WHO-EM/CAH/192/E

Integrated Management of Child Health

IMCI

pre-service education

A guide to evaluation

World Health Organization
Regional Office for the Eastern Mediterranean

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Contents

Foreword

Medical schools play a key role in preparing the future cadres of health professionals who will be providing child health care services in the community, whether in the public or private sector. It is recognized that investment to enhance teaching in these institutions is as important as other key public health interventions, as well as being of support to those interventions. Effective teaching contributes to improving the quality of health care in a country; also, upgrading teaching represents a long-term response to the health care needs of a community.

Since its inception in the 1990s, when the Integrated Management of Child Health (IMCI) strategy was introduced in the Eastern Mediterranean Region, the WHO Regional Office for the Eastern Mediterranean recognized the need to introduce IMCI not only in the public health system but also in the teaching programmes of medical schools. Thus, it collaborated closely with the medical schools in the Region, and pioneered efforts in this area globally. Wide experience has since been gained in the Region. Based on that experience, the Regional Office has developed this IMCI pre-service education package to support countries and institutions in introducing IMCI in their teaching programmes, and in evaluating its use using standard approaches.

The advantage of this IMCI pre-service education approach is that it can be integrated with existing teaching programmes and does not necessitate the creation of new vertical structures. Further, it enhances the process of skills development that is key to improving the quality of care to children. I trust this package, with the instruments it offers, will be of great benefit to guide and support teaching institutions in their efforts to further enhance the quality of their teaching and, eventually, to produce qualified professionals ready to sustain the challenges ahead.

Hussein A. Gezairy MD FRCS
WHO Regional Director for the Eastern Mediterranean

Preface

This publication is part of the IMCI pre-service education package developed by the WHO Regional Office for the Eastern Mediterranean. The package was developed as a set of tools to assist teaching institutions in introducing, implementing and assessing undergraduate teaching programmes that include the IMCI approach.

Medical and allied health professional schools play a key role in preparing the future cadres of health providers who will be providing child health care services in a country, whether in the public or private sector. An increasing number of medical schools in the Eastern Mediterranean Region have been taking steps in recent years to introduce the Integrated Management of Child Health (IMCI) approach into their undergraduate teaching programmes. The Regional Office, through its child and adolescent health and development programme, has been closely collaborating with these institutions in the task, when IMCI was introduced in the Region as a public health approach, and as an initiative to address future IMCI sustainability. Development of this package was based on this collaborative experience and on a recommendation from the Member States. It proposes a standard approach to each phase, from planning to evaluation.

The package comprises the following publications.

1. *IMCI pre-service education: orientation and planning workshop: facilitator guide* is designed to assist in the conduct of in-depth participatory workshops for teaching institutions to develop plans to introduce IMCI into the teaching programmes. The guide, tested in an intercountry workshop in July 2009, includes detailed guidelines, presentations and tools to support this task.
2. *IMCI pre-service education: teaching sessions,* with lesson plans to support planning and conduct of IMCI-related teaching sessions within the paediatric and community medicine teaching programmes, describes the student learning objectives, content and procedures of each session. The content was thoroughly reviewed by an expert group in 2008.
3. *IMCI pre-service education: guide to evaluation* is a comprehensive tool to assess whether IMCI pre-service education as a public health intervention improves students' competencies in managing main childhood health problems in outpatient settings. Extensively reviewed through expert consultations and tested in four medical schools, this guide comes with a user guide to data entry and analysis and a CD with the relevant e-forms and programme files.
4. *IMCI pre-service education: question bank* is a resource library of multiple-choice questions and case scenarios suitable for evaluations of IMCI pre-service education and student formative and summative assessments. It has already been used to develop student knowledge tests for evaluations in two medical schools, in 2009.
5. *IMCI pre-service education: e-lectures* on CD provides standard technical content as a resource to support IMCI-related teaching.
6. *IMCI pre-service education: e-learning material for students* on DVD is designed to support students' learning at their own pace through an electronic, interactive medium.

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Introduction

This guide was developed by the WHO Regional Office, based on the work of the technical committee on the evaluation of IMCI pre-service education evaluation, which was established for this specific purpose in 2005. Extensively reviewed through expert consultations, it was developed in response to a need expressed by Member States.

An increasing number of medical and allied health professional schools have taken steps in recent years to introduce the Integrated Management of Child Health (IMCI)[1] approach into their teaching programmes for undergraduate students. This guide is intended to support ministries of health, pre-service teaching institutions and partners in planning for and conducting evaluation of these efforts. It is expected to be particularly useful as a practical instrument for those designated as focal points for the evaluation at both ministries of health and teaching institutions.

The guide was conceived as a dynamic tool: it will be updated and more instruments will be added as more experience is acquired through its use and as new needs are identified by ministries of health and teaching institutions. It currently focuses on assessing teaching at paediatric departments as experience with evaluations of IMCI pre-service education has to date concentrated on them. It is envisaged that future work will expand the scope of the evaluations also to family medicine and community medicine departments. Updates will be posted on the web site of the WHO Regional Office for the Eastern Mediterranean at www.emro.who.int/cah, in the section on IMCI pre-service education.

[1] IMCI originally stood for Integrated Management of Childhood Illness. The scope of IMCI expanded in the Eastern Mediterranean Region over the years to emphasize not only the curative but also the promotive and preventive aspects of the child health strategy. The original acronym of IMCI was retained as this is how the strategy was globally referred to. IMCI is now promoted in the Region as the primary child health care strategy.

Chapter 1. Background and objective

1.1 Background

What is the IMCI strategy?

The Integrated Management of Child Health (IMCI) strategy is a public health strategy that aims at improving the quality of health care provided to children under 5 years of age both at primary health care facilities and at home, through its three components:

- improvement of health providers' performance;
- improvement of related elements of health system support;
- improvement of family and community practices.

This primary child health care strategy promotes a holistic approach to the management of under-five children, addressing promotive and preventive aspects of child health, as well as curative aspects of priority child health problems in a country.

What is IMCI pre-service education?

IMCI pre-service education refers to the introduction of IMCI-related clinical and public child health concepts and approaches in medical and allied health professional school teaching programmes before graduates enter service, including integrated protocols on the management of common child health problems at outpatient primary health care settings and interventions at family and community level. The methodology may vary from one country to another and even from one school to another.

Regional experiences in introducing public health programmes into teaching curricula

Countries in the Eastern Mediterranean Region have acquired useful experience with the introduction of the guidelines of some public health programmes into the teaching curricula of medical and allied health sciences, such as control of diarrhoeal diseases and the Expanded Programme on Immunization (EPI). These experiences have provided a teaching model both for the use of standardized clinical protocols and approaches to disease management and for giving attention to priority public child health problems in teaching. Collaboration between ministries of health and teaching institutions has been a major outcome of those experiences. However, the sustainability of these teaching approaches has been adversely affected by the failure to institutionalize them and by the inadequate training of some of the teaching staff to master those public health subjects.

Main objective of IMCI pre-service education

IMCI pre-service education is seen in the Region as one of the most important interventions to upgrade the teaching quality of public child health-related subjects in order to improve students' related competencies and, eventually, health provider performance in both the public and private sectors, ensuring sustainability and scaling-up of IMCI. The Regional Office has adopted a standardized approach to the introduction of IMCI into teaching programmes in order to assist countries and institutions in this task.

Importance and relevance of IMCI pre-service education

IMCI pre-service education is seen as important and relevant to the following partners involved in implementing the IMCI strategy because of what it is expected to offer, as summarized below.

Teaching institutions

- Strengthens the teaching of priority child health problems by using standardized protocols for case management.
- Improves the quality of outpatient teaching of paediatrics, family medicine, community medicine and public health for medical and allied health sciences students by:
  - strengthening students' knowledge and skills in managing common child health problems;
  - strengthening students' communication skills by practising counselling with the child caregivers;
  - exposing students to real-life situations in dealing with children, also at community level.
- Enhances the overall teaching quality in the school, by promoting active learning, improving student–teaching staff relationships and strengthening interdepartmental coordination, to mention but a few. This would contribute to enhancing the reputation of the institution.
- Facilitates the establishment or strengthening of links between the teaching institution, the health system and the community in the country.

Ministry of Health

- Ensures new graduates' acceptability of the IMCI strategy and its syndromic approach adopted in the health system.
- Facilitates better fitting of the new graduates into the Ministry of Health existing health system.
- Disseminates the concept of IMCI and provides knowledge and skills to health staff who will choose to work in other public and private health sectors.
- Alleviates the Ministry of Health training burden, in terms of financial costs, human resources and time.
- Increases IMCI coverage and overcomes the problem of the high turnover of trained health providers and the need to keep training new health providers in IMCI. This ensures IMCI sustainability at health facility level.
- Improves the quality of child health care at health facilities and in the community.
- Reduces the cost of child health care through the use of standard protocols and child health promotion and prevention approaches.

Other public and private health care sectors

Sectors which apply the IMCI strategy:

- Facilitates the fitting of the new graduates into their health system.
- Improves the performance of their health providers.
- Reduces the cost of child health care.

Sectors which do not apply the IMCI strategy:

- Sensitizes and improves health providers' attitudes towards the IMCI guidelines.
- Improves health providers' skills (e.g. recognition of clinical signs, counselling).

New graduates in the field (both public and private sectors)

- Provides them with an integrated protocol for systematic, action-oriented management of children under five years of age, which enables rapid identification and urgent referral of severe cases.
- Provides them with a link to real-life situations where diagnostic tools and medicines may be scarce.
- Builds their confidence and ability to work within the country's existing health system.
- Helps them link and perform promotive, preventive and curative care.
- Provides them with additional skills in important areas, such as counselling, that enable more effective communication with family members.

1.2 Objective of the evaluation of IMCI pre-service education

The main objective of evaluating IMCI pre-service education is to assess whether IMCI pre-service education as a public health intervention improves students' competencies in managing main childhood health problems and promoting child health in outpatient settings and the community before graduation and their clinical performance after graduation. It aims also at assessing whether the quality of teaching has improved as a result of the introduction of IMCI into pre-service education.

Chapter 2. What to evaluate

Evaluation of IMCI pre-service education would mostly entail assessing: the establishment of an environment supportive to IMCI pre-service education at all levels; the planning process at national and institutional level; the quality of IMCI-related teaching; student competencies in child health care; knowledge, skills and attitudes of the new graduates; the benefits of the investment to the teaching institution and the health system; and the sustainability of the approach. This concerns evaluating both process and its results.

2.1 Process

Process evaluation will require the evaluation of the approach followed for the introduction of IMCI pre-service education at both national and institutional level, including also inputs.

National level

Evaluation at this level mainly consists of the evaluation of the planning for IMCI pre-service education from the early phases of IMCI introduction in the country, including the following.

a) Creation of a supportive environment

- Identification of partners:
  - Ministry of Health departments
  - teaching institutions
  - legislative and advisory councils
  - professional syndicates and societies
  - UN agencies and other organizations
  - research institutions
  - other partners (such as the community).
- Creation of ownership, which includes partners' early involvement and continuous participation in IMCI introduction, adaptation, planning, implementation, monitoring and evaluation, and contribution to the national IMCI task force, review bodies and key events.
- Obtaining the endorsement and commitment of decision-makers to IMCI pre-service education at national level.
- Establishment of a national management structure for IMCI pre-service education.
- Establishment of an effective coordination mechanism between the Ministry of Health, institutions and key partners for IMCI pre-service education.
- Raising awareness and sensitizing the teaching institutions and key partners to IMCI using different mechanisms.

b) Identification of targeted institutes, activities, responsibilities, resources, time frame and monitoring and evaluation (as key elements of planning for IMCI pre-service education).

c) Commitment made to IMCI pre-service education at national level.

Institutional level

Evaluation at this level consists of the evaluation of the following.

a) Identification of concerned departments

Discussions initiated by the national IMCI pre-service management structure[2] with the teaching institution to agree on the departments that will be involved in pre-service education. Paediatric, community medicine and family medicine departments are usually the main departments that will be fully involved in the IMCI teaching.

b) Orientation workshop/s

Planning for and conducting the orientation workshop with the concerned departments, usually organized and carried out by the IMCI pre-service management structure, including:

- Identification and distribution of responsibilities
- Identification of the participants
- Development of schedule
- Decision on methodology and tools to be used for the orientation
- Description of the expected outcome of the workshop.

c) Official endorsement by the institution and concerned departments

- Level of endorsement
- Mode of endorsement
- Timing of endorsement (e.g. early in the process)
- Whether the endorsement has been translated into action (see below).

d) Establishment of a management structure

- Agreement on the members of the working group or task force at institutional level
- Nomination of the focal point
- Terms of reference and responsibilities of the group and focal point
- Distribution of tasks among departments (complementarities to ensure covering of all the IMCI tasks).

e) Planning workshop

Usually the national IMCI pre-service management structure conducts a planning workshop with the IMCI working group of the institution, during which the situation at the teaching institution is reviewed and a plan of action is developed. The plan is expected to cover the following.

- Setting targets
- Learning objectives
- Placement of IMCI in the teaching programme of the identified departments
- Teaching options (e.g. IMCI as a synthesis block, dispersed in the teaching or as a satellite)
- Training of teaching staff in IMCI case management and facilitation skills
- Teaching process:
  - methodology
  - materials
  - preparation of the training sites
  - students to trained staff ratio
  - schedule

[2] The structure differs according to the country's situation, e.g. it could be the national IMCI task force, including academics from different institutes, or the national IMCI pre-service education task force.

- Students' assessment: type, methods, content (IMCI elements included) and its contribution to the overall students' evaluation
- Budget:
  - items for costing:
    – training of staff
    – teaching materials
    – supplies and equipment
    – transportation of students, if any, to training sites
    – salaries for part-time staff, if any
  - source of funds
- Monitoring and re-planning: development and use of tools and utilization of results for re-planning.

f) Implementation of the plan

- Activities implemented according to the plan
- Facilities where students are trained
- Targets achieved.

g) Sustainability

- Sustainability of the approach to date
- Measures taken to ensure sustainability
- Measures planned to maintain sustainability.

2.2 Results

This would entail an evaluation of what the IMCI pre-service education approach has resulted in at national, institutional and health care delivery levels. The word "results" is used here as some of the items listed in this section are not "outcomes" properly speaking (e.g. costs, quality of teaching) and should otherwise have been included in the previous section. They are included together as "results" here as they are often perceived as important "results" that the introduction of IMCI into pre-service education is expected to achieve, such as reducing the burden of costs of in-service training and improving the quality of teaching, in addition to the results on student competencies (outcomes) and, ultimately, performance (effectiveness).

National level

Evaluation at this level refers to the benefits of IMCI pre-service education to the ministry of health and partner institutions. It includes an analysis of the following:

a) Expected benefits to the ministry of health (e.g. financial, human resources, time, responsiveness to public health needs, graduates fitting into the existing system);

b) Costs in the early phase of introduction of IMCI pre-service (e.g. orientation and training of teaching staff, teaching and assessment material, audiovisuals and exchange of visits between institutions);

c) Costs of IMCI in-service training before and after IMCI pre-service education;

Institutional level

Evaluation at this level consists of an evaluation of the following:

a) attitudes and satisfaction of teaching staff and students towards IMCI teaching and learning;

b) quality of teaching;

c) acquisition of essential IMCI competencies by students.

Health care delivery level

Evaluation at this level consists of assessment of the knowledge, skills and attitudes of the new graduates before they receive any in-service refreshment training on IMCI, to determine the effect of IMCI teaching on their competencies and their acceptance of IMCI and to identify their needs for additional training[3].

[3] The IMCI Health Facility Survey tool, properly adapted, can be used to address this question (*Health facility survey tool to evaluate the quality of care delivered to sick children attending outpatient facilities.* WHO, Geneva, 2003). Samples of the tool and methodology used in the Region are available at: http://www.emro.who.int/cah/surveys.htm#Section3.

Chapter 3. Planning for the evaluation

The decision to carry out the evaluation is usually made by the national IMCI coordinator, the national committee on IMCI pre-service education—in countries in which it has been established—or the concerned departments of the teaching institution involved. This section is meant to assist the coordinator designated for the evaluation in planning for the evaluation itself.

A briefing on the purpose and methodology of this evaluation should be provided to the institution involved and all those concerned well ahead of the evaluation. This will enable preparation for the evaluation as outlined in the checklist on the following page and described in detail in this section (Table 1).

The evaluation may be conducted by teams with members from outside the country or outside the teaching institution involved (external evaluation). In principle, some aspects of the evaluation can be conducted periodically by the teaching institution on its own (internal evaluation), if staff have developed capacity in all the required evaluation tasks. This is, however, very demanding.

The first evaluation in a country provides an opportunity to gain experience with it and adapt the evaluation instruments and methodology as appropriate. Therefore, besides interviews at national level, the first evaluation usually includes a visit to only one teaching institution, also because of logistics and cost considerations (e.g. duration of the evaluation, number and availability of staff involved, costs and other arrangements). Subsequent evaluations in the same country can also serve as a follow-up on the main recommendations made in the previous evaluations and may cover more institutions, based on a number of factors (e.g. availability of evaluation persons, financial resources, timing).

It should be emphasized that the information collected at institutional level during this evaluation is part of the broader context of the evaluation, namely the introduction of IMCI into pre-service education in a country as a public health intervention to sustain child health efforts in the future. It should also serve the institution/s concerned to learn how well the teaching programme is doing and what could be done to further strengthen it, rather than compare it with other teaching institutions.

Table 1. Checklist for the evaluation of IMCI pre-service education

Task	When (timing)
Planning for the evaluation	
Plan for the evaluation	
a) Identify the teaching institution	Beginning of the academic year
b) Select the coordinating team	
c) Define the objectives	
d) Assign the tasks	
e) Collect preliminary information	
f) Decide when to conduct the evaluation	
g) Select the evaluation team	
h) Plan for data entry, analysis and dissemination of findings	
i) Draft the schedule	
j) Contact the evaluation team	
k) Write to the teaching institution and partners	
l) Estimate and secure the budget	
Finalize the plans	
a) Confirm the availability of partners and evaluation team members	1 month before the date of the evaluation
b) Finalize the schedule	
c) Sample students	
d) Adapt and reproduce the forms	
e) Arrange for facilities and supplies at the institution	
f) Train the evaluation team	Close to the evaluation
Conducting the evaluation	
Review the evaluation tasks	
a) Teaching institution and national level	A week before the start of the evaluation
b) Evaluation team	The day preceding the start of the evaluation
Conduct the evaluation	
a) Conduct interviews at national level	First day of the evaluation
b) Visit the teaching institution: • Collect information • Analyse data and summarize main findings	Second to fourth day of the evaluation
c) Conduct the feedback meeting	Right at the end of the evaluation
d) Revise teaching plans	Soon after the feedback meeting

3.1 Plan for the evaluation

This section outlines the tasks involved in planning for the evaluation of IMCI pre-service education (Table 2).

Table 2. Tasks involved in planning for the evaluation

Task	When (timing)
Plan for the evaluation	
a) Identify the teaching institution	Beginning of the academic year
b) Select the coordinating team	
c) Define the objectives	
d) Assign the tasks	
e) Collect preliminary information	
f) Decide when to conduct the evaluation	
g) Select the evaluation team	
h) Plan for data entry, analysis and dissemination of afindings	
i) Draft the schedule	
j) Contact the evaluation team	
k) Write to the teaching institution and partners	
l) Estimate and secure the budget	

a) Identify the teaching institution

At this preliminary planning stage, criteria can be set to identify the institution or institutions to be evaluated in order to select them. Among the criteria to be considered are the following.

- The teaching institution is interested in evaluating its teaching and supports the evaluation itself as needed; and
- IMCI-related teaching has been conducted throughout the teaching curriculum at the institution for at least two consecutive years or until the first batch of students exposed to it has reached graduation. This enables the institution to introduce useful changes and adaptations in teaching based on a minimum, initial experience before this is evaluated.

b) Select the coordinating team

A coordination mechanism for the evaluation, defining how to harmonize the management of evaluation-related tasks and activities (e.g. by meetings, telephone and video calls or conferences, visits, etc.), should be established from the beginning of the planning process, with one person designated as the evaluation coordinator. In addition to the evaluation coordinator, the coordinating team should include:

- a focal point at the ministry of health (preferably the national coordinator/focal point for IMCI and/or IMCI pre-service education and a member of the national pre-service education committee, where this exists);
- a focal point at the medical school concerned (preferably the IMCI pre-service education focal point); and
- WHO and other partners directly participating in the evaluation, as appropriate.

Members of the team should be familiar with IMCI and the teaching system in the country. In some countries, especially those in which a national committee on IMCI pre-service education has been established, a coordinating structure may be set up to oversee plans for the evaluation.[4] The support of a person with evaluation experience in conducting reviews and qualitative and quantitative studies would be an added value to the group and is recommended.

The evaluation coordinator and the focal point at the institution concerned will be involved in all planning tasks described in detail in the following pages. On the other hand, the main tasks of the coordinating team include:

- defining the objectives of the evaluation (see item c. Define objectives);
- assigning tasks and responsibilities (see item d. Assign the tasks);
- identifying partners in IMCI pre-service education;
- agreeing on coordinating mechanisms at national and institutional level and coordinating:
  - the preparation of a brief on the milestones of the introduction of IMCI into the teaching programmes of teaching institutions in the country;
  - the collection of preliminary information at national level and from the institution concerned (see item e. Collect preliminary information);
  - the identification of national and international members of the evaluation team (see items g. Select the evaluation team; and j. Contact the evaluation team);
  - the development of a schedule for the evaluation to be conducted at the end of the students' rotation period in the concerned department, including interviews at national and institutional level and feedback meeting to present the results of the evaluation (see items f. Decide when to conduct the evaluation; and i. Draft the schedule);
  - planning for dissemination of findings (see item h. Plan for data entry, analysis and dissemination of findings);
  - the adaptation of forms for the assessment of student knowledge and skills (see item d. Adapt and reproduce forms, in section 3.2 Finalize the plans);
  - sending of a copy of the national IMCI chart booklet and background information on IMCI pre-service education and the teaching programme of the teaching institution concerned to all members of the evaluation team well in advance of the visit.
- formally contacting the concerned teaching institution/s and partners, informing them of the evaluation plans and specific tasks to be carried out (see item k. Write to the teaching institution and partners);
- ensuring that all planned tasks have been carried out and the necessary information has been collected.

c) Define the objectives

The main objectives of the evaluation are described earlier in section 1.2. Objective of the evaluation of IMCI pre-service education. They relate to the assessment of student competencies and, as a key determinant of them, of the teaching promoted by the introduction of IMCI into the teaching programme of the concerned institution. The coordinating team should review and finalize the objectives.

d) Assign the tasks

To facilitate and monitor its work, the coordinating team should develop a plan outlining all main planning tasks (see item b. Select the coordinating team). The plan should include a timeline and assignment of responsibilities to members of the team and relevant individuals outside the team as appropriate. Key planning tasks are described in detail (in item e) below.

[4] If the terms of reference of the national committee on IMCI pre-service education already include evaluation, then the same committee may be responsible for this evaluation, without the need to establish a separate structure.

e) Collect preliminary information

The plan to collect information includes two steps: 1) before the evaluation; and 2) during the evaluation. The first step is described in this section; tasks related to step 2 are presented in item i. Draft the schedule.

The national evaluation coordinator, in close coordination with the IMCI pre-service education focal point at national level and the institution, should ensure that background information and documents on IMCI pre-service education activities conducted at national and institutional level are collected and summarized well in advance, including the completion of the tables of Form 1 in Annex 1: Evaluation tools. In this way, this information can be sent to the members of the evaluation team for their review 6 to 8 weeks before the evaluation. Such documentation includes:

At national level

- Milestones of introduction of IMCI into pre-service education in the country (prepared as background report);
- Formal endorsement of the national IMCI pre-service education initiative;
- Formal establishment of the IMCI pre-service education management or coordinating structure;
- National plan for IMCI pre-service education;
- Reports relevant to IMCI pre-service education (e.g. IMCI review report, IMCI pre-service education progress reports, reports on previous evaluations of IMCI pre-service education, reports on the adaptation of the IMCI guidelines and minutes of meetings on IMCI pre-service education, reports on the IMCI pre-service education planning and orientation workshops);
- List of main public and professional child health events in the past two years and related reports, if available.

At the institution

- Steps of introduction of IMCI into the concerned department/s;
- Document officially endorsing IMCI pre-service education;
- Composition and terms of reference of the IMCI pre-service education task force;
- Minutes of meetings of the IMCI pre-service education task force, including list of participants;
- Plan of action on IMCI pre-service education;
- Official teaching programme, schedule and objectives of the concerned department/s;
- Number of department teaching staff trained in IMCI and number of teaching units in the department, as applicable;
- Teaching and learning materials used;
- IMCI pre-service education progress reports;
- Reports on previous internal evaluations of IMCI pre-service education;
- Complete list of names of students enrolled in the rotation batch/es that will be evaluated (to review issues related to sampling);
- A sample of the last three student examinations, including both written and clinical tests, if available;
- A list of the names of the:
  - concerned department/s teaching IMCI
  - head/s of these department/s
  - IMCI focal point at those departments, if any.

If a cost analysis is planned, related information should also be collected at both national and institutional level (see Form 13, Annex 1: Evaluation tools).

Selected information could also be requested in advance from the partners to be interviewed at national level, so as to be complemented and validated by them as appropriate in time for the evaluation. The forms annexed to this guide can serve as a guide to the type of detailed information that should be collected from partners and institutions. This preparatory work facilitates the visit and provides more time for in-depth interviews and discussions during the evaluation.

It is essential to obtain the teaching programme from the concerned department/s of the teaching institution at the beginning of the academic year, to plan for the proper time for the evaluation (see item f. Decide when to conduct the evaluation) and organize all tasks efficiently, including interviews with teaching staff, observation of teaching, practical and clinical sessions, and evaluation of student knowledge, attitudes and skills (see also item i. Draft the schedule).

f) Decide when to conduct the evaluation

The evaluation is usually conducted at the end of student rotation in the concerned department. This makes it possible to assess students' knowledge and skills for all IMCI tasks and their attitudes and perceptions about IMCI after they have been fully exposed to it. When deciding the timing of the evaluation visit to the teaching institution, the availability of the head of the department/s, teachers and students need to be considered (see item i. Draft the schedule), together with the availability of the evaluation team members (see item j. Contact the evaluation team). For example, attention should be paid to the time students and their teachers are busy with examinations and away for term breaks or holidays, including national holidays. In some institutions, teaching lessons at the end of the year may focus on reviewing topics already covered during the rotation period. In these cases, the observation of a typical teaching session may be carried out at the beginning of the rotation period, when plans are made at national level for the evaluation. A member of the evaluation team can visit the institution to discuss the preparation for the evaluation and, at the same time, observe a teaching session.

g) Select the evaluation team

The evaluators should be selected among senior teaching staff who meet the following criteria.

All members of the evaluation team:

- have been involved in the IMCI strategy in the country, particularly IMCI in-service training;
- are very familiar with IMCI pre-service education;
- have experience in introducing IMCI into the teaching programme of teaching institutions;
- have good public health understanding;
- have been trained in the methodology to conduct this type of evaluation (see item f. Train evaluation team, in section 3.2 Finalize the plans); and
- preferably, have been involved in this evaluations at least once.

Some members of the evaluation team:

- have some familiarity in conducting focus group discussions.

At least one member of the team:

- is familiar with the evaluation methodology, data entry and analysis of the data on the assessment of student knowledge and skills.

The national IMCI coordinator and/or IMCI pre-service education focal point should preferably be members of the team. The evaluation team may consist of internal staff—from the same institution (internal evaluations)—and external staff—from outside the institution (external evaluations), depending on the objective of the evaluation itself.

h) Plan for data entry, analysis and dissemination of findings

Plans should be developed for data entry, analysis and presentation of findings well ahead of time. Details are given in Chapter 6. Analysis and presentation of findings, including indicators.

- *Data entry and cleaning*. It is important to plan for data entry well ahead of time because this time-consuming task influences the timeliness of presenting the findings at the end of the evaluation. Before entering the data, especially those on observation of case management (skill test), forms should be carefully checked one by one by a different member of the evaluation team from the member who filled in the form. Data should then be entered independently by two different operators on two different computers and then cross-checked to ensure that all the data which have been entered match 100% in the two datasets. All the entries of records found to have data that do not match should be re-checked individually one by one.
- *Analysis*. The main indicators to be measured at national and institutional level should be reviewed in line with the main objective of the evaluation. Detailed information on indicators is given in Chapter 6. Analysis and presentation of findings. These plans should be developed by the evaluation coordinator, discussed with the concerned department/s of the teaching institution and finalized by the evaluation team.
- *Dissemination of results.* It is useful at this stage also to develop a proposed plan to disseminate the results, including the feedback meeting, to be reviewed and finalized with the teaching institution concerned at the end of the evaluation feedback meeting. The plan may include presenting the findings at professional events at the local institution or in national symposia and partners' meetings, publishing of articles in local newsletters and web sites (teaching institution, ministry of health, partners, including WHO) or medical journals. Proper dissemination of findings can serve as an effective advocacy tool to elicit further interest and support to IMCI pre-service education and, more broadly, child health efforts in the country.

i) Draft the schedule

To prepare the schedule for the evaluation, specific information from the concerned teaching institution is needed. Therefore, the IMCI pre-service education focal point at that institution should:

- ensure that preliminary information has been collected (see item e. Collect preliminary information);
- prepare a list of staff teaching IMCI and not teaching IMCI available for the focus group discussions;
- share the teaching schedule with the national level to prepare the schedule of the evaluation visit to the institution, identify when IMCI-related teaching sessions—including practical and clinical sessions—are held and plan for their observation;
- consider the total number and availability of the members of the evaluation team (see item j. Contact the evaluation team).

A schedule for the evaluation can then be prepared. It is advisable to carry out the evaluation following a number of steps over a period of a week, if one teaching institution is involved, as shown in Table 3. Details are described in Chapter 4. Conducting the evaluation.

Table 3. Sample programme for the first evaluation of IMCI pre-service education in a country

Day	Venue	Activity
Day 0 (preceding the first day of the evaluation proper)	Ministry of Health or WHO	Preparation meeting
Day 1	Ministry of Health	Meeting with the Minister of Health and senior health officials. Interviews with national child health programme manager and IMCI pre-service education focal point, and partners involved in IMCI pre-service education
Day 2–4 (number of days depends on number of evaluation team members)	Teaching institution	Meeting with the dean and head of concerned department/s Process and outcome evaluation of IMCI-related teaching
Day 5	Teaching institution	Data analysis and preparation for feedback meeting

Evaluation activities at the teaching institution are carried out not only sequentially but also in parallel, to reduce the duration of the visit to a few days only. For this reason, while one group of randomly selected students should be involved in the knowledge assessment, skill assessment and, possibly, focus group discussions throughout the evaluation, other students may be involved in the observation of teaching, practical and clinical sessions as shown in Table 4. The duration of the visit to the institution depends on good planning, the total number of members of the evaluation team, the number of students to be assessed for clinical skills and the number of departments to be covered. During the visit to the teaching institution, the evaluation team is expected to perform the following tasks.

- Interview with the head of the concerned department (e.g. Paediatric Department, Family and Community Medicine Department) and IMCI focal point at the institution (approximate duration: 90–120 minutes);
- Focus group discussions with departmental staff teaching IMCI (and IMCI focal point) and not teaching IMCI, respectively (60 minutes each);
- Observation of outpatient practical and clinical teaching sessions (60–120 minutes each) and/or community teaching sessions, depending on the department/s involved;
- Assessment of student knowledge (by multiple-choice questions and case scenarios) (90 minutes);
- Assessment of student clinical and communication skills (by observation of the management of a sick child) (30–45 minutes per student, depending on whether the teaching programme has included only assessment and classification or also treatment and advice on home care; it is advisable to allocate more time for the first day of observation to become acquainted with the forms);
- Focus group discussions with students, following observation of case management (60 minutes per group per day). Time and arrangements permitting, discussions with students may also be conducted after the observation of teaching sessions (total time depends on actual duration of sessions and availability of students and evaluators for the discussion);

- Visit to the outpatient department (OPD) or outpatient teaching site to assess the facilities and supplies necessary for IMCI teaching (15 minutes);
- Visit to the library to review the availability of reference materials (15 minutes);
- Data entry (an average of 15–20 minutes per student, corresponding to a total of 7–10 hours for 25–30 students) and cleaning (an average of 5–6 minutes per student, corresponding to a total of 2–3 hours for 25–30 students);
- Preliminary analysis of data on student knowledge and skills (3–4 hours) and preparation of tables and presentation with main results (2–3 hours);
- Meetings of the evaluation team to review information and summarize the main findings (see Table 4).

The tasks which require most time are: 1) the assessment of student clinical skills, for which several evaluators assess several students each at the same time daily for three consecutive days; and 2) data entry, cleaning and analysis. In determining the sample size of students, practical aspects should be considered carefully, such as the number of evaluation team members (who should remain the same throughout the evaluation), the total duration of the evaluation and the time for data entry, as described in item c. Sample students, in section 3.2 Finalize the plans. If the teaching institution has decided to increase the sample size of students for the knowledge and skill assessment to improve the precision of the findings, then plans should include additional days for the skill component of the assessment. For each additional day, it may be estimated that one evaluator may be able to assess on average three more students. So, if three evaluators are available to work in parallel, some nine to ten more students can be assessed on each additional day.

Table 4 shows a sample schedule as an example of the sequence in which tasks can be performed by a four-member evaluation team in four days. The schedule needs to be adapted carefully according to the timing of the teaching sessions to be observed, the number of departments (e.g. paediatrics, family and community medicine) and the number of team members.

Table 4. Sample schedule of the visit to the paediatric department of a teaching institution by a four-member team

<table>
<tr><th>Time</th><th>Evaluator 1</th><th>Evaluator 2</th><th>Evaluator 3</th><th>Evaluator 4</th></tr>
<tr><td colspan="5">First day</td></tr>
<tr><td>09.00–09.30</td><td colspan="4">Courtesy call with the Dean
(clinical coordinator of the teaching institution starts selection of sick children for case management)</td></tr>
<tr><td>09.30–10.00</td><td colspan="4">Transfer to the department</td></tr>
<tr><td>10.00–10.30</td><td colspan="4">Meeting with department head, evaluation focal point and clinical coordinator to review arrangements</td></tr>
<tr><td>10.30–11.00</td><td rowspan="4">Interview with head of department and IMCI focal point</td><td rowspan="3">Assessment of student clinical skills: observation of case management (four students)</td><td rowspan="3">Assessment of student clinical skills: observation of case management (four students)</td><td rowspan="5">Review of completed case management forms and data entry</td></tr>
<tr><td>11.00–11.30</td></tr>
<tr><td>11.30–12.00</td></tr>
<tr><td>12.00–12.30</td><td rowspan="3">Focus group discussions with teachers who teach IMCI</td><td rowspan="3">Focus group discussions with students</td><td rowspan="3">Observation of OPD clinical session (1)</td></tr>
<tr><td>12.30–13.00</td></tr>
<tr><td>13.00–13.30</td></tr>
<tr><td>13.30–14.00</td><td>(session may extend)</td><td></td><td></td><td></td></tr>
<tr><td>14.00–15.00</td><td colspan="4">Break</td></tr>
<tr><td>15.00–16.30</td><td colspan="4">Discussion and summary of findings of the first day</td></tr>
<tr><td colspan="5">Second day</td></tr>
<tr><td>09.00–09.30</td><td colspan="3">Checking arrangements for the day with the department evaluation focal point (clinical coordinator of the teaching institution starts selection of sick children for case management)</td><td rowspan="3">Assessment of student knowledge (MCQ and case scenarios - all students)</td></tr>
<tr><td>09.30–10.00</td><td rowspan="2">Focus group discussions with teachers who do not teach IMCI</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>10.00–10.30</td></tr>
<tr><td>10.30–11.00</td><td>(session may extend)</td><td rowspan="3">Assessment of student clinical skills: observation of case management (four students)</td><td rowspan="3">Assessment of student clinical skills: observation of case management (four students)</td><td rowspan="3">Review of completed case management forms and data entry</td></tr>
<tr><td>11.00–11.30</td><td rowspan="3">Assessment of student clinical skills: observation of case management (two students)</td></tr>
<tr><td>11.30–12.00</td></tr>
<tr><td>12.00–12.30</td><td rowspan="3">Observation of practical session (and discussion with students)</td><td rowspan="2">Focus group discussions with students</td><td rowspan="3">Observation of OPD clinical session (2)</td><td rowspan="3">Review of completed MCQ and case scenarios forms and data entry</td></tr>
<tr><td>12.30–13.00</td></tr>
<tr><td>13.00–13.30</td><td></td></tr>
<tr><td>13.30–14.00</td><td></td><td></td><td></td></tr>
<tr><td>14.00–15.00</td><td colspan="4">Break</td></tr>
<tr><td>15.00–16.30</td><td colspan="4">Discussion and summary of findings of the second day</td></tr>
<tr><td>16.30–18.00</td><td colspan="3"></td><td>Data entry (cont.) and cleaning</td></tr>
</table>

Table 4. Sample schedule of the visit to the paediatric department of a teaching institution by a four-member team (*cont.*)

Time	Evaluator 1	Evaluator 2	Evaluator 3	Evaluator 4
Third day				
09.00–09.30	Checking arrangements for the day with the department evaluation focal point (*clinical coordinator of the teaching institution* starts selection of sick children for case management)			
09.30–10.00	Assessment of student clinical skills: observation of case management (three students)	Assessment of student clinical skills: observation of case management (three students)	Assessment of student clinical skills: observation of case management (three students)	Review of completed case management forms and data entry
10.00–10.30				
10.30–11.00				
11.00–11.30				
11.30–12.00				
12.00–12.30	Observation of OPD clinical session (three)	Visit to OPD and library	Focus group discussions with students	
12.30–13.00			(session may extend)	
13.00–13.30				
13.30–14.00	(session may extend)			
14.00–15.00	Break			
15.00–16.30	Discussion and summary of findings of the third day			
16.30–19.00				Preliminary data analysis and preparation of tables
Fourth day				
09.00–12.00	Discussion and preparation of presentation of findings and recommendations			Preparation of tables on results of outcome data analysis
12.00–12.30	Discussion of results of outcome data (student knowledge and skills)			
12.30–4.00	Feedback meeting with department head and staff			

j) Contact the evaluation team

Because of their high profile and busy schedule, potential candidates considered for the evaluation team (refer to item g. Select the evaluation team) should be contacted well ahead of time, at the beginning of the academic year, to confirm their interest and availability to participate in the evaluation and be trained in the methodology, if applicable. Being teaching staff, they have many other commitments, more so at the end of the academic year, when student examination time is approaching.

k) Write to the teaching institution and partners

The national evaluation coordinator, once the partners and institution have confirmed their interest in participating in the evaluation, should on behalf of the coordinating team send official letters to:

- the dean of the teaching institution with a copy to the head/s of the concerned department/s, providing information on the objectives of the visit, proposed dates and brief description of tasks to be accomplished during the visit (see Table 4);
- the head of the concerned department: 1) enclosing the proposed schedule, to facilitate any logistics arrangements that are required for the visit, so as to assign responsibilities within the institution to facilitate the process (see item i. Draft the schedule and Chapter 4. Conducting the evaluation); 2) requesting that relevant background information be prepared and sent to him/her (see Form 3 of Annex 1 and item e. Collect preliminary information); and 3) suggesting that a formal communication is sent from the head of the department to the teaching staff who are expected to participate in the focus group discussions, to brief them on the objectives and the methodology of the evaluation;
- the identified partners, to inform them of the evaluation plans (e.g. objectives of the evaluation, proposed dates for the interviews, teaching institution/s involved, feedback meeting).

l) Estimate and secure the budget

Financial resources required to support the evaluation should be estimated and secured when the activity is planned. This is usually the responsibility of the national IMCI coordinator or child health programme manager in consultation with the evaluation coordinator. The budget required is usually small for local activities but may entail additional costs for the participation of external consultants. It covers:

- activities to be undertaken locally, such as: planning meetings of the coordinating team at national level; travel expenses, honoraria and per diem for the local evaluation team members; reproduction of forms; feedback meeting; dissemination of findings;
- possible participation of one or two international staff or external consultants from outside the institution or the country (travel costs, honoraria and per diem).

3.2 Finalize the plans

This section outlines the tasks involved in finalizing the plans for the evaluation of IMCI pre-service education (Table 5).

Table 5. Tasks involved in finalizing the plans for the evaluation

Task	When (timing)
Finalize the plans	
a) Confirm availability of partners and evaluation team members	1 month before the date of the evaluation
b) Finalize schedule	
c) Sample students	
d) Adapt and reproduce forms	
e) Arrange for facilities and supplies at the institution	
f) Train the evaluation team	Close to the evaluation

a) Confirm availability of partners and evaluation team members

Tentative arrangements made earlier need to be confirmed with each concerned party to be involved in the evaluation four to eight weeks before the start of the evaluation. This includes partners, mostly for the interviews at national level, and national and international members of the evaluation team.

b) Finalize schedule

The schedule originally drafted should be reviewed by the coordinating team, two to four weeks before the start of the evaluation. In addition to the availability of partners and evaluation members, all the other arrangements should be reviewed and confirmed. The evaluation coordinator, in collaboration with the IMCI focal point/s at the teaching institution/s concerned, should:

At national level

- confirm the date and time of the evaluation team's courtesy calls with the minister of health or senior officials of the ministry of health and the dean;
- confirm the date and time of the evaluation team's interviews with partners;

At the teaching institution

- confirm the availability of the head of the department and teaching staff for the interviews and focus group discussions;
- confirm the timing of teaching sessions in relation to the evaluation schedule;
- identify a clinical coordinator at the institution for the selection of sick children for the assessment of clinical skills and brief him/her on his/her responsibilities during the evaluation. The clinical coordinator should be a member of the teaching staff in the department who is very familiar with IMCI, teaches IMCI and is fully available each morning during the clinical skill test;
- randomly select 25–30 students for the knowledge and skills assessment tests, as described in the next item (c. Sample students);
- inform the students of the date, time and venue for the knowledge and skills assessments and focus group discussions;
- confirm date, time and venue of the feedback meeting and names of participants to be invited.

c) Sample students

Ideally, it would be good if one were able to assess for knowledge and skills in the evaluation of IMCI pre-service education all the students who go through their rotation in paediatrics, family medicine or community medicine during the relevant academic year in which they are most exposed to IMCI. However, this number of students is usually large and would make this approach not practical, given also the difficulty in gathering all these students—no one excluded—for the assessment. A smaller number of students should then be selected (called "sample") to make estimates that would apply to all the students from whom this sample was taken. When selecting the students for the knowledge and skills assessment tests[5] (a process called "sampling"), consideration should be given to the objective of the assessment and feasibility issues. Options and sampling, including sample size, are described below.

[5] Multiple-choice questions and scenarios for the knowledge test and observation of case management for the skill test.

1. Options

Two main options are discussed here.

1) If the main objective is an overall evaluation of IMCI pre-service education and the assessment of students is carried out over three days as one of the evaluation activities described in this guide, then it would be reasonable to sample a small number of students who can be assessed during this short period of time; although small, this number would still provide useful information;
2) If the objective is to assess student knowledge and skills with more precision and the teaching institution has the resources to extend the evaluation over a longer period of time, then a larger number of students could be assessed.

When reviewing feasibility issues, a number of points should be considered if there are plans to increase the number of students to assess.

- *Knowledge versus skill assessment:* the same students who have undertaken the MCQs and case scenarios (knowledge assessment test) should be involved in skill assessment. While it is relatively easier to gather more students in one place for the knowledge test, the arrangements for skill assessment are much more demanding (see below). So, before increasing the number of students for the knowledge test, the implications of increasing the number also for the skills test should be taken into due consideration.
- *Duration of assessment:* for each additional day, three students per evaluator can be assessed for skills. So, if there are three evaluators available for this purpose daily, nine more students can be assessed each day.
- *Availability of evaluators:* the clinical coordinator and evaluators are often senior teaching staff and their availability should be checked carefully before deciding to have an evaluation that involves them for more than three days in a row. Evaluators should be the same persons throughout the test.
- *Data entry and cleaning:* if more students participate in the test, then more data need to be entered and checked and this requires more time. For every extra day with nine students assessed, 3–4 more hours should be added to the total time for data entry and cleaning for the knowledge and skill assessment tests, if one person checks and enters the data and another person enters the data independently on a different computer to validate data entry. Some of this work can be done during data collection, i.e. while evaluators observe students managing sick children.
- *Precision:* the larger the number of students involved, the better the precision of the results. On the other hand, evaluators' recording work during the observation of case management for skill assessment is tedious; the higher the number of students they assess, the higher the chances of evaluators' missing some information on the recording forms, making mistakes or checking the forms less carefully after filling them in.

2. Sampling steps

The three simple steps to guide the selection of the students for the assessment of knowledge and skills are to: determine the sample size; list and number all the students; and select the students.

1) Determine the sample size

Table 6 shows the number of students required for the assessment (sample size), assuming simple random sampling as the sampling method (see also 3. Select the students). To calculate the sample size and arrive at the figures shown in the table, a number of points have been considered. These include:

a) the estimate of the rate to be measured;
b) the level of precision required; and
c) the confidence level.

- *Estimate of the rate to be measured*. The estimate of the rate refers to the main indicators on student performance to be measured in the assessment, e.g. the percentage of students expected to obtain the agreed minimum score in the knowledge test or in case management. To be on the safe side, the table assumes that half of the students obtain the agreed level of knowledge or skill performance, as this is the rate for these indicators which requires the largest sample size (i.e. 50%). Student performance rates which are higher or lower than this value would then require a smaller sample size.
- *Level of precision required*. The table is based on a range of precision with upper and lower limits called "limits of precision". For example, if 50% of students in our sample obtain an acceptable score value in the knowledge test with limits of precision of ±15%, this means that the true rate in the population of students from which we took the sample is likely to lie between 35% and 65% (i.e. 50% ± 15%). In fact, the results we find in the sample are only estimates of the true values, as we assessed only a sample of students rather than all of them. The limits of precision define how precise such estimates are: these estimates are not the actual rates but a range of values within which the true rates are likely to fall. The greater the precision (narrower range of values), the larger the sample required. It is important to find a balance between the theoretical desire for greater precision of the results and the practical limitations of selecting too many students for the assessment. For example, enrolling 400 students to have greater precision (± 5%) would need a special, long study with substantial logistics arrangements and costs. Aiming at greater precision is therefore not advisable for this type of evaluation. Also, any increase in the sample size may adversely affect the quality of the data collected. It should be emphasized that even if the desired limits of precision may not be achieved, the results would still provide useful information for the evaluation as a whole and for teaching; in fact, this test is not meant to be like an examination to decide which students pass or fail.
- *Confidence level*. The table assumes a 95% confidence level. This means that we are 95% confident that the true rate in the population of students from which we took the sample lies within the range of values that have been defined by the limits of precision. If we refer to the above example and assume a sample of 50 students to ensure limits of precision of ±15% at a 95% confidence level, we would conclude that we are 95% confident[6] that the true rates in the population of students from which they were selected fall between 35% and 65% (i.e. 50% ± 15%).

Table 6. Sample size based on limits of precision at 95% confidence level (assuming random sampling)[1]

	Limits of precision			
	± 5%	± 10%	± 15%	± 20%
No. of students needed	400	100	50	25

[1] The numbers reported in the table refer to the largest sample size required for each level of precision (estimated rate of the indicator to be measured = 50%). Other assumptions include student population homogenous and random sampling. See text for more details.

[6] Being 95% confident means that we have a 95% chance that our estimates are within that range of values.

The calculations are also based on the assumptions that the student population on which the sample is drawn is homogenous and that we have used random sampling.

It should be noted that the size of the sample is basically not affected by the total size of the student population being assessed, whether this is the total number of students in a batch, all the students in the rotation in the concerned department during an academic year or all the students who are about to graduate or have just graduated.

If there are plans to compare the results of this batch of students with those of other batches in the future, the sample size would need to be increased substantially. This would be a major challenge in the context of these evaluations for the reasons explained above.

2) List and number all the students

- First, decide from where you wish to take your sample. The sample can be taken from:
  a) all the students of the teaching units of the same rotation batch in the concerned department which have completed or are about to complete the paediatric—or community or family medicine—rotation. This approach is simpler and relatively easier to arrange than the other two approaches described below. It also provides prompt feedback to teaching staff during internal evaluations to adapt the teaching programme. On the other hand, it has its limitations. In fact, the results obtained by assessing a sample taken only from this batch of students are acceptable only if the teaching received by different batches of students within the same academic year is similar and the batches of students are comparable with each other. If teaching or student characteristics differ between batches, then this is an important limitation to consider, as the sample would not be representative of all students;
  b) all the students of all the batches which have gone through the rotation in the paediatric—or community or family medicine—department during the academic year. This approach is much more demanding than the previous one, especially because of the substantial difficulty of gathering students who completed the paediatric rotation many months earlier and are no longer with the department concerned;
  c) all the students previously exposed to IMCI teaching who are about to graduate or have just graduated, i.e. at the point at which they should be ready to apply their knowledge and skills. While this is ideally the preferred approach, it is probably the most challenging to be arranged because of the difficulty of contacting the students and the risk that many of them may be unable to participate in the assessment on the different days set for the knowledge and clinical tests. This approach could however be carried out jointly with the ministry of health before the new graduates receive further public health training before entering public service. In this case, new graduates taking up exclusively private practice would however be excluded from the sample.

  Irrespective of the approach, the procedures to sample the students for the assessment are similar. Once selected, the same students will be assessed first for knowledge and then for skills.
- Second, list in alphabetic order all the students who have gone through the rotation and have received "IMCI teaching" in a given academic year. This list represents the "sampling frame" from which the sample will be selected.
- Third, assign a consecutive number to all the students who have been listed in alphabetic order.

3) Select the students

The method to select students described here ("sampling method") is "simple random sampling" (SRS). This method gives each student equal chances of being selected. To select each student, use random numbers. Random numbers can be easily generated through computer programs, which are available also on the Internet. Alternatively, a random number table or a currency note can be used, although the latter is very time-consuming and is rarely used.

Computer programs

Enter "random number" or "random number generator" or similar key words into an Internet search engine to see a list of web sites which provide facilities to generate random numbers. Random number generator programs usually request the user to enter the following data:

- how many random numbers you need: this corresponds to the number of students that you want to select;
- minimum value: this is "1", corresponding to the first student in the list; and
- maximum value: this is the total number of students included in the list from which you are going to select your sample.

Some programs request that you specify whether or not to allow duplicate entries. Choose "no", as you want each random number to be unique, different from each other.

Example: Let us assume that you want to select 30 students from a list of 150 students. You will have to enter the following information:

How many random numbers? → enter: **30**
Minimum value → enter: **1**
Maximum value → enter **150**

Random number table[7]

- Select any starting number at random, for example, by touching the random number table with the tip of a pencil with your eyes closed. If there are 100 or more students in the sampling frame (list of students), use the three-digit numbers. If there are fewer than 100 students in the sampling frame, then use only the first two digits of the numbers. If the number you have selected at random is larger than the number of students in the sampling frame, go down the column to the next number in the random number table (Table 7).
- Identify and mark the selected student on the list.
- In the random number table, go down the column to the next number. Use this number to select the next student on the list.
- Identify and mark the second selected student on the list.
- Repeat the process until you have selected the number of the students to be sampled. When you have completed one column, go to the top of the next column and work down the column.

[7] Slightly adapted from "Sample the health facilities to survey", in: *Health facility survey manual: diarrhoea case management.* Geneva, World Health Organization, 1994, p.27.

Table 7. Random numbers[8]

449	338	542	678	960	961	007	148	690	254	478	154
894	344	448	598	769	203	825	536	132	896	804	491
544	526	941	955	483	676	446	147	226	219	210	877
969	421	343	633	821	002	282	956	758	090	485	873
879	094	323	436	585	077	284	465	116	504	377	301
302	461	853	371	227	505	922	565	240	438	409	187
229	130	320	430	757	949	154	891	733	183	905	461
891	277	633	873	494	248	795	606	071	009	920	755
161	033	402	524	239	925	540	314	068	228	726	741
215	074	309	461	201	338	567	384	382	113	152	649
429	951	271	370	433	031	979	713	442	666	425	767
214	482	016	472	563	375	148	996	622	339	324	286
900	702	767	250	166	547	574	017	208	694	379	056
932	253	939	844	223	132	939	515	285	571	772	626
460	722	904	103	397	832	378	616	041	155	294	019
382	139	861	171	245	268	662	399	024	530	727	225
826	857	511	740	125	941	420	161	827	312	932	101
078	740	598	030	787	134	743	108	721	115	611	333
952	843	139	957	436	603	190	602	112	730	482	570
535	265	399	867	910	138	253	398	025	969	623	773
729	530	476	995	277	699	668	265	300	787	651	652
879	892	664	159	834	769	500	728	706	873	163	327
104	342	401	010	577	086	398	422	049	832	224	750
680	985	467	306	418	936	517	417	613	981	616	124
802	924	608	186	459	258	709	607	117	092	700	407
598	781	602	003	368	884	340	091	642	779	323	690
783	041	776	733	789	205	061	272	173	593	005	667
230	542	950	777	816	969	371	935	875	076	473	122

Banknote

- Take a local banknote. Each banknote has a unique serial number of many digits. Look at the first three digits of that number if there are 100 or more students in the sampling frame (list of students); look at the first two digits if there are fewer than 100 students in the sampling frame. If the number you obtain is larger than the number of students in the sampling frame, select a new number of same digits by moving to the right by one digit within the serial number.

  Example: Let us assume that you take your sample from a batch of 150 students who have completed their paediatric rotation and the serial number of the banknote is 4118021. As the sampling frame is a three-digit number greater than 100 (150), select the first three digits of the serial number. These are 411

[8] From "Sample the health facilities to survey", Table 4 (Random numbers), in: *Health facility survey manual: diarrhoea case management.* Geneva, World Health Organization, 1994, p.28.

(**411**8021). This number (411) is larger than the sampling frame (150), so it can not be used. Move to the right by one digit. The new number is 118 (4**118**021). This number is within the sampling frame and can now be used to select the first student of the sample (student no. 118).

- Identify and mark the selected student on the list.
- In the banknote, move again to the right by one digit to select the next random number.

  In the example described above, this number is 180 (41**180**21). This number is larger than the sampling frame of 150 and so can not be used. If you move to the right by one more digit you obtain the number 021 (i.e. 21) which can be used as it is smaller than the sampling frame. So, the second student selected is student no. 21 in the list.
- Identify and mark the second selected student on the list.
- Pick up a new banknote and follow the process described above, until you obtain a valid number that you can use to select the next student on the list. Then repeat the process until you have selected the number of students to be sampled. This method is simple but less practical for relatively large samples. In fact, its disadvantage is that you would need many banknotes to generate sufficient numbers to select all the students of your sample.

d) Adapt and reproduce forms

The forms for the assessment of student knowledge and skills (Forms 14, 15 and 16 in Annex 1. Evaluation tools) include:

- a test with multiple-choice questions and case scenarios, for the knowledge component; and
- a form for the observation of the management of a sick child, for the clinical skills component.

The national evaluation coordinator, together with the teaching institution focal point, should review these forms and:

- carefully adapt them to ensure that they are consistent with:
  - the national IMCI guidelines, and
  - the teaching programme at the institution.
- translate and test them if needed;
- reproduce them in adequate copies;
- ensure that any changes are reflected in the data entry and analysis program.

Adaptation of forms 14, 15 and 16. For example, in countries in which there is no malaria, the emphasis may be on acute respiratory infections and diarrhoeal diseases, while in countries in which malaria is a problem malaria will need to feature prominently as appropriate in MCQs, case scenarios and the clinical management tasks of a child with fever. Also, some countries may have included the management of sore throat and other conditions in the IMCI guidelines and these may be taken into consideration.

The second aspect guiding the adaptation concerns the teaching programme, i.e. what the objectives of teaching are and what is actually taught to students during the rotation period in the department. In some institutions, only assessment and classification of sick children according to the IMCI guidelines may be taught, because of time constraints, while in other institutions the full scope of IMCI—thus including also treatment, counselling and follow-up visits—may be taught. In some cases, only the identification of the treatment plan may be included in the teaching programme, while in other cases doses and details of treatment may be included. If some aspects of case management are not taught (e.g. follow-up, counselling), the reasons for this should be included as one of the items of the focus group discussions with teaching staff at the time of the evaluation.

Table 8. Forms to be reproduced for the evaluation

Form	Copies required
For interviews at national level	
Form 1: Interview with the national IMCI committee or working group	• 1 copy for use as background before the evaluation • 1 copy to be completed by the evaluation team • 1 copy for each member of the evaluation team as a reference
Form 2: Interview with partners	• 1 copy for each partner to be interviewed, for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
For the evaluation at the teaching institution	
Form 3: General information about the department	• 1 copy for use before the evaluation • 1 copy for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
Form 4: Introductory phase	
Form 5: Planning phase	
Form 6: Implementation phase	
Form 7: Teaching process	
Form 8: Student assessment	• 1 copy for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
Form 9: Observation of practical session	• 2 copies for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
Form 10: Observation of outpatient department teaching session	• 3 copies for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
Form 11: Focus group discussion with teachers (a) teaching IMCI and (b) not teaching IMCI	• 2 copies for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
Form 12: Focus group discussion with students	• 3 copies for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
Form 13: Cost analysis	• 1 copy for use before the evaluation • 1 copy for use by the evaluation team • 1 copy for each member of the evaluation team as a reference
Forms 14a/b: Multiple-choice questions	• 1 copy for each student to be assessed • 1 copy for each member of the evaluation team as a reference
Forms 15a/b: Case scenarios	
Form 16a/b: Observation of case management	

Translation. Forms and tests may also need to be translated, especially those meant to be completed by the students, such as the MCQs and case scenarios. Adequate time should be provided for the translation: proper wording of the stem and options of an MCQ item is crucial. The translation should be coordinated and verified by the national IMCI coordinator. If major adaptations have been introduced and this is the first evaluation in the country, it may be appropriate to test the adapted instruments.

Reproduction. Once a decision is made on which specific adaptations should be made to the forms, the forms will need to be reproduced in adequate number (see Table 8). In addition to the number of copies required to be filled in during the evaluation, an additional copy should be made available to each member of the evaluation team.

Data entry and analysis. The adaptations will need to be reflected by the evaluation team in the data entry and analysis program well before the evaluation starts. The team will also need to review the scores assigned to MCQ correct and wrong options or tasks performed by the students and introduce changes in the data entry program as appropriate.

The following checklist helps to guide the adaptation process for the knowledge test.

- Decide which categories of questions to include in the test, based on what teaching has covered (e.g. "A. IMCI guidelines", "B. Assess and classify", "C. Assess feeding problems", "D. Identify treatment", etc.);
- Decide how many questions to include in the knowledge test for each category;
- Decide whether to use MCQ items with only *one* or *one or more* correct answer options;
- Select the MCQs and case scenarios and adapt them based on the national IMCI guidelines;
- Carefully review which options are correct ("keys") and which ones are wrong ("distracters"), based on the adaptations made and the national IMCI guidelines;
- Review the score assigned to each answer option and weigh scores based on difficulty of each item and total score per item (resulting from the total number of correct options per item);
- Order the MCQs by category and by level of difficulty within each category;
- Translate and test the full tests if needed; test items which are introduced for the first time in the knowledge test;
- Enter changes into the data entry program;
- Print, review and reproduce forms for the test (Table 8).

e) Arrange for facilities and supplies at the institution

The IMCI pre-service education focal point at the institution should make arrangements to ensure that the following items are available during the evaluation at the teaching institution, on different days, as per the final schedule (see Table 4 as a sample of the schedule).

Rooms

- A small room for the focus group discussions with teaching staff, capable of accommodating 8–10 people, to be available for 1–2 hours on 2 different days;
- A large room for the assessment of student knowledge (MCQ and case scenarios), capable of accommodating 25–30 students, with 30 chairs and tables (preferably) or support to write, to be available for 90–120 minutes only on 1 day;
- A small room for the focus group discussions with students, capable of accommodating 8–10 students daily, to be available for 60–90 minutes for 3 consecutive days (1 day for each group of students);
- A large room with adequate space where 2–3 students can assess 1 child each and the evaluators can observe them at the same time. If separate rooms are available, then that would be preferable.

- A small room for data analysis, capable of accommodating 5–8 persons, with a table and easy access to two functioning electric sockets, for 3–4 hours on 1 day;
- A small room for the evaluation team's meetings at the end of each day for 2–3 hours, daily, and for 4 hours on the last day;
- A large room for the feedback meeting, for 3 hours on 1 day at the end of the evaluation.

Supplies (Table 9)

- IMCI chart booklet (and mother's card if counselling is included in teaching): one copy for each student (total of 25–30 copies) available for consultation by each student on the day of the assessment of knowledge, and three copies available at the room for case management observation for consultation by students during skills assessment for 3 consecutive days. Students may be asked to bring their own copies.
- IMCI case recording form: a total of 175–210 forms for 25–30 students for the 3-day evaluation, as follows:
  - five copies for each student for the knowledge assessment test (one copy per case scenario)—optional (125–150 copies);
  - one form for each student to complete during case management (25–30 copies); and
  - one form for each evaluator for each sick child (25–30 copies).
- One enrolment card per sick child to record child's name, temperature and weight (total 25–30 cards for the 3-day evaluation);
- One pencil and eraser for each student for the knowledge and skills assessment (total of 25–30 pencils and erasers for the three-day evaluation) and a total of 3–5 clipboards for skills assessment (each student will pass the clipboard to the next student right after managing the child);
- Three timers for use by students during the skills assessment to count the respiratory rate if they have no watch available and ask for it;
- A thermometer and scale at the outpatient department;
- Jars with water, cups and spoons for use by students during the skills assessment;
- One tongue depressor for each student for skills assessment, if assessment of "sore throat" is included (total of 25–30 for the 3-day evaluation);
- Three torches for the 3-day evaluation, if the national IMCI guidelines include checking for a throat problem.

Equipment

- One computer;
- One data show projector (and screen, as appropriate) to be available for 3–4 hours on the days of data analysis and feedback meeting;
- Easy access to a printer as needed on the day of data analysis;
- Optional: tape recorder for focus group discussions (as done in qualitative studies) but written notes may be sufficient in most cases.

Table 9. References and supplies for assessment of student knowledge and skills

For each student	Total for 25–30 students
IMCI chart booklet	30–35
IMCI case recording form	175–210
Enrolment card	25–30
Pencil and eraser	25–30
Other supplies	**Total for the test**
Clipboards	3–5
Timers	3
Thermometer	1
Scale	1
Jars with water and cups	3
Spoons	25–30
Tongue depressors	25–30
Torches	3
Equipment	
Computer (with printer connected)	1
Data show projector	1

f) Train the evaluation team

All members of the evaluation team must have received training in the pre-service education evaluation at any time before participating in the evaluation itself. It is advisable to conduct the training of new evaluators close to the evaluation, so that the evaluation practice serves also to strengthen their evaluation skills right after training. In fact, training aims at providing evaluators with the skills to conduct this type of evaluations. It should be conducted by a person who has good experience with these evaluations. Preferably, capacity-building for conducting this type of training and training of potential evaluation team members should be carried out at national level. Details of this training are available separately from the WHO Regional Office for the Eastren Mediterranean, Child and Adolescent Health Unit.

Chapter 4. Conducting the evaluation

This section describes the main tasks related to the review of final arrangements a week prior to the evaluation and the actual conduct of the evaluation, including the feedback meeting and revision of teaching plans (Table 10).

Table 10. Tasks involved in conducting the evaluation

Task	When (timing)
Conducting the evaluation	
Review the evaluation tasks	
a) Teaching institution and national level	A week before the start of the evaluation
b) Evaluation team	The day preceding the start of the evaluation
Conduct the evaluation	
a) Conduct interviews at national level	First day of the evaluation
b) Visit the teaching institution: • Collect information • Analyse data and summarize main findings	Second to fourth day of the evaluation
c) Conduct the feedback meeting	Right at the end of the evaluation
d) Revise teaching plans	Soon after the feedback meeting

4.1 Review the evaluation tasks

Task	When (timing)
a) Teaching institution and national level	A week before the start of the evaluation
b) Evaluation team	The day preceding the start of the evaluation

a) Teaching institution and national level

A week before the start of the evaluation, the IMCI focal point at the teaching institution should ensure that all the arrangements have been made and confirmed (see Table 11). The national evaluation coordinator should ensure that all the appointments for the interviews at national level scheduled for the next day are confirmed.

Table 11. Arrangements to be checked

1.	Availability of teaching staff involved and not involved in teaching IMCI in the department has been confirmed for the time set for the focus group discussions with them
2.	25–30 students, depending on the final schedule of the visit, have been randomly selected from the same department rotation batches and informed to come: a) on a given day for the assessment of knowledge; and b) in groups of 6–9 each over three consecutive days for the assessment of clinical skills, followed by focus group discussions
3.	A clinical coordinator from the department has been identified and duly briefed to select sick children at the outpatient department each morning for the assessment of student clinical skills
4.	The time of teaching, practical and clinical sessions corresponds to the time of their observation by the evaluation team as per the schedule of the visit
5.	Rooms have been reserved for the focus group discussions with teaching staff and students and the observation of case management
6.	Case recording forms, IMCI chart booklets and supply items are available in adequate number for the assessment of student knowledge and skills
7.	Arrangements for the feedback meeting have been made, including informing all those invited to participate and availability of the room and equipment for the meeting

b) Evaluation team

The day before the evaluation, the national evaluation coordinator and each member of the evaluation team should meet to agree upon the specific responsibilities of each individual during the evaluation and the procedures to be followed ("who does what, when and how"). The following should be reviewed, among others:

- background documentation on IMCI pre-service education in the country and teaching institution, summarizing the key points;
- final schedule and all logistics arrangements;
- evaluation procedures and team members' evaluation tasks;
- definitions used in the assessment of student skills; and
- selection of cases for clinical management.

All members of the evaluation team should have received training in this type of evaluation (see item f. Train the evaluation team in section 3.2 Finalize the plans).

4.2 Conduct the evaluation

Task	When (timing)
a) Conduct interviews at national level	First day of the evaluation
b) Visit the teaching institution • Collect information • Analyse data and summarize main findings	Second to fourth day of the evaluation
c) Conduct the feedback meeting	Right at the end of the evaluation
d) Revise teaching plans	Soon after the feedback meeting

Note: All forms referred in this section can be found in Annex 1. The forms given in Annex 1 are preceded by explanatory notes on procedures and their use.

a) Conduct interviews at national level

This task helps review the introduction of IMCI into pre-service education and coordination mechanisms in the country. It is usually carried out by the whole evaluation team in one day, at the end of which the team travels to the site of the teaching institution, if located in a different city. The team is expected to have reviewed the background information the day before conducting the interviews. Key informants should have been identified previously by the national evaluation coordinator (see item b. Select the coordinating team, in section 3.1 Plan for the evaluation). For logistics reasons and to maximize the time available, it is advisable to conduct all the interviews in the same location, so that the team does not need to spend time travelling to different places and can focus efficiently on the interviews. Key informants usually include: the national IMCI coordinator and focal point; the national IMCI pre-service education focal point or committee—where it exists; main partners involved or interested in IMCI pre-service education (donors, international organizations, high council of universities, civil society, etc.); and some of the teaching institutions—other than the one to be visited—which have introduced IMCI into their teaching programmes. The national IMCI coordinator should be interviewed first (Form 1), before the partners (Form 2).

b) Visit the teaching institution

The activities to be conducted at the teaching institution are summarized in Table 4 under item i. Draft the schedule in section 3.1 Plan for the evaluation. As mentioned in that section and illustrated in the table, the evaluation team performs many tasks during the visit, using standard forms and validating information which has been collected earlier (see item e. Collect preliminary information, in section 3.1 Plan for the evaluation), namely:

- pays a courtesy call to the Dean and head/s of the department/s concerned, highlighting the objectives and activities of the evaluation;
- interviews the head/s of the department/s concerned and IMCI focal point at the institution to:
  - review all arrangements for the evaluation and availability of the head of the department/s;
  - review and validate general information about the department (Form 3);
  - obtain their views about the IMCI experience in their department/s, the process followed, facilitating factors, constraints, main issues identified and how they have been addressed and future sustainability. The length of this interview and degree of detail depends on whether the head of the department is able to join the focus group discussions with teachers (Form 11).
- interviews the IMCI pre-service education focal point to:
  - review and validate information on the process followed in the school to introduce, plan and implement teaching related to IMCI (Forms 4, 5 and 6);
  - review the IMCI teaching methodology (Form 7);
  - review information on IMCI student formative and summative assessments (Form 8);
- visits the OPD or outpatient teaching site and library to assess facilities and supplies needed for IMCI teaching and availability of reference materials (Form 7);
- observes an IMCI practical (Form 9) and clinical teaching session (Form 10), respectively, and/or community teaching sessions, depending on the department/s involved;
- facilitates focus group discussions with staff "teaching IMCI" and "not teaching IMCI" and students (Forms 11a, 11b and 12) to learn about their attitudes toward "IMCI teaching";
- assesses student knowledge and skills related to IMCI (Forms 14, 15 and 16), enters and analyses the data; and
- summarizes and presents the main findings and recommendations in a feedback meeting.

As shown in Table 4 (under item i. Draft the schedule, in section 3.1 Plan for the evaluation), each evaluator of the team is given specific assignments, which have been reviewed and confirmed the day before the evaluation. The assessment of student skills is carried out by three or more evaluators—depending on student sample size and availability of evaluators—at the same time. Thus, collection of information and data is carried out not only sequentially but also in parallel, to reduce the duration of data collection to three days, followed by an additional half-day to one day for data analysis and preparation of the presentation and another half-day for the feedback meeting.

Information on sampling students has been given in item c. Sample students, in section 3.2 Finalize the plans. Chapter 6 provides details on data entry and analysis, together with indicators and other information to be presented in the feedback meeting.

As mentioned above, even if the schedule of the visit is supposed to have been discussed and finalized before the visit, it is advisable to review it briefly with the head of the department and IMCI focal point at the institution once the team arrives there to ensure that all arrangements are in place (see section 4.1 Review the evaluation tasks).

c) Conduct the feedback meeting

Each country and teaching institution may develop different plans for a feedback meeting to provide some information on the results of the evaluation. The objective of the meeting and its audience may vary based on each particular situation. The feedback meeting should be conducted preferably right at the end of the evaluation. It may be useful to provide feedback at least to the teaching staff of the same department and invite the dean or vice-dean of the faculty to attend. The national coordination team for the evaluation and interested partners should also attend. The findings relate to a few thematic areas, namely supportive environment, management and coordination, planning, the approach followed to introduce IMCI, teaching quality, teaching staff attitudes and student competencies, namely attitudes, knowledge and skills (see Chapter 6). The meeting should end with conclusions and practical, feasible and action-oriented recommendations, with a view to strengthening and supporting current efforts and sustaining them over time. A final report should be prepared and sent to the national level and/or institution concerned by the evaluation team within a reasonable time after the evaluation, to serve as a reference and advocacy tool. The report should be shared with all the departments and persons concerned in the institution. Results of the evaluation can also be disseminated to a broader audience through various means—including leaflets, newsletters, scientific fora—as agreed during planning (see item h. Plan for data entry, analysis and dissemination of findings, in section 3.1 Plan for the evaluation).

d) Revise teaching plans

Plans for teaching in the institution/s concerned should be revised based on the findings of the evaluation, preferably soon after the feedback meeting, when interest in the issue is still high and decision-makers are available.

Chapter 5. Evaluation questions

This section helps to guide the analysis of the information collected during the evaluation.

5.1 Process

Information on the process can be obtained through guided interviews, using standard questionnaires and record review. Below is a series of questions to be addressed in the process evaluation, by level and topic area.

National level

a) Was a supportive environment created?

- Awareness-raising and advocacy activities
  - Were any activities carried out to raise awareness and sensitize teaching institutions and other targeted partners to the IMCI strategy and pre-service education?
  - What are these activities?
- Were key partners in pre-service education identified?
  - Who were they?
  - Why were they selected?
  - At which stage were partners involved in the IMCI strategy (orientation, planning, adaptation, implementation, evaluation and pre-service education)?
  - Which partners are still involved in IMCI implementation? In which way?
  - What were the main reasons for losing partners, if any?
- Was there any continuous active participation of decision-makers and influential teaching staff members, involved in pre-service education, in public child health key events (e.g. IMCI major orientation meetings, debriefing on IMCI health facility surveys, national and international child health days)?
  - Were there essential child health events since inception? What were they?
  - Which events involved decision-makers and influential staff? At which level?
  - What was the outcome of their involvement?
- Were influential IMCI Ministry of Health staff and partners involved in relevant child-related academic events (those events that convene a high number of concerned medical societies and with a child health-related topic, paediatric scientific fora, etc.)?
  - In which of those events did the influential IMCI staff and partners participate?
  - What type of participation was it?
  - What was the outcome of their participation?
- Was the IMCI pre-service approach endorsed at the national level?
  - By whom, when and how?

b) Was a management structure and/or a focal point for IMCI pre-service education established at national level? (Management structure is intended as having responsibilities for coordination, planning and tasks related to pre-service education activities.)

- How was it established? (e.g. by Ministry of Health directive, circular, minutes of a meeting, etc.)
- Who were the members and why were they selected?
- What were the terms of reference of this structure?
- What were the main activities in which the management structure was actively involved?

- Is there a coordination mechanism between the Ministry of Health, institutions and key partners for IMCI pre-service education? What form of coordination mechanism?
- Were activities conducted to raise awareness and sensitize the teaching institutions and other targeted partners to the IMCI strategy and pre-service education? What were these activities?

c) Was a plan developed for IMCI pre-service education?

- Did the plan include identification of targeted institutes, activities, responsibilities, resources, time frame, monitoring and evaluation?

d) What commitment was there to IMCI pre-service education at national level (based on previous answers on official endorsement, identification of a focal point or management structure for IMCI pre-service education, preparation of a plan of action, allocation of resources, etc.)?

Institutional level

a) Identification of concerned departments

- Were the concerned departments identified?
- How were they identified?
- Which departments were they?

b) General Information on the concerned department/s

- How many teaching units are there in the concerned department/s?
- How many teaching staff are there in the concerned department/s and per unit?
- What is the duration of student rotation?
- What is the number of undergraduate students per unit?
- What is the ratio of students to teaching staff actively involved in teaching within the department?
- What is the number of teaching hours?

c) Orientation workshop/s

- Was an orientation workshop conducted?
  - Who organized the workshop?
  - What was the method used?
  - Which tool was used for the orientation?
  - Who were the participants?
  - What was the outcome of the workshop?
  - Was this workshop documented? How?

d) Official endorsement by institution and concerned departments

- Was there any official endorsement for introducing IMCI into the teaching programme in the institution/concerned departments?
- At what level was it made?
- When was the endorsement obtained?
- Which form of endorsement was it? (Provide the document if available.)
- Was information on such endorsement shared with the national IMCI coordinator?
- Was the endorsement translated into action (this will be based on the evaluators' conclusions on the answers to all the following items)?

e) Formulation of working group and nomination of a focal point

- Was a working group/task force formulated in the institution/concerned department?
- How was it formulated (criteria, officially)?
- Who were the members?
- Did the working group select a focal point?
- Were the terms of reference of the working group and the focal point agreed upon?
- Was this documented? (Provide the document.)
- How frequently did the working group meet?
  - Did it meet regularly?
  - Were the meetings based on the plan?
  - What were the outcomes of these meetings?
  - Were the meetings documented? (e.g. minutes)

f) Planning phase

- Was a planning workshop conducted?
- Who organized the workshop?
- Who attended the workshop?
- Was a plan of action developed with targets and indicators? (If available, provide a copy of the plan of action.)
- The components of the plan of action should be checked against the checklist.

g) Implementation of the plan

- Which activities were implemented (according to the plan of action)?
- What facilitated the implementation?
- What were the difficulties/constraints faced during the implementation?
- What were the reasons behind the lack of implementation of planned activities?
- Were the targets of the plan achieved? To what extent?

h) Teaching process

- General information
  - Were IMCI learning objectives identified? What are they?
  - Did teaching cover those learning objectives?
- IMCI training status among teaching staff
  - How many teaching staff have been trained in IMCI case management to date? What is their profile?
  - How many are still active in teaching IMCI?
  - What is currently the ratio of students to teaching staff trained in IMCI case management?
  - Do all the teaching units have staff trained in IMCI case management?
  - How many teaching staff have been trained in IMCI facilitation skills? (Problems in availability of trainers to conduct courses for teaching staff.)
  - How many of them are still active in teaching IMCI?
  - Are teaching staff kept informed about any technical updates of the IMCI clinical guidelines? How?
- IMCI teaching methodology
  - What are the IMCI learning objectives covered by this concerned department? (Provide a document that states those objectives.)
  - How many teaching units are teaching IMCI?
  - How many hours are allocated to IMCI-related teaching within the department teaching schedule per rotation?

- Methodology of classroom sessions
  - How many classroom sessions are assigned for IMCI teaching per rotation? How many hours per session?
  - What are the learning objectives of these sessions? (Provide a document that states the objectives.)
  - What is the student-to-teaching staff ratio?
  - What is the methodology used to conduct the IMCI classroom sessions (lecturing, presentation, photos, videos, demonstrations, etc.)?
  - What is the methodology used to teach IMCI?
  - Does IMCI teaching address the scientific rationale of the IMCI guidelines?
  - Does IMCI teaching link to classical teaching?
- Methodology of clinical sessions
  - How many clinical sessions are spent on IMCI-related teaching per rotation? How many hours per session?
  - What are the learning objectives? (Provide the document stating the objectives.)
  - What is the student-to-teaching staff ratio?
  - What is the methodology used to conduct the clinical sessions (clinical demonstration, clinical examination, case presentation, etc.)?
  - Describe those sessions (who does what, how, where).
- Does the teaching methodology stimulate students' active participation? How?
- Teaching materials
  - Are there any IMCI learning materials for students?
  - What are these learning materials?
    - Students' materials (e.g. student's manual)
    - Chart booklet
    - Recording forms
    - Mother card
    - Wall charts
    - CDs, video tapes
  - Are those materials consistent with the national IMCI guidelines?
  - Are they consistent with the content of the programme of the concerned department/s?
  - Are these IMCI teaching materials separate materials or are they incorporated into the department's reference book? Who provides them and who pays for them?
  - Does every student receive his/her own copy of these materials? Does he/she need to pay for them? Who provides them and who pays for them?
  - Are there any IMCI teaching materials for instructors? What are these teaching materials (e.g. teacher's guide which provides lessons plans and brief outlines of teaching sessions, other supportive materials such as lectures, presentations, photo booklet, wall charts, videos, slides, transparencies)? Who provides the materials and who pays for them?
  - Are the key students' references available in the library? If so, which ones and how many copies are available in the library? Who provides them and who pays for them (correlate the number of available copies to the number of students per rotation)?
  - Have any measures been taken to ensure sustainability of the regular supply and availability of those materials?
  - Do the teaching materials stimulate student self-learning? How?
- Training site
  - How is the training site for clinical teaching (describe location, space, audio visual

equipment, flow of patients, weighing scales, spoons, timers, nebulizers, thermometers, tables, chairs, etc.)?

- Which constraints does the teaching process face (e.g. lack of commitment, shortage of teaching staff, resources for teaching materials, lack of staff interest, high number of students, turnover of leadership, inadequate space for clinical teaching, lack of teaching materials and teaching aids)?
- Are the following items available?
  - Timers
  - Weighing scales
  - Thermometers
  - ORT utensils
  - Other items (tongue depressors, nebulizers or other items as per the adapted IMCI guidelines)

i) Monitoring and re-planning mechanism

- Was monitoring included in the plan?
- Were different levels of monitoring identified?
- Was a specific monitoring plan developed? (Provide a copy of the plan.)
- Who is responsible for monitoring?
- Was a monitoring tool developed for each level (if relevant)?
- Was regular monitoring conducted using the tool?
- Were the results documented? (Provide example.)
- Were the results of monitoring used for re-planning, corrective measures and other actions?

j) Students' assessment (check the last three exams)

- Are IMCI elements included in student assessment?
- Is there a mechanism to introduce changes in student assessment?
- Which mechanism is it? Did the IMCI introduction in teaching follow the same mechanism?
- When are students assessed in IMCI during the department teaching programme?
- What type of assessment is it (formative and/or summative)?
- Which methods are used for this assessment?
- What proportion of marks has been allocated to the IMCI component in relation to the total subject marks (paediatric/community medicine, others, if any)?
- What are the IMCI competencies (knowledge and skills) covered by the examination?
- Are the examination results used to strengthen teaching?

k) Costs

- Were there specific funds available for those activities? What was the source of those funds?
- Is the cost of activities considered in the plan?
- Which budget items were included in the plan?
- Were all planned funds received? What proportion of planned funds was actually received?
- What were the costs of IMCI pre-service education for the following items:
  - Management and coordination, including meetings, visits, special events and supervision;
  - Orientation and training of teaching staff;
  - Teaching space, equipment and learning materials.
- Are financial records available as a source of information?

l) Sustainability

- Has an official endorsement for introduction of IMCI into teaching been obtained?

- Has IMCI pre-service education received long-term support? What type of support?
- Is IMCI considered a time-limited project or an integral part of the teaching programme?
- Have funds been regularly available to implement the IMCI pre-service education plan?
  - Does the flow of funds match the original IMCI pre-service education plan and current needs?
  - Can funds and their source be secured on a long-term basis (i.e. five years)? How? Are there other options?
- Has logistic support been made available, as needed, according to plans?
- Is there any mechanism to ensure regular support of logistic needs in the long term? If so, what are the mechanisms to ensure availability of the following:
  - Students' materials (by cost recovery measures, library, etc.)
  - Teaching materials/aids
  - Maintenance of equipment
  - Training site (e.g. place, setting, etc.)
- Are teaching staff trained in IMCI available?
- Is there any mechanism (policy/resources) to train new staff and replace those who leave, in the long term?
- Is implementation of the plan and teaching programme regularly monitored (refer to item i)?
- Have decision-makers and influential teaching staff been actively participating in key events such as events that convene a large number of concerned medical and professional societies on a child health-related topic, paediatric scientific fora, national and international IMCI meetings, national child health days, international child health days, etc.?
  - Were any essential child health events held during the last two years? If so, what were they?
  - Which of those events involved decision-makers and influential staff? At which level?
  - What was the outcome of their involvement?
- Is IMCI part of students' assessment (refer to item i)?
- How do teaching institution leaders and staff believe that sustainability of IMCI pre-service education can be ensured and maintained over time?

5.2 Results

Following is a series of questions to be addressed in the evaluation of results, by level and topic area.

National level

a) What are the expected benefits of IMCI pre-service education to the MOH?

- Are there any benefits relating to the extent to which the in-service training burden has been reduced, compared with before the introduction of IMCI into pre-service education, concerning:
  - Time (e.g. duration of IMCI in-service standard case management training courses, time required by facilitators to facilitate these training courses, time needed to create a pool of facilitators, duration of use of training sites for these courses, length and degree of interruption of delivery of health care and other services during the absence of trainees and facilitators for training)
  - Cost of training (e.g. daily allowance and logistics, including rent of training sites, materials, transportation, etc.)

- What is the effect of IMCI pre-service education on the quality of health services provided to children under-5 years of age?
- How has IMCI pre-service education eventually affected the attitude of health staff towards IMCI (acceptability, compliance, commitment)?

Institutional level

a) What are the attitudes and levels of satisfaction of teaching staff towards IMCI teaching, with regard to the following?

- Staff who are not teaching IMCI:
  - Do department staff accept IMCI teaching?
  - How is their acceptance or non-acceptance manifested?
  - Do they believe that IMCI pre-service education has facilitated the dissemination of knowledge and transfer of some skills related to the IMCI standardized protocol? What specifically? What impact do they think this dissemination and transfer have had?
  - What is their perception of the IMCI teaching/learning process and students' assessment methodology?
- Staff actively involved in IMCI teaching:
  - Do they accept IMCI teaching as an integral part of their work? Do they consider it an extra load? Why?
  - Do they think that IMCI teaching has an added value? Which one (e.g. it responds to public health needs, uses standardized protocols, employs a variety of teaching methodologies, improves teaching skills)?
  - Do they think IMCI teaching has contributed to their continued professional development? How? Have they gained new knowledge and skills (e.g. through participation in international courses, workshops, updates on technical issues, etc.)?
  - Has IMCI teaching helped establish more linkages with the MOH, other teaching departments and partners (e.g. other universities, international organizations) and strengthened relationships with students and other teaching staff? How? How useful is this?
  - Has IMCI pre-service education enhanced the reputation of the department/institution? How (e.g. criteria for accreditation and rewarding, invitation of faculty members to international events as resource persons or consultants, etc.)?
  - Did IMCI contribute to the improvement of logistics required for teaching? Were these new arrangements for supply and equipment actually used in teaching?

b) What are the attitudes and satisfaction of students towards IMCI, as regards the following?

- Questions to be addressed to the teachers:
  - Do students appreciate the IMCI teaching? How (e.g. better attendance to classes and practice, increased demand for it, compliance with assignments, results of examinations, closer relationships with teaching staff)?
- Questions to be addressed to the students:
  - Do students think that IMCI teaching is useful? Why?
  - Do they think it is an extra load to them?
  - Is there any difference between the IMCI teaching methodology and the teaching used for other subjects of the concerned academic programme? How? Do they feel it to be more or less effective for learning?
  - Do you think that the IMCI teaching/learning methodology and materials are useful? How?

c) How good are students' competencies (assessment of knowledge and skills)?

Health care delivery level

a) What are graduates' perceptions and attitudes towards IMCI?

b) Did the IMCI teaching that they received before graduation assist them in managing children? How?

c) What are graduates' knowledge and skills (assessment of knowledge and skills)?

d) Are graduates applying the IMCI protocol in their place of work? Why? Are there any constraints (e.g. adds substantial work load)?

Chapter 6. Analysis and presentation of findings

The previous chapter helps to guide the analysis of the information collected during the evaluation. Findings can be analysed and presented in relation to the "process" followed and the "outcome" to which this process has led. They can be organized by the main thematic areas, related to the national and teaching institution level. The presentation should preferably be in bulleted form, short and concise, highlighting whether:

- at national and institutional level:
  - a supportive environment and effective partnerships in pre-service education have been established;
  - a functional management and coordination structure is in place;
  - plans for IMCI pre-service education have been developed and implemented;
- at the teaching institution level:
  - teaching is consistent (e.g. content on IMCI guidelines versus the whole paediatric teaching programme) and teaching quality (methodology and learning resources) is adequate;
  - teaching staff and student perceptions toward IMCI teaching approaches are favourable;
  - students are competent.

Table 12 shows in which forms to find the information collected according to the thematic areas listed above. Forms include at the end a short paragraph on main conclusions, which help summarize the results. Preferably, when presenting the findings, recommendations should follow the relevant finding, which provides the rationale for them. More details about the analysis and presentation of findings on student competency (knowledge and skills) are presented in section 6.2 Quantitative findings.

The recommendations should focus on key issues and be specific, practical and aim to sustain IMCI pre-service education over time, to serve as the basis to develop or revise the plan of action. Such a plan could cover a short period of 6 to 12 months and clearly identify a mechanism to monitor its implementation.

Table 12. Information source by thematic area

Thematic area	Level	Source of information
Supportive environment, including partners	National	Forms 1, 2
	Teaching institution	Forms 3, 4
Management and coordination	National	Form 1
	Teaching institution	Form 4
Planning and plan implementation	National	Form 1
	Teaching institution	Forms 4, 5, 6
Costs	National and teaching institution	Form 13
Teaching methodology	Teaching institution	Forms 3, 5, 7, 8, 9, 10
Teaching staff and student perceptions	Teaching institution	Forms 11a, 11b, 12
Student knowledge and skills	Teaching institution	Forms 14, 15, 16

6.1 Qualitative findings

To illustrate how to summarize findings, examples of qualitative findings and recommendations are given in: Table 13 on supportive environment at national and institutional level, Table 14 on planning, Table 15 on teaching methodology and Table 16 on student attitudes toward IMCI from focused group discussions. Analysis of findings on student knowledge and skills is presented in section 6.2 Quantitative findings.

Table 13. Example of main findings on supportive environment at national and institutional level

Findings	Issues	Recommendations
Thematic area: *Supportive environment at national and institution level* (from Forms 1, 2, 3 and 4)		
Strong partnership between medical schools, MOH and WHO	Irregular, ad hoc coordination between MOH and medical schools	Establish more regular coordination mechanisms (e.g. by regular annual meetings, telephone and e-mail contacts, etc.)
	Limited sharing of IMCI technical updates with teaching institutions by MOH	Establish group e-mail system to disseminate IMCI technical updates electronically Distribute annual reports on IMCI implementation and major national activities to teaching institutions
Early involvement of teaching staff in IMCI in-service activities		
National IMCI pre-service education committee established and initially functional; it has not met for a long time after the first few meetings	Original plan very broad	Review the committee plan of action and members' commitment
	Some high profile teaching staff too busy to attend	Consider high-profile, very busy academic staff as 'resource persons' to the committee rather than 'members'
	A few medical school teaching staff with a high reputation left out	Update membership
Standardized process followed to introduce IMCI into pre-service teaching programmes	IMCI pre-service education not included in the national IMCI strategy plan	Ensure next national IMCI plan includes also IMCI pre-service education
IMCI teaching included as a requirement for accreditation of medical schools	Many private professionals unaware of IMCI	Include IMCI in continuing medical education
High level of commitment (dean of school, head of paediatric department)	Efforts based on external short-term assistance and personal initiative (issue of sustainability)	Plan for sustainability (institutionalization, training of teaching staff, availability of teaching and learning materials, etc.)
IMCI is included in the paediatric department teaching programme	IMCI is not included in the community medicine teaching programme	Coordinate between the two departments and revise teaching programmes

Table 14. Example of main findings on planning

Findings	Issues	Recommendations
Thematic area: *Planning* (from Forms 4, 5 and 6)		
Plans for teaching IMCI at the institution drafted	Plans never finalized Lack of clear indicators and targets in the plan to monitor progress Lack of monitoring of department teaching programme	Finalize plans, with indicators and targets Develop monitoring and documentation tool Establish monitoring and re-planning system for teaching programmes
Most teaching staff within the department oriented to IMCI	Some senior staff who did not attend not convinced about teaching IMCI outpatient approach	Orient these senior teaching staff through in-depth, practical orientation session
Focal point for IMCI teaching designated and active	Working group on IMCI not established	Review coordination mechanisms within and between departments

Table 15. Example of main findings on teaching methodology

Findings	Issues	Recommendations
Thematic area: *Teaching methodology* (from Forms 3, 5, 7, 8, 9, 10)		
Teaching staff trained in IMCI	Training of teaching staff in IMCI fully dependent on MOH assistance Total number of teaching staff trained in IMCI inadequate to ensure good teacher-to-student ratio	Build capacity within the institution Provide on-the-job IMCI training for house officers and residents involved in teaching Assign more teaching staff trained in IMCI to students to have smaller groups
IMCI included in teaching curriculum	Learning objectives and lessons plans not fully developed IMCI teaching much dependent on individual interest and initiative IMCI teaching limited to: • "assess and classify" and • child age group 2 months up to 5 years No clinical outpatient teaching component in paediatric teaching programme IMCI-related teaching does not include clinical practice Very limited time allocated to IMCI teaching in department programme Some inconsistencies between some elements of traditional paediatric teaching and IMCI teaching	Develop teaching sessions and monitor teaching Include in IMCI-related teaching programme: • identification of treatment and counselling and • young infant less than 2 months Introduce outpatient component into paediatric teaching programme Include clinical practice with actual cases Review current teaching programme of relevant departments to distribute more hours to IMCI, especially clinical practice
IMCI included in student assessment and log-book and student examinations	Major focus on the theoretical part of teaching	Include IMCI also in the clinical part of student examinations
IMCI student notes included in the local textbook of paediatrics		
IMCI chart booklet distributed for free to students	IMCI chart booklets currently received for free by the ministry of health: issue of sustainability Only few copies of reference materials available in the library	IMCI chart booklet can be incorporated in the textbook of paediatrics Use a small revolving fund to ensure adequate copies of reference materials are yearly available in the library Add internet links—with list of references—in the library to WHO global and regional Child and Adolescent health (CAH) on-line documents

Table 16. Example of main findings on student attitudes toward IMCI

Findings	Issues	Recommendations
Thematic area: *Student perceptions* (from Form 12)		
Feel positive about the overall IMCI experience	Feel IMCI taught in isolation from overall paediatrics	Integrate IMCI into teaching as an approach to outpatient management, rather than teaching it as a separate subject
Feel confident to deal with children by following the IMCI approach	Feel time allocated short, especially for practice	Consider redistributing teaching time in paediatrics to secure adequate time for IMCI, especially for skill practice sessions
Appreciate the variety of teaching methods used for IMCI and teaching approach (moving from theory through demonstration to clinical practice)	Lack technical basis to understand the rationale for the IMCI guidelines	Include technical rationale for IMCI guidelines and provide references
Find learning resources useful	Availability of such resources is limited	(see Table 15)
Wish all paediatric subjects were taught in a similar way		Consider trying the IMCI outpatient teaching approach also for other non-IMCI-related topics

6.2 Quantitative findings

This section deals with the findings on student knowledge and skills, which are derived from the knowledge test (MCQs and case scenarios) and the case management skill test. As a scoring approach is proposed for the analysis, this is described first.

Scoring answers and tasks

This guide recommends the use of scores for each correct answer option selected by a student in the knowledge tests (MCQs and case scenarios) and each correct task performed by the student in the skill test (case management). The scoring approach is described below.

Knowledge (MCQs and case scenarios)

In the MCQ and case scenarios, a positive score is pre-assigned to each correct answer option and a negative score to each incorrect option. According to this system, points are therefore deducted for incorrect answer options within the same MCQ item. However, in no case will this result in a total negative score for a given item: if the total of positive and negative scores for one item is negative, the total would be converted to "0", so that no negative score is carried over to the total score of the test. The reason for this approach—i.e. deducting marks for wrong answers—is mainly to discourage guessing and because if a participant ticks all or most of the answer options to one MCQ, s/he would by default get also the right one/s. For example, if a five-choice MCQ item has two correct options and three incorrect options and the student ticks all the five answer options, then the total for that item will automatically be adjusted to "0".

The score obtained by each student in the full test is then expressed as the percentage of the total score assigned to the test. This approach is preferred to scoring only MCQ items which have been answered fully correctly (i.e. all correct options and no incorrect options selected for each item), because it scores also partially correct answers ("partial knowledge"); thus, it provides still useful feedback to the pre-service education evaluation, which is the primary purpose of why these tests are conducted.

At the same time, one can keep track also of the total number of the items answered correctly fully, meaning all the MCQ items for which the student has selected all the correct and no incorrect options (e.g. fully correct answers given to 14 out of 25 MCQs). This combined approach gives the complete picture for the analysis: on the one hand the percentage score, and on the other hand the percentage of all fully correct answers.

Options of certain question items may be assigned scores with different weight, based on the difficulty of the MCQ and the different implications of the various incorrect options. This approach may be rather laborious and subjective and requires much preparation—including review by several experts very familiar with IMCI, although it makes the test more balanced. The data entry program made available with this guide gives full flexibility to assigning any desired score to each answer option and, thus, to each item.

Skills (case management)

The case management process followed by a student is important feedback to teaching, in addition to the final outcome of his/her assessment of the sick child. For this reason, the scoring approach used in the assessment of skills takes into account the various clinical steps carried out by the student, identifying deficiencies and accounting for them in the score.

Scores with different weights are assigned to the case management tasks based on their importance, whether they are carried out, whether they are performed correctly and whether the student's conclusion agrees with observer's (gold standard), as applicable. For example, the student may pinch the skin to assess the dehydration status of a child with diarrhoea (task done) but may pinch it using an incorrect technique (task performed but incorrectly) or may incorrectly conclude that the skin pinch goes back slowly in a child when in fact it goes back very slowly (incorrect conclusion). This may lead to misclassification of the child with implications for his/her management. The range of scores is wide so that if an important task is not carried out, then there is a loss of many points that would clearly be reflected in the total score (see examples below). In this way, the total score would more closely reflect the participant's overall clinical performance and keep track of all the steps of the process.

As for the knowledge test, the score results in the skill test are expressed as a percentage of the maximum score (percentage score), rather than absolute score values, as shown in the examples below. This approach allows to take into consideration the variability of cases assigned to students: typically, even when "standardizing" the selection of cases for this assessment, sick children present with a different number and types of conditions which require a different number and types of clinical tasks to be performed by each student.

Example 1: Child with history of diarrhoea
Skill: skin pinch
Score: 10 points distributed as follows:

– *Skin pinched:* score = points 2 if done (0 if not done)
– *Skin pinched correctly:* score = points 4 if done correctly (0 if done incorrectly)

– *Conclusion on skin pinch correct* (e.g. goes back very slowly): score = points 4 if conclusion correct (0 if incorrect)

Let us assume that the student pinches the skin (2 out of 2 points), but uses an incorrect technique (0 out of 4 points) and makes the wrong conclusion on the skin pinch (0 out of 4 points). Then, we would have the following percentage score:

TOTAL MAXIMUM SCORE AVAILABLE FOR SKