their year.
- Writing a literature review.
- Writing a research proposal.
- Writing letters to the editor. Students are provided with some preselected articles to choose from during their block. They write letters to the editor about an article they have chosen. In their letters they can endorse or negate results or criticize methodology and execution. A letter should contain at least two or three relevant references.
- Two students study a certain theme and explain it to each other. One student plays the role of the teacher and tries to explain the theme from the very beginning. The other student is a critical student and asks questions to ensure he understands it completely. Subsequently, this student takes the role of the teacher and tries to explain the theme to a third student (while the first student listens and adds information if necessary).
- A student formulates a number of open questions. The questions should be focussed on the understanding or evaluation of certain themes or links. The student should provide a complete answer key including the correct answer, the expected incorrect answers and why these answers are incorrect.
- In small groups or individually, the students organize a practical (anatomy, physiology, Skillslab, et cetera) for first-year or second-year students. They have to be well-prepared, pay attention to how information can best be presented and choose an ideal setup.
A faculty member assesses their proposal and may ask them to really organize the practical.

- Students design a leaflet to inform patients about a certain disease or medical situation (for instance health law). The leaflet should be clear and to the point, contain true information and be usable in practice.

- The students are confronted with a clinical situation and are asked a specific question. The students should compile as much information as they need in order to formulate plain, unambiguous and well-founded advise to the patient. Example: a patient with cluster headache is treated with Imigran and oxygen. This helps to ease the attacks, but he has to use a substantial amount of these drugs. He suffers from attacks during several months each year. This year the period of attacks is very long. He is also a heavy smoker and it would take him a lot of effort to give up smoking. However, it has been suggested that smoking aggravates his disease. He wants your advice: should he give up smoking or not. He stresses that it would be hard for him to stop smoking and if it has no effect on his headaches, he would not only be disabled by his disease but also lose the pleasure of smoking. Formulate your advise to the patient, based on recent and relevant studies in this field.

- The students are provided with a written case study describing an entire history (from initial complaint until after the treatment). The students indicate small errors and more serious errors that have been made, for instance with respect to unnecessary or insufficient diagnostic procedures, matters that have slowed down the process, medication or diagnostics that are too expensive or actions that may have caused legal problems.

- The students test each other (without supervision) on one or more skills. They give each other feedback and when they feel they have mastered a particular skill, they move on to train skills in the same field but at a higher level.

- Test training sessions are organized to test the skills that were practised in that year. The students do not know in advance which skills will be tested. During the test training, the tutor gives assignments to the students. The students can ask the tutor to assess and record their performance.
Several times a year, the students are asked to simulate being a patient for their peers. The tutor selects a student who talks to the simulated patient. This selected student plays the role of the doctor and conducts the interview. On request, his performance can be assessed by a tutor. The simulated patient receives written instructions about his role and can also ask the tutor to assess his performance.

The students watch videos of people (children, adults) with certain visible abnormalities (for instance concerning gait or locomotion). The students should be able to recognize and, depending on their year of study, explain the abnormality.

A substantial part of the curriculum is dedicated to skills training. But what are these physical examination techniques based on? What are the limitations of certain kinds of physical diagnostic examination and/or laboratory tests? The students are asked to provide pathophysiological reasons to explain why certain types of physical diagnostic examination and/or laboratory tests are to be performed in a certain way.

The students give a short presentation (10 minutes and 5 minutes discussion) in the tutorial group meeting. Their peers and a tutor fill in forms to evaluate the content and structure of their presentations.

The students have to do a group assignment related to a certain theme or block. Each group prepares a poster of their assignment which is put up in a public area at the end of the project. Each group presents their poster in a poster session. The content and setup of the posters are assessed by peers and a tutor.

All experiences gained in health care (during excursions, working visits, clerkships et cetera and maybe also personal experiences) and encounters with patients as well as organizations or people providing care are discussed afterwards in tutorial group meetings. On the one hand, these discussions enable the students to exchange and ‘spout’ experiences, but it is also an exercise in reporting well-documented information and information about patients to colleagues. It can also be addressed how important medical files and letters are to the communication between medical professionals. Furthermore, the discussions can be used to formulate new learning objectives for all areas of competence. Some
activities will require supervision by a person with specific expertise. These activities can be tutored with the help of a second supervisor beside the tutor. The present simulated patient encounters can also be discussed during tutorial group meetings in a similar way. Other examples are:

- **Students working in an outpatient clinic write a report about the patients they have seen using a structured evaluation list.** The report should include information about the patient's medical history, how the history was handled at the clinic, which examinations were performed, how these were motivated and what the student’s opinion is. The reports are discussed with a tutor in a certain educational setting (to be determined). The discussion may give rise to new learning objectives with regard to certain skills.

- **A student talks to a simulated patient with a complaint that has been discussed before.** The student does not know in advance what the patient’s complaint is and has to conduct the interview. A tutor may assess the interview on request.

- **The present simulated patient encounters can be used as the first case study at the beginning of a block.** The two students who saw the simulated patient (one as a doctor, the other as an observer) are asked to report the consultation to their tutorial group and to analyse the patient’s problem with the group.

- **Another possibility is to use the encounters, as they are now, as an exercise to apply and integrate different areas of competence.** Therefore, evaluation of the encounters in tutorial group meetings should be preferred to separate tracks such as the present PMT (practical medical training). Evaluation in tutorial group meetings on the basis of video recordings should mainly be focussed on the development of learning objectives at the higher aggregation level of integration.

- **In pairs, the students visit a client in a care institute.** During the tutorial group meeting preceding the visit, the students formulate questions and assignments about the client and his situation as well as the institute. The students report back on the visit and discuss the questions and assignments.

- **The students do their first dissection practical.** During the tutorial group meeting they do not only discuss the anatomical knowledge they have acquired, but also the emotional aspects of this first dissection.
experience. In addition, dissection skills can be addressed.

- Outpatient encounters, for instance in the third year, are reported in a tutorial group meeting for further analysis by the entire group. Video recordings of the encounters can also be used in the group discussion.

Long cases are suitable to show the link with social and health care systems, because also the period following primary care can be part of the cases. When dealing with a long case, the tutorial group is supposed to spend several meetings going through a number of phases in order to gradually unravel the patient’s problem. For example, the case starts at a general practice, continues with additional diagnostics, returns to the general practitioner to discuss the results and for referral to a specialist, further diagnostic tests, results, waiting for hospitalization, complications after the treatment, discharge from the hospital, further treatment at home, et cetera. Each specific part of diagnostics, policy and care can be discussed in great detail. One can apply the present multidisciplinary approach to health care problems such as diabetes mellitus, acute intensive care problems, atherosclerosis and dementia. Problems related to health care management should be considered as well. Long cases can also focus on conditions such as MS and rheumatism, in which the course of the disease runs over a longer period and/or different age categories. The main point is that the group studies a problem for a longer period of time. As described before, the start and course of the problem can be presented in the group in various ways.

LEARNING RESOURCES

In addition to the tutorial group meetings as the pivot of the learning process, there should be ample possibilities to meet the formulated learning needs, or ample learning resources. Again, a large variety is required, because the students learn in many different ways. The usual resources include articles, books, excursions, audio-visual and computer materials, lectures, practicals, skills training et cetera. In view of the planning of tutor-dependent learning resources in the new curriculum it is important
to make conscious choices for, for instance, seminars, demonstration lectures of selected topics by faculty who have proved to possess first-class teaching qualities. Resources the students can use at any time without supervision are preferred. Learning resources requiring a tutor should only be used if the content cannot easily be offered without supervision. Modern media technology offers many possibilities for high-quality productions, which means that a certain budget should be reserved to buy and/or develop these resources. Because faculty members will only tutor or supervise students when it is really necessary, more money can be spend on the development of learning resources.

ASSESSMENT PROGRAMME

Literature suggests that five basic questions need to be answered in order to structure the development of an assessment programme: why do we assess, what should be assessed, when should the student be assessed, how should the student be assessed and who should assess the student. These questions will be discussed below in order to describe the development of education-based assessment. Progress tests, skills tests and computer case-based tests (CCT) will be maintained, the development of these tests is also discussed below.

WHY SHOULD WE ASSESS?
The question ‘why’ refers to the aim of assessment. There is a classic difference between the selective and formative function of assessment, also termed summative and formative assessment. The formative function is the degree in which feedback is given to students, teachers and the educational organization. In the new curriculum the emphasis is placed explicitly on the formative effect of assessment. The new assessment programme should:

- have a positive impact on the learning attitude as required in PBL;
- provide information for correction of the curriculum by students, faculty and the Institute of Medical Education.

However, this choice does not imply that assessment does not play a role in decisions about study progress. It is not about making a choice bet-
ween summative or formative evaluation, but about how to combine the two. The general aim is to bring education and assessment as closely together as possible. Basically, it is suggested that preferably all assignments the students do are also being assessed.

WHAT SHOULD BE ASSESSED?
A useful model with respect to medical competence is provided by Miller. It is a pyramid with several layers (see Figure). The basis consists of knowledge (knows). At a higher level knowledge should be applied in real context (knows how). Subsequently, this should be executed in a (simulated) practical situation (shows how). Finally, at the highest level, it should all be applied in daily practice (does). Written tests, such as the progress test, will never assess a higher level than ‘knows how’. Skills tests take it one step further and assess ‘shows how’. Direct observation in general or clinical practice, but also the evaluation of a student’s behaviour during tutorial group meetings, assesses the highest level, ‘does’. The present assessment programme is mainly focussed on the lower levels of the pyramid.
The new assessment programme will be based on the principle that it should always aim to test all levels of the competence pyramid. A general aim is to test the students on the highest possible level of the pyramid. The present block evaluation, for instance, does not surpass the lowest level of the pyramid, whereas it would be advisable - and should be possible- to assess a higher level. Applying the acquired knowledge in context is what should also happen in tutorial group meetings.

Another example is assessment during clerkships, which are especially suited to assess ‘does’. However, if the assessment format consists of oral, written or computer tests, it can only evaluate skills at a ‘knows how’ level. So, the competence pyramid is a useful aid to decide what kind of assessment format should be applied.

The existing assessment programme is divided into knowledge, problem solving, skills and attitude. However, it has been shown that these areas of competence can hardly be distinguished from each other. A classification of the different aspects of competence should reflect the requirements medical doctors are to meet and result in a competence profile that can be used in longitudinal assessment (see below). The committee decided to comply with the definitions of competence included in the Blueprint 1994: training of medical doctors in the Netherlands.\(^2\) It should again be emphasized that the student's learning behaviour will also be a part of the evaluation and assessment. Self-reflection, adaptability, ‘learning to learn’ are skills that are encouraged by PBL, but as yet not formally assessed in the evaluations. The experiments with the assessment of professional behaviour that started already in 2000, are an excellent first step in this direction. Information about learning behaviour might contribute to the personal aspects of the above-mentioned competence profile.

WHEN SHOULD THE STUDENT BE ASSESSED?
The answer to this question is simple: as often as possible. Assessment can only be part of the learning process if it happens frequently. Apart from frequent, assessment should be longitudinal. In our present assessment programme, for instance, each clerkship is evaluated at the end. However, information obtained during one clerkship hardly seems
to ‘trickle through’ to the next clerkship. This is not a desirable situation considering that clerkships should not be isolated but contribute to general clinical competence in its broadest sense. Longitudinal information allows long-term assessment and offers students the opportunity to improve. The national ICRA-report (sequel to the Blueprint 1994) clearly recommends longitudinal assessment.37

The choice to assess frequently does not necessarily imply that the number of decision moments will increase. Not every assessment moment is also a decision moment. Frequent assessment is desirable, but frequent decision moments are not. There is a clear relationship between the number of decision moments (for instance the number of exams per year) and the progress of students: the more decision moments, the lower the progress.39 Therefore, a decision moment should include the results of several assessment moments.

HOW SHOULD THE STUDENT BE ASSESSED?

Literature on assessment advocates more authentic or real life assessment formats as well as assessment of and during the learning process. An integral approach to assessment is ‘portfolio assessment’, originating from art and architecture. An artist has a portfolio, a file including his best works. Potential employers or buyers can take a look at the portfolio, which reflects the artist’s quality or his ‘competence’. In portfolio assessment, the portfolio contains a data file. A complete portfolio approach implies that general requirements and criteria concerning competence are established and the student has to prove he has met these requirements, a reversed burden of proof as it were. How the student has to prove this is determined in advance or by mutual agreement between the student and the educational organization. Periodically, the students is asked to reflect on his progress and discuss this with a mentor. The student’s progress is thus continuously controlled and his learning can be adjusted. The student is actively involved in this.

Portfolio assessment requires a kind of supervision or mentor system, making it an expensive method. The Faculty of Medicine used a mentor system before, but it was abolished a number of years ago. The main
reasons for abolishment were, apart from the high costs, the varying quality of supervision and the bureaucratic paperwork involved (keeping inefficient files). The variation in supervision can be limited if the mentors are carefully selected and well-prepared for their task. It should be noted that in most cases the quality of the supervision provided in the former mentor system appeared to be good. The mentors were very committed and established good rapport with the students. Bureaucracy presented a real problem, but it must be feasible to tackle this considering the present possibilities of ICT. There are several examples of digital portfolios now. The advantages are that access can be regulated (who has rights and who has not), it is independent of place or time and electronic feedback can be arranged more effectively (for instance via access to longitudinal data and by means of graphic interfaces).

The disadvantages of portfolio assessment are the difficulty to formulate good criteria about the acceptance of ‘proof’. In addition, one should try to limit the variety and subjectiveness of judgement between mentors. A portfolio approach may have different levels of ambition. At the lowest level, a portfolio is no more than a student file with test results compiled by the educational organization including set procedures, criteria, credits, et cetera. At the highest level of ambition, only the learner provides ‘proof’ and the criteria are established in a ‘negotiation’ between the mentor and the learner. We advocate a less ambitious level for our programme. It is important to bear in mind that also selective decisions have to be taken and objective decision-making remains necessary.

WHO SHOULD ASSESS THE STUDENT?
The question who should be involved in student assessment can be answered from three different perspectives. The first perspective is the question who assesses the student. It has been indicated above that the tutor’s conventional role as the person who primarily judges the students will be supplemented by others. First of all, this should be the student himself. It is the student’s responsibility to fill his portfolio. The student is also expected to reflect periodically on his progress (self-assessment). The students’ involvement is vital in order to cultivate self-evaluation and a critical attitude, the actual basis for continuous learning. In addition,
fellow students are to play a role in the assessment if possible. Unlike the present assessment programme, the new programme will require assessment of papers, presentations and other products, which will be quite demanding on the faculty members. It is important to consider for each part how the students can be involved, thus serving both an educational (students learn to provide feedback, to judge) and an economic purpose. Moreover, as mentioned before, assessment should be part of education and not a separate activity; it should work both ways. Finally, it is possible to bring in other people who are involved in education, such as residents, nurses, skills trainers, et cetera.

The second perspective is that of quality assurance. In the present programme, assessment is closely controlled by review committees for the different assessment formats. This system could still be applied to tests that are used in the entire or large parts of the curriculum (progress tests, computer case-based tests (CCT), skills tests). This does not imply that the content and format of these tests do not need to be adjusted. In the new curriculum, planning groups are responsible for the design and faculty and students implement it accordingly. Quality control should be aimed for, but will not always be feasible. Since the formats of testing are explicitly divers and creativity is required to apply new formats, the planning groups may need some assistance. A second type of quality assurance is to evaluate educational activities afterwards. It is important in every assessment programme to continue monitoring its effects. Quality can be guaranteed by means of structured evaluation. Given the previous experience, it would be useful to explicitly evaluate the mentor system as well as the mentors.

Finally, test results should be used more explicitly to evaluate the educational programme. The multitude of information offers natural starting points to assess the effectiveness of the programme, especially since we can now compare the data of Maastricht students with those of students of other Medical Faculties.
PROGRESS TEST
The progress test will still be used. This is a justified choice, because the progress test has proved its usefulness over the years. Research has shown that the degree in which test-oriented preparation takes place is limited, whereas, on the other hand, knowledge clearly increases over the years of study. It is especially useful to include progress tests because these tests allow more freedom to assess other aspects in block-related tests. The present assessment programme shows a large overlap of what is assessed in progress tests and what in block tests. The use of progress tests allows block-related tests to focus on different aspects of competence (higher levels in the pyramid, more context-based tests, more process-based).

Most of the policy changes with regard to progress tests as proposed in the policy document called ‘Het toetsprogramma getoetst’ (Assessing the assessment programme), written in 1997, have been implemented. A more balanced blueprint for each progress test has been introduced (attaching importance according to categories and disciplines) and collaboration with other Medical Faculties has been established. The Maastricht progress test is now close to a ‘national progress test’ composed by three Medical Faculties (of Nijmegen, Groningen and Maastricht; Leiden buys the test and Gent is using it on trial). This does not imply that the test cannot be improved. The progress test is still too focussed on factual knowledge. More case-oriented questions or questions of a higher cognitive level and less questions about details should be included in the progress test. It is also preferred to adapt the method of questioning and ask less true / false questions and more multiple choice questions. The partners do not object to these changes, but it will take some time to implement them.

CCT
Computer case-based testing (CCT) was originally developed to assess students during clerkship. The choices made to develop this tool fit in well with the development of education and assessment as described in this document. The test is based on real cases, the questions the students have to answer are related to the ‘key concepts’ in the case. A wide variety
of types of questions can be used, which type is chosen depends on what the student should know. The underlying software is also being used for resits of block tests and its application in interfaculty research has been very successful. However, producing case studies is very time-consuming. Therefore, our Faculty produces case studies for a number of disciplines in collaboration with the University of Amsterdam. CCT will be applied at an earlier stage in the new curriculum. The possibility should also be developed to take a test without tutor involvement when the student is ready to check whether his own judgement of the preparation for a certain part is correct. In short, many applications are possible in the new curriculum. We should invest in the production of case studies and access to tests via the Internet.

SKILLS TEST
Nationally and internationally, station tests (objective structured clinical examinations, OSCE) are often applied to assess skills. Traditionally, station tests consisted of short stations with minor subtasks. Some years ago, the Maastricht Faculty chose to use longer stations. The test has been studied in great detail.43,44 The test assesses a combination of ‘shows how’ and ‘knows how’. It is important to develop OSCE that are as realistic as possible. Because of the costs and the fact that student observation during the test is not the most appreciated role of faculty, it should be carefully considered what the test should include. A number of aspects are (also) being assessed at other moments.
### Diagram of the New Medical Curriculum 2001-2007

#### Emergency Care and Regulatory Systems
- Emergencies
- Traumata
- Dyspnea
- Shock
- Abdomen
- Unconsciousness

**Blocks:** 40 weeks
**2001-2002**

#### Stages of Life and Diagnostics
- Cell growth
- Pregnant!?
- Birth and growth
- Puberty: adolescence
- Adulthood: work and health
- The elderly
- Electives

**Blocks:** 40 weeks
**2002-2003**

#### Chronic Disorders
- Cardiovascular system and lungs
- Brain and behaviour
- Locomotor apparatus
- Abdominal complaints

**1st rotation:** 40 weeks
**2003-2004**

#### Theory and Practice
- Dermatology
- Ear, nose and throat medicine
- Ophthalmology
- Social medicine
- Electives

**2nd rotation:** 30 weeks
**2004-2005**

#### Clerkships
- Internal Medicine
- Surgery
- Paediatrics, gynaecology
- Psychiatry, neurology
- General practice

**3rd Rotation:** 50 weeks
**2005-2006**

#### Participation
- Research participation
- Participation in patient care

**Participation:** 40 weeks
**2006-2007**
ELABORATION OF THE CURRICULUM PROPOSAL

The diagram represents the general outline of the curriculum. Each year comprises 40 weeks, this was decided to ensure the feasibility to follow as well as to organize the programme. The curriculum will be discussed below in greater detail.

YEAR 1 + 2 TUTORIAL GROUP-BASED BLOCKS

The design of the first two years is similar to that in the present curriculum. The main difference is that education will be based on the context of patient problems. In addition, the tutorial groups will take up an even more central position and more project-based and assignment-based education will be provided. All assignments will be assessed at the end of each block by means of presentations, reports, papers, et cetera. It is important to involve the students in the assessment. They can be asked to assess themselves (self-assessment is an important skill in the lifelong track of learning-to-learn) or each other. For instance, a presentation can be followed by feedback and assessment. The teacher always has the final responsibility for the assessment.

Skills training should be geared more closely to theoretical education. It has been suggested to formulate skills objectives as part of the process of formulating learning objectives. Ideally, the acquired skills should be tested immediately. Observers in the skillslab could do this, using a system to assess and tick off skills. In addition, integral and integrating skills tests at crucial decision moments should be maintained. Integration of skills tests into the context of medical content should be enhanced as much as possible.

Scientific skills should be practised right from the beginning of the programme. The ability to search and interpret literature, to handle conflicting findings and to present data is important in tutorial group meetings. Similar skills are trained by means of assignments and group projects. Based on block content, selected teachers will discuss selected topics, thus giving
the students an overview of the research issues studied within the Faculty of Medicine.

Professional behaviour should be assessed in each block period. This means that we will actually test in the highest level of the pyramid. Conform to the present proposals, it seems advisable to assess professional behaviour both at the beginning and at the end of a block and only count the assessment at the end of the block. Again, it is important to involve others (the student himself, peers) in the assessment process. Assessment of professional behaviour is not necessarily limited to behaviour exhibited in tutorial groups, but could include behaviour in other educational settings as well.

It can be considered to cluster the present supply of block test questions according to subject and make them available via computers (preferably via the Internet) for self-evaluation.

The actual block evaluation should consists of a combination of data. So, there will be no block test, but block-based assessment. It remains to be settled how these elements contribute to the elements of the portfolio and in what way. It is important to point out that this does not have to be the same for each block. For instance, writing skills may be trained in one block by means of a paper, presentation skills in another block by means of a presentation and planning skills in another block where students have to work on a group project.

The above may suggest that a substantial amount of testing is involved. In the new curriculum, assessment is regarded as part of education. The aim is to find a balance between assessing everything to stimulate the student to work hard, providing effective feedback to adjust the learning process and selecting all this information to take decisions on study progress.

Group work requires group assessment, which raises the issue of ‘free riders’. However, this should not be a problem if group assessment is only one part of a wide range of evaluation formats. Besides, the problem will be addressed when the students evaluate each other.
The theme of the first year is *Regulatory Systems and Emergency Care*. Emergency care is used as the starting point to study problems concerning regulatory systems. Because information is offered in context, the student’s motivation increases and it has a positive effect on the way students learn and remember. A student version of the course Advanced Trauma Life Support (ATLS) can be the common thread for skills required in emergency care.

Appendix 1 elaborates on each block theme of the first year in the form of a proposal for a blueprint. The blueprints will supplemented with a number of specific points for the block planning groups to consider. The blueprints are meant to clarify and define the task of each block planning group and to provide a general outline of the curricular structure to all planning groups. During the first and second year, a group of students is assigned to a mentor. It still has to be decided whether a mentor guides a group of students during the entire programme or whether each group has different mentors in the course of their study. It is the mentor’s task to supervise the portfolio system and to coach the group of students. Because tutors cannot perform all the tasks themselves, mentors can also be involved in the evaluation of field contacts or (simulated) patient encounters. In that case, the group coached by the mentor should be small, if not so, his duties may be too heavy. If a mentor is also a teacher, his group should of course be assigned to a different mentor after two years.

The main theme of the second year will be *Stages of Life and Diagnostics*. The skills training provided in that year, together with the training provided in the first year, will offer sufficient preparation to make the patient encounters in the third year useful and instructive. Each block will address aspects that give the diagnostic procedures a scientific basis. In previous versions of the Maastricht medical curriculum, the theme ‘stages of life’ has mainly focussed on the normal course of life and has touched the border between normal and abnormal. The new curriculum will also discuss complaints and disorders that are important at a specific stage of life. It seems obvious to compare this with the present blocks 1.7 and 2.5 - 2.7 (Cell Communication; Growth & Differentiation; Born and Raised;
Ageing, respectively), also because these blocks received very positive feedback. However, the function of the new second year is different and demands a fresh view on the blocks that are to be developed. The block titles are provisional and should be regarded as working titles.

In the second year, one block period will be reserved for electives. Which block this will be remains to be decided and depends partly on logistic factors in connection with other years. The students can choose from a number of tracks for their electives. Suggested so far are medical research track, education track, international track. The committee believes that the tracks should not be a prespecialization. Electives are an additional activity and the students spend extra time on this activity outside the elective block. The total programme still leads to one MD degree. The students may of course also arrange their own elective. A limited number of fixed elective programmes are offered in the second year. It should be examined whether groups of students can be exchanged during this period with students at European Medical Faculties. Clinical programmes (including many patient encounters) in the university hospital cannot be accepted because the capacity of the hospital is needed for the third-year students.

Appendix 2 elaborates on each block theme of the second year in the form of a proposal for a blueprint. The English blocks, which are now scheduled in the fourth year, will be moved to the end of the second year. In preparation for these English blocks, the students should be offered an English language course at the beginning of the second year.

**YEAR 3 TUTORIAL GROUP-BASED BLOCKS AND STRUCTURED FIELD CONTACTS**

The theme of the third year is *Chronic disorders*. Approximately 30% of the blocks will consist of field contacts. These contacts take place in the university hospital and extramural institutes. It is not feasible to schedule the contacts for all students of one year to take place at the same time. The students are therefore divided into four groups (tracks), who follow
First rotation: theme chronic disorders. 5 groups of 60 students each follow 5 8-week blocks in a different order.

<table>
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<tr>
<th>Group</th>
<th>Week 1 - 10</th>
<th>Week 11 - 20</th>
<th>Week 21 - 30</th>
<th>Week 31-40</th>
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- **block 1**: cardiovascular system and lungs
- **block 2**: brain and behaviour
- **block 3**: locomotor apparatus
- **block 4**: abdominal complaints
four ten-week blocks in different orders. So the blocks are offered in a rotation scheme as represented in the Figure. Each group is assigned to a mentor. As indicated before, it has not yet been decided whether this should be the same mentor as in the first two years of study. The advantage of a rotation system is that the need for patient encounters and field contacts remains constant throughout the year. A disadvantage is that activities such as lectures will have to be offered four times. The workload for teachers involved in practicals and skills training does not change much. However, the organization of these activities becomes more complex, which may increase the workload for supporting staff.

The educational setup of the third year is similar to that of the first two years. Patient problems will be discussed in tutorial groups and arrangements about assignments and tasks will be made. In order to define which patient problems should be addressed, a Maastricht problem list is being composed. The topics indicated for each block are still very tentative. The definite topics should be determined in consultation with the departments depending on what is logistically feasible. It should also be considered to allocate the coordination of a block to a department. This will increase the commitment for a block. In block 3.2 (Inabilities) of the present curriculum, for instance, this works very well, although obviously the block still includes contributions from other disciplines. In the new curriculum, this will especially be an advantage with regard to the complex logistics. The blueprint of the block will guarantee contributions from other disciplines.

The field contacts should be evaluated. In view of the aim to test students in the highest possible level of Miller’s pyramid, direct observation seems to be most appropriate. These are the first field contacts with an important value as training exercises, qualitative feedback is therefore important. It has been suggested to let the students perform these contacts in groups of two or three. The observing students can play an explicit role in this setup. A tool should be developed that can be used to provide effective feedback. When the students are to report in writing, a set structure of reporting can be used. In the past the SOEP (Subjective information, Objective information, Evaluation, Plan) and POMR (Problem
Oriented Medical Record) were applied for this purpose. As indicated above, field contacts require the year group to be split up into subgroups. It can be considered to use CCT as a part of the block evaluation. The idea of rotations fits in well with flexible assessment by means of CCT via the computer. However, it was shown to be rather difficult to develop case studies for CCT and it will require additional effort to develop more.

YEAR 4 COMBINED PRACTICAL TRAINING AND BLOCK EDUCATION

The fourth year will include blocks on dermatology, ophthalmology, ear, nose and throat medicine and the social medicine clerkship (five weeks each). The blocks consist of a combination of subjects and skills trainings that are presently included in the first four years of study and in the clerkships. These blocks will consist of approximately 40% of practical training. In order to integrate practice and theory, it is useful to plan the practical training in the university hospital. It is not yet clear whether the capacity is sufficient to do so.

The contents of these blocks will be addressed again in the general practice clerkship in the fifth year. On the whole, the same applies to this year of combined practical training and block education as to the instructional format in the third year. However, in this year the patient encounters will be more frequent and more intensive. Partly, this format will be more like a traditional practical training, except that the education offered is well-supervised and more structured. Again, direct observation is essential. Structuring can be achieved if the clinical problems that should be covered and the skills that should be mastered are specified. This can be done by means of a journal or logbook in which the addressed areas are recorded as well as whether feedback has been given. Research has shown that little feedback is provided and no direct observation is done during most practical training periods. It is also known that assessment of practical training periods provided as an overall evaluation at the end of the period is neither reliable nor very informative. Frequent testing and direct
observation by different people make assessment reliable. A more
structured assessment is thus obtained on the basis of short observations
(clinical work samples). It has been suggested to design a general form
that can be used as an assessment form and that is quick and easy to fill in. This form is then saved in the digital portfolio. General assessment
categories could include: history taking, physical examination,
(differential) diagnosis, management policy, communication skills and
professional behaviour. It is our explicit intention to involve different
people in student assessment (residents, nurses, clinical specialists), depen-
ding on who has been involved in the supervision of the student. CCT
could also play a role in this context. Furthermore, similar assessment
formats can be applied as for the instructional formats mentioned before
(papers, presentations, skills tests, et cetera).

YEAR 4 SOCIAL MEDICINE AND ELECTIVES

The social medicine clerkship is a relatively new clerkship. It can be
considered to shift the emphasis of this clerkship to social health care.
The development of the tutorial day and the assessment format has already
been started.
A period of 10 weeks has been reserved for electives. The electives can
be spend abroad and be tied in with one of the tracks. The committee is
of the opinion that students who want to broaden their views in a particular
area should be allowed to follow non-medical education during this
period. The fourth year is also organized as a rotation system, as
represented in the Figure below.

YEAR 4/5 CLERKSHIPS

Clerkships take place in different affiliated hospitals because it is useful
for the students to gain experience in different hospitals. Another reason
for this is the choice to use the capacity of the university hospital (AZM)
during the third and sixth year. The responsibility for the clerkships lies
with a planning group chaired by the head of department, the clerkship
Second rotation, year 4: each student follows one of the 5 tracks

<table>
<thead>
<tr>
<th>Track</th>
<th>Week 1 - 5</th>
<th>Week 6 - 10</th>
<th>Week 11 - 15</th>
<th>Week 16 - 20</th>
<th>Week 21 - 25</th>
<th>Week 26 - 30</th>
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- Electives
- Ear, nose and throat medicine
- Dermatology
- Ophthalmology
- Social medicine
coordinator of the university hospital department concerned or the chairman of a capacity group. In order to increase their commitment, the possibility should be examined to offer one staff member of each department of affiliated hospitals an honorary appointment at Maastricht University Hospital (AZM) or the Faculty of Medicine. Over the past few years, a substantial part of health care has shifted ‘from hospital wards to outpatient clinics’. It is therefore extremely important to include outpatient clinics in the clerkships. Clerkship students see new patients, are being supervised and write draft letters to general practitioners. It is important that the students learn to work with the computerized information systems used in health care. Between clerkships, intermediate weeks of education are scheduled to prepare the clerkship and to present the results of tasks. These intermediate weeks take place in Maastricht. Because the clerkships have to be scheduled at outpatient clinics, continuous presence of students is important to the affiliated hospitals. The clerkships and intermediate weeks are therefore organized in blocks of ten weeks (see Table and Figures).

During the intermediate weeks, it is also important for the students to gain more in-depth knowledge of basic medical subjects. In order to stimulate the students to study the basic subjects in sufficient depth, specific attention should be paid to this aspect in the formulation of assignments. Because presently a number of rapid changes and developments are taking place with respect to these basic subjects, the latest insights can be discussed in the intermediate weeks. In addition, subjects included in the present interclerkship education will be addressed.

In the new curriculum, third-year students will see more patients than they do now. Moreover, a large part of the general objectives are attained in the sixth year. Because of the shift from hospital wards to outpatient clinics, the clerkships will be more instructive and more efficient. The fact that the period of clerkship will be shorter is acceptable because more attention is paid to patient-based education throughout the curriculum.
<table>
<thead>
<tr>
<th>Clerkship</th>
<th>Length in weeks</th>
<th>Number of intermediate weeks</th>
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<tbody>
<tr>
<td>Internal Medicine</td>
<td>8</td>
<td>+2</td>
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<tr>
<td>Surgery</td>
<td>8</td>
<td>+2</td>
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<tr>
<td>Paediatrics</td>
<td>4</td>
<td>+1</td>
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<tr>
<td>Gynaecology</td>
<td>4</td>
<td>+1</td>
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<tr>
<td>Psychiatry</td>
<td>4</td>
<td>+1</td>
</tr>
<tr>
<td>Neurology</td>
<td>4</td>
<td>+1</td>
</tr>
<tr>
<td>General Practice</td>
<td>10</td>
<td>incl. tutorial days</td>
</tr>
</tbody>
</table>

Clerkship schedule of 8 weeks +intermediate weeks

Clerkship schedule of 4 weeks +intermediate weeks

1 2 3 4 5 6 7 8 9 10
capacity weeks
calendar weeks
Third rotation, year 5: a group of 60 students starts their clerkships in groups of 12 who enter the clerkship rotation at two-week intervals.

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<th>Group</th>
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I = Intermediate weeks
The assessment of the clerkships is similar to that in the previous educational period. Since these clerkships are done in non-university hospitals, there will be more one-to-one contacts between the clinician and the clerkship student, which should provide possibilities for direct observation and feedback. It has also been suggested to give specific assignments, such as writing evidence-based reports on clinical problems, which the students have to do during their clerkship (for instance with the group of students working in the same non-university hospital) and present in a clinical conference in the final week. These assignments can be included as part of the assessment. Again, CCT may play an important role. Another possibility is to use an integral, practice-oriented skills test (a clinical competence test).

The clerkships and the weeks at the Faculty are considered one educational period (block). This should be clearly reflected in the test schedule and in regulations.

YEAR 6 PARTICIPATION

PARTICIPATION IN RESEARCH
The present curriculum includes a three-month research elective. This period is too short for the students to finish a part of a research project and to write a scientific report about it as well. The research elective in the new curriculum takes up twenty weeks. The responsibility for these research electives lies mainly with the research institutes. This period can also be spend abroad at a Faculty collaborating with one of the institutes, but the institute is still responsible. The quality of the research electives will be monitored afterwards by the educational organization. During the period, small-group education will be scheduled about subjects the students need to know for the research projects in question. Scientific training will of course also be provided in the rest of the curriculum.

Traditionally, a research period is concluded by means of a research report. This will be very demanding on the capacity of supervising staff. The Faculty of Economics and Business Administration of the University
of Maastricht has obtained positive experiences using a supervising method for graduation theses in which intensive guidance and limited staff involvement were combined: the ‘graduation circle’. A graduation circle consists of a number of students and one or two coaching teachers who are responsible for the guidance and assessment of the reports of the participating students. A graduation circle meets on a regular basis, each meeting following a fixed structure: opening round, drawing up the agenda, discussing content-related issues of the reports, closing round. The students select a discussion leader and a minutes secretary to lead the circle meeting.

This approach means the teachers work more efficiently: they need less time to read the reports, because the draft versions are read by the participating students and they spend less time on coaching because they meet with several students at the same time. In addition, the graduation circles aim to stimulate cooperative learning and enhance the function of feedback: by stimulating reflection, team work and joint responsibility between the students on the one hand and between the students and the teacher on the other. During the meetings, discussion about the beginning or progress of the reports is most important. Decision-making within the circle takes place according to the consentient decision rule: something is decided if none of the participants (both the coaching teachers and the students) have any objections. For instance, a discussion leader is chosen and the final assessment is determined according to this principle.

PARTICIPATION IN PATIENT CARE
Some of the general final objectives can only be achieved if the student takes on the responsibility for real patients. A number of aspects concerning daily patient care and cross-disciplinary collaboration can actually only be trained in this setting. This can hardly ever be realized in normal clerkships. In the new curriculum, twenty weeks are dedicated to a period in which each student is responsible for a number of patients. The student works as a junior doctor (judo), which will facilitate the transition to residency after graduation. This period can be done in the university hospital as well as in the affiliated hospitals. Extramural institutes also
offer some capacity, for instance in affiliated general practices, provided the student can really be responsible for a number patients. Students can opt for several possibilities. A committee needs to be established in due course to determine which departments meet the criteria and can offer the students sufficient responsibility and supervision. Since the fifth-year students are doing their clerkships in affiliated hospitals, the period of participation during the sixth-year can be organized in the university hospital. There will also be possibilities at the wards of affiliated hospitals, because most fifth-year students work in outpatient clinics. The supervision during this period will be exercised by one member of staff, who sees the student every day. The students of each hospital form a group and are offered two consecutive days of education each month. The meetings are partly meant to reflect upon experiences (supervision / intervision / attitude development). In addition, subjects such as ethics, health law and pharmacology will be discussed. Participation in research and in patient care can be combined, as in postgraduate training combining medical specialization and Ph.D.-research. This combination can stimulate clinical research.
THE NEW MAASTRICHT CURRICULUM

THE CURRICULUM FROM DIFFERENT PERSPECTIVES

STUDENTS

In the new curriculum, the student is exposed to practice and patients sooner than in the present curriculum. This enhances learning and remembering. Learning to learn is an important starting point, because basic medical education takes up a relatively short period of the educational continuum. Therefore, the students will be given a lot of responsibility. The introduction of assignments and projects and the changes in the assessment system imply that students have to devote more attention to their study and on a more regular basis. It is important for the students’ future career in patient care to focus on professional behaviour right from the start and to provide feedback on this behaviour. The content and design of the curriculum link up well with the developments in health care. The curriculum is concluded by a training period in which the students participate independently in scientific research and health care.

FACULTY

The new curriculum offers a larger variety of instructional formats than the present curriculum and thus includes a large variety of tasks for faculty members. The aim is to achieve a better connection between the individual qualities of faculty members and the required teaching tasks. This will have a positive impact on the teachers’ motivation. A prerequisite is that the three tasks of the Faculty of Medicine and the hospital (education, research and patient care) should be valued equally. Furthermore, sufficient and appropriate training should be offered to faculty members.

AFFILIATED HOSPITALS

Staff members at the hospitals participating in student education will have a clear task in the reform of the clerkships. Collaboration in other areas
(education, research, patient care) has partly already been established and can be reinforced. This development should be accompanied with appropriate appreciation and compensation. In the sixth year, interested and motivated students can join the team for a longer period of time.

UNIVERSITY HOSPITAL

The educational task of the university hospital is emphasized in the third year and in the intermediate weeks during the fifth year. The planned changes have many logistic implications. It has therefore been suggested not to schedule the clerkships in the university hospital. Also, the demand for working space facilities will increase. The combination of participation in research and patient care during the sixth year offers possibilities to place extra emphasis on clinical research.

PRIMARY HEALTH CARE

The increase in field contacts and patient encounters also has an impact on primary health care. In fact it means that existing programmes have to be elaborated and translated. This will require a good positioning of the affiliated general practices for the various tasks.

DEPARTMENTS

The changes in the approaches of teaching faculty also require a new faculty development policy in the departments. This is only possible if the three tasks are valued equally. As mentioned above, an improved relationship between qualities and tasks will have a positive influence on the motivation of faculty members.

The changes in the curricular content stimulate better integration of basic medical subjects and topics relevant with respect to practice and patient care. Education during intermediate weeks partly aims to deepen the
students’ knowledge. The contribution of the basic medical subjects is essential to achieve this aim.

With respect to clinical subjects, the proposed reform allows more room for the subject expertise of faculty (and therefore of the subject field), because field contacts and patients encounters are introduced at an earlier stage.

RESEARCH INSTITUTES

The extended possibility to participate in research and the increased attention paid to scientific education create many opportunities for the research institutes. Depending on the block theme, selected teachers are invited to provide the students an overview of research in their field. In addition, specialized researchers are approached for a number of projects. Learning to judge available information and learning to handle evidence-based medicine are a main thread throughout the curriculum. Because the students participate in research during the sixth year, they can develop an interest in this field and consider the career possibilities in research. Since more attention is paid to useful research skills at an earlier stage in the curriculum, the students are better prepared for research participation in their final year.

FINALLY

The blueprint described above has many implications. As part of its implementation, consultations with departments, hospitals, et cetera will take place. The aim of these consultations is to have an open discussion with the people involved in order to work out the details of the proposal. The proposal suggests many changes and will therefore require the expertise and creativity of as many staff members as possible to make it successful. The first year of the new curriculum will start on 1 September 2001. So we all know what we are supposed to do in the coming months.
REFERENCES


8. Prince KJAH, Wiel MWJ van, Scherpibier AJJA, Vleuten CPM van der, Boshuizen HPA. A qualitative analysis of the transition from theory to practice in medical education. Advances in Health Sciences Education. In press.


APPENDIX 1. YEAR 1

EXPLANATORY REMARKS

This appendix provides the general outline of each block. The exact details will be specified by the future block planning groups. The classification of the educational objectives complies with the classification as suggested in the Blueprint 1994: training of medical doctors in the Netherlands:

- Medical aspects: medical knowledge and skills
- Scientific aspects: the basics of research and academic thinking
- Personal aspects: relationships with patients and colleagues
- Social and health care aspects: economic, administrative, legal and ethical knowledge and skills

In this appendix, a number of these aspects have been filled in, others still need to be established.
Block 1.1 Emergencies

**General objectives**
To give the students a general introduction to working in a problem-based learning system and a general overview of the subjects that will be discussed in the first year;

**Medical aspects**
knowledge of and insight into:
- the main principles of stabilizing mechanisms in the human organism with regard to circulation, consciousness, respiration, regulation of temperature and general homeostasis
- reactions of people in panic

skills including:
- providing effective first aid in a situation in which acute care is required (until professional help arrives)
- showing availability, offering comfort and giving the opportunity to ask questions

**Scientific aspects:**

**Personal aspects:**
attitude awareness with respect to:
- dealing with one's own fear and shock reactions
- keeping a balance between patient care and self-care

**Social and health care aspects:**

Content outline

```
Dyspneic patient       Unconscious patient
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
BASIC PRINCIPLES REGULATION MECHANISMS
|                          |
Confused patient         Skate accident
|                          |
|                          |
Temperature              Acute abdomen
|                          |
|                          |
Hypothermia               Burns
|                          |
|                          |
Heatstroke
|                          |
```
### Block 1.2 Traumata

#### General objectives

**Medical aspects:**
- knowledge of and insight into:
  - diagnostics, providing first aid and further treatment in the most common accidents in the Netherlands
  - regulatory systems that can be disturbed by different kinds of accidents and how the body may respond to that
- skills including:
  - applying bandages in accident patients, wound care, preparing patients for transport
  - handling a patient’s strong emotions

**Scientific aspects:**

**Personal aspects:**
- attitude awareness with respect to:
  - dealing with one’s own emotions
  - empathizing with the patient’s feelings in trauma situations
  - identifying the patient’s feelings

**Social and health care aspects:**

#### Content outline

- Fractures
- Drowning
- Head trauma
- Blunt abdominal trauma
- Intoxication
- Distortion
- Stab / shot wound
- Pneumothorax

- Cell division / regeneration / differentiation
- Regulation of temperature
- Coagulation mechanisms
- Wound healing
- Water balance
Block 1.3 Dyspnea

General objectives

Medical aspects:
knowledge of and insight into:
- the pathophysiological background underlying the different causes of the subjective perception of dyspnea
- the regulatory mechanisms playing a role in an optimum exchange and transport of gases

skills including:
- providing first aid to a dyspneic person
- performing a physiological diagnostic examination of the thorax
- dealing with and reassuring a dyspneic person
- providing effective information to patients

Scientific aspects:

Personal aspects:

Social and health care aspects:

Content outline

Dyspnea
- Pulmonary
- Cardiac
- Emotional
- Neurological

Respiratory regulation
Gas transport
Cellular respiration

Asthma
Cardiac asthma
Hyperventilation
Pneumothorax
Intoxication
Altitude sickness
Caisson sickness
Duchenne's disease
Block 1.4 Shock

General objectives

Medical aspects:
knowledge of and insight into:
- the different types of shock and the underlying pathophysiological mechanisms
- the regulatory systems in the human body that attempt to prevent shock

skills with respect to:
- making diagnoses and providing first aid to a person in shock
- maintaining contact as well as possible with a patient in shock
- dealing effectively with pressure of time

Scientific aspects:

Personal aspects:
attitude awareness with respect to:
- identifying the impact of time pressure
- learning from one's own experiences

Social and health care aspects:

Content outline

SIGNS of SHOCK

Regulation:  Cardiogenic
Blood pressure  Vasovagal
Heartbeat  Septic
Cardiac output  Hypovolemic
Fluid / water-salt  Anaphylactic
Vasodilatation / vasoconstriction  Emotional

Role of autonomic nervous system
**Block 1.5 Abdomen**

**General objectives**

Medical aspects:
knowledge of and insight into:
- the concept of acute abdomen and its underlying pathophysiology
- the structure and function of abdominal organs
- the regulatory mechanisms that may be disturbed at the onset of an acute abdomen
- the range of diagnostic options and limitations in cases of an acute abdomen

skills including:
- performing physiological diagnostic examination of the abdomen
- performing gynaecological examination
- performing rectal palpation
- providing effective information and offering structure
- reflecting on the patient’s feelings

Scientific aspects:

Personal aspects:
attitude awareness with respect to:
- dealing with patients in pain and describing this experience
- considering the consequences of pain for the patient’s behaviour

Social and health care aspects:

**Content outline**

<table>
<thead>
<tr>
<th>Intake and excretion</th>
<th>Acute diarrhea / vomiting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peristalsis</td>
<td>Ectopic pregnancy</td>
</tr>
<tr>
<td>Menstrual cycle</td>
<td>IBS</td>
</tr>
<tr>
<td>Defence mechanisms</td>
<td>Ovulation pain</td>
</tr>
<tr>
<td>Pain perception</td>
<td>Dysmenorrhea</td>
</tr>
<tr>
<td>Water balance</td>
<td>Diverticulitis</td>
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<tr>
<td></td>
<td>Pancreatitis</td>
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<td></td>
<td>Intestinal perforation</td>
</tr>
<tr>
<td></td>
<td>Colic pains</td>
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<td></td>
<td>Ileus</td>
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<tr>
<td></td>
<td>Kidney stones</td>
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<td></td>
<td>Food poisoning</td>
</tr>
</tbody>
</table>
Block 1.6  Unconsciousness

General objectives

Medical aspects:
acquiring knowledge of and insight into:
- the various causes of coma and the underlying pathophysiological mechanisms
- the regulatory mechanisms that control consciousness and sleep
skills including:
- determining the degree of consciousness or coma
- performing and interpreting relevant laboratory tests
- taking a history from a third party
- handling a person respectfully who does not react to stimuli

Scientific aspects:

Personal aspects:

Social and health care aspects:

<table>
<thead>
<tr>
<th>Content outline</th>
<th>Intoxications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation consciousness and sleep</td>
<td>CO</td>
</tr>
<tr>
<td>Regulation circulation in the brain</td>
<td>Illicit drugs</td>
</tr>
<tr>
<td>Metabolic regulatory mechanisms</td>
<td>CVA</td>
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<tr>
<td></td>
<td>Epilepsy</td>
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<tr>
<td></td>
<td>Hypo / hyperglycaemia</td>
</tr>
<tr>
<td></td>
<td>Psychiatric brain damage</td>
</tr>
</tbody>
</table>
APPENDIX 2. YEAR 2

EXPLANATORY REMARKS

This appendix provides the general outline of each block. The exact details will be specified by the future block planning groups. The classification of the educational objectives complies with the classification as suggested in the Blueprint 1994: training of medical doctors in the Netherlands:

- Medical aspects: medical knowledge and skills
- Scientific aspects: the basics of research and academic thinking
- Personal aspects: relationships with patients and colleagues
- Social and health care aspects: economic, administrative, legal and ethical knowledge and skills

In this appendix, a number of these aspects have been filled in, others still need to be established.
Block 2.1  Cell growth

**General objectives**
The block is an introduction to the possibilities of molecular medicine and research in this field

Medical aspects:
knowledge of and insight into:
- the different types of cells, normal growth and differentiation and possible abnormalities
- cellular response in cases of inflammation
- intercellular communication mechanisms and regulation
- examples of aberrant cell communication resulting in atherosclerosis and cancer
- reactions in mourning processes

skills including:
- performing physical diagnostic examination that are relevant to detect malign disorders
- applying the basic techniques of communicating information and bad news

Scientific aspects:

Personal aspects:
attitude awareness with respect to:
- experience in communicating bad news
- the impact of personal background on how one interprets one’s duties

Social and health care aspects:

<table>
<thead>
<tr>
<th>Content outline:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental influence</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Differentation</td>
</tr>
<tr>
<td>Cell growth</td>
</tr>
<tr>
<td>Cell communication</td>
</tr>
</tbody>
</table>
Block 2.2 Pregnant !?

**General objectives**

Medical aspects:
knowledge of and insight into:
- spermatogenesis and oogenenis, fertilization and the physiological course of the first trimester of pregnancy
- social and ethical implications related to this period of pregnancy
- the main problems that may occur during this period

skills including:
- examining a women during the first trimester of her pregnancy
- performing and interpreting different pregnancy tests
- holding an explorative conversation clarifying the patient’s core problem
- informing a patient in a clear way

Scientific aspects:

Personal aspects:
attitude awareness with respect to.:
- the difference between men and women with respect to their perception of the future
- the significance of getting / being pregnant and the ability to empathize with expecting parents

Social and health care aspects:

**Content outline:**

- **Gametogenesis**
  - Unwanted pregnancy
  - Spontaneous abortion
  - Unvoluntary childlessness

- **Gonadal development**

- **Early embryonal development**

- **Foetal**
  - Blood loss in 1st trimester
  - Ectopic pregnancy
  - Hyperemesis
Block 2.3  Birth and growth

**General objectives**

Medical aspects:
knowledge of and insight into:
- normal development during the second and third trimester of pregnancy
- gestoses
- physiological childbirth
- peripartal pathology and congenital defects
- normal growth and development of children until menarche and the main disturbances that may occur

skills including:
- examining women in their second and third trimester of pregnancy
- relating the findings of this examination to possible deviations in presentation
- examining neonates
- examining the sense of hearing and the vision of a child
- guiding and supporting the (future) parents
- holding a conversation with a child

Scientific aspects:

Personal aspects:
attitude awareness with respect to:
- distinguishing between helping and protecting someone
- empathizing what it means to have children

Social and health care aspects:

**Content outline:**

- Physiological childbirth
- 2nd and 3rd trimester pregnancy
- Child
- Mother
- Gestoses
- Bleeding
- Postnatal depression
- Peripartal pathology
- Retarded growth
- Congenital defects
- Stomach ache
- Exanthema
- Fever
- Menarche
- Neonate
- Baby
- Pre-school child
- Schoolchild
- Normal development
Block 2.4  Puberty / adolescence / young adults

**General objectives**

Medical aspects:
- knowledge of and insight into:
  - normal growth and development during this stage of life
  - hormonal regulatory mechanisms determining the menstrual cycle and spermatogenesis
  - the development of sexuality
  - the impacts of sports on normal physiological development
  - the most common sports injuries
  - risk behaviour characteristic to this stage of life
  - causes and impacts of study delay

Skills including:
- examining the locomotor apparatus (elbow, knee, foot, ankle)
- performing STD-diagnostics
- stitching a wound
- holding a conversation about risk behaviour
- holding a professional conversation about sex (history-taking, education, help)

Scientific aspects:

Personal aspects:
- attitude awareness with respect to:
  - holding a conversation about sexuality and dealing with the possible personal view regarding future behaviour
  - the significance of family, work, illness to men and women involved
  - your own judgement on sexual inclinations
  - the treatment of others in this respect

Social and health care aspects:

<table>
<thead>
<tr>
<th>Content outline</th>
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<tbody>
<tr>
<td><strong>TEENAGER</strong></td>
</tr>
<tr>
<td>Physical</td>
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<td>Hormonal</td>
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<td>STD</td>
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<td>Sport injuries</td>
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<tr>
<td>Psychological</td>
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<tr>
<td>Growth and development</td>
</tr>
<tr>
<td>Sexuality</td>
</tr>
<tr>
<td>Risk behaviour</td>
</tr>
<tr>
<td>Sports</td>
</tr>
<tr>
<td><strong>YOUNG ADULT</strong></td>
</tr>
</tbody>
</table>

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Block 2.5  Adulthood: work and health

General objectives

Medical aspects:
acquiring knowledge of and insight into:
- the risk factors that are important in this stage of life in order to obtain emotional balance and physical health
- the main disorders resulting in disability

skills including:
- examining the locomotor apparatus (back, shoulder, wrist, hand)
- performing a gynaecological examination and a smear test
- holding a explorative conversation to clarify the patient's core problem, taking histories and negotiating the possibilities of assistance or help
- holding a conversation and giving advice with respect to risk behaviour

Scientific aspects:

Personal aspects:
attitude awareness with respect to:
- one's own risk behaviour and the formulation of a personal view regarding future behaviour
- the significance of family, work, illness to men and women

Social and health care aspects:

Content outline:
Block 2.6 The elderly

General objectives

Medical aspects:
knowledge of and insight into:
- the epidemiology of ageing and the main theories about the mechanisms of ageing
- the physiological changes occurring in organs and organ systems
- the main areas of functional loss
- the consequences of ageing for individuals and society

skills including:
- performing examination the hip
- examining the sense of hearing and the vision of an elderly person
- performing a neurological examination
- communicating bad news / counselling an elderly patient

Scientific aspects:

Personal aspects:
attitude awareness with respect to:
- the significance of the loss of functions and how to make it discussible
- one's own experiences with and the possibilities to communicate bad news
- not being able to cure someone

Social and health care aspects:

Content outline:

Physiological changes due to old age

Brain CVA
Locomotor app. Osteoporosis / Arthrosis
Cognition Dementia
Senses Balance disorders
Cardiovascular system Claudication
Urinary tract Incontinence

Disorders due to old age
Prevention

Epidemiology of ageing
Social and economic aspects of ageing
Organisation of care
APPENDIX 3. SUMMARY OF ‘REQUIREMENTS’ FOR THE PROJECT

AIM

The aim is to introduce a new medical curriculum, operational from 2001-2002 (in phases), characterized by
- a student-centred, patient-based, problem-based and project-based educational concept;
- a useful and motivating role of faculty;
- a multidisciplinary and thematic organization;
- an integration of theory and practice according to the ‘Z-shaped model’.

The project has to satisfy a number of requirements and conditions, which are divided (according to their decreasing obligation) into limiting conditions, functional requirements and operational requirement.

LIMITING CONDITIONS

These are conditions that cannot be influenced by the project and should therefore be regarded as certainties.
- A budget of NGL 3.8 million/ 81 FTE for university staff/ 44 FTE for supporting and management staff (10 for departments?)/ for 200 students during the realization phase. Starting point is that the long-term expenses do not change compared with those of the present curriculum and that the budget increases when the number of students rises. A separate estimate will be submitted to the Faculty Board including project expenses related to the implementation of the new curriculum.
- A six-year programme, conform to the present Dutch legal framework (Higher Education and Research Act, WHW)
- The programme should link up with the final objectives of the secondary school (VWO) profiles of nature & health / nature & technology and biology 1, 2, with regard to the content of these pro-
files as well as the new skills and learning skills included in the Dutch ‘study house’ system.

- The programme trains students to achieve the final objectives included in the Blueprint 1994: training of medical doctors in the Netherlands which is a prerequisite for MD-registration in the health care professions (BIG) register.

- The programme should comply with the WHW, especially with respect to testing, resists, credits, study load and study feasibility. These aspects should be specified in an Education and Examination Regulation (OER) for the new curriculum.

FUNCTIONAL REQUIREMENTS

These requirements include the desired achievements and content-related characteristics of the new curriculum, the starting points.

- The programme is regarded as part of the medical educational continuum. It should stimulate the student’s responsibility for his own learning process. During practical training and clerkship, therefore, the student is to take increasing responsibility (from orientation to participation) for the care of patients, cumulating in the supervised, full responsibility for a number of patients in the sixth year.

- Integration of theory and practice; a student-centred, patient-based, problem-based and project-based approach; a variety of instructional formats; a clear link with the learning process. The present division between the theoretical and the practical part of the curriculum will partly disappear. The starting point is the Z-shaped curriculum following a basic line of ‘paper’ in the beginning, then alternating ‘paper and patient’, and later ‘mainly patient but also still paper’.

- Sufficient attention should be paid to ‘learning to learn’. The curriculum should allow enough time to train the study skills needed for a particular instructional format. It is also essential that students understand the use and purpose of educational didactic ‘rules’.

- A multidisciplinary and thematic approach prevents that only one (monodisciplinary) side of an issue or subject is explored.
- Scientific education should be intensified. The programme also aims to introduce the students to and make them participate in research. They should acquire knowledge and skills to judge new and old facts and literature on the basis of scientific standards.

- The electives will be more coherent and profound because of the introduction of tracks (medical research, education, internationalization).

- More emphasis is placed on outpatient and extramural care and the multidisciplinary character of care. The organization of practical medical training is adjusted to the organization of health care and the recent developments in that area. The best opportunities for learning in a practical setting are being determined. As a result, students may be assigned to different places in the beginning of their studies than in a later stage when they are able to work more independently. In addition, the emphasis will shift from hospital wards to outpatient clinics and extramural care.

- More attention should be paid to professional behaviour and skills, because these appear to be very important to ensure a successful professional life. The following areas can be distinguished: Dealing with tasks (time management, stress management, showing initiative and leadership, setting one’s limits); Dealing with other people (treatment, coping with criticism, giving presentations, teamwork skills); Dealing with oneself (providing and receiving feedback, reflecting, coping with insecurity).

- The assessment system should focus on educational objectives.

- Student mobility / internationalization should be encouraged. The UM has a vast international scope. Ideally, all Maastricht students should follow at least one part of their studies abroad.

OPERATIONAL REQUIREMENTS

These include the requirements for the application and management of the new curriculum

- The quality of the programme will be controlled by a system of internal and external quality care.
- The concept of quality will be quantified through programme evaluation, interfaculty progress tests and the success rate of the programme.

- Each educational unit will be evaluated on a yearly basis. Standards will be established with respect to the core aspects (including instructiveness, study load and organization) of each evaluation. The educational units have to meet these standards.

- Presently, the interfaculty progress test is used in Nijmegen, Groningen and Maastricht. It is a curriculum-independent knowledge test and it will be used during the curricular reform as a quality control for the level of our programme. It is an operational requirement that, after the introduction of the new curriculum, the Maastricht medical students obtain at least similar scores to their peers in Nijmegen and Groningen.

- A minimum success rate for the freshman year of 90% after one year and 95% after two years.

- A minimum success rate for the Master’s degree of 85% after five years.

- A minimum success rate for the degree of Doctor of Medicine of 85%.

- A maximum mean study duration of 7 years.

- The data mentioned above will be the input in a cycle of quality care. At least once a year, issues about quality care will be reported to the Educational Committee. Quality care is also included in the Management report on education, which is an annual part of the consultations between the Institute of Medical Education and the Faculty Board and between the Faculty Board and the Board of Governors.

- External quality care. Periodical external audits of medical schools are organized by the VSNU (Association of Universities in the Netherlands) by means of visitations by external experts. The visitation report is public. Also, the ‘Keuzegids’ (information prospectus) for higher education, issued every two years, offers a source of information about the quality of education and organization.

- Opportunity to give faculty and affiliation partners a motivating role in education.

- Performance data will be the main criterion to select, qualify and stimulate faculty. The new programme should be teacher-oriented in
a way that faculty members can, also in the long term, fulfil functions they consider useful.

- Involvement in education (teaching, development and organization) should have the same weight as research and patient care. Consequently, career prospects via achievements in education need to be created.

- The allocation of educational tasks in the new curriculum implies that a lot of attention will be paid to the professionalization of faculty. In order to do this efficiently, teachers will be selected for some of the functions. This is only feasible if career prospects are offered.

- Information and communication technology in education (ICT) is used both as an important facility and a learning objective. Important advantages of ICT are its independence of place and time and the possibility to interact. The intention is to introduce ICT in the study process, educational process as well as the educational management process. This should result in a central digital forum for the medical programme on the Internet, where students can search and exchange information, pass on changes of address, register for electives, look up study results, time schedules and planned activities.

- An effective design of the management of FTE for teaching for the core functions: FTE planning (development, needs, test schemes); FTE financing (expenses, profits, output requirements with regard to quality and quantity) as well as budgeting and report; FTE management (index numbers and standard measures).

- Research of education is required in order to guarantee a well-founded educational reform that can be permanently adjusted, supplementing international developments (Best Evidence-based Medical Education).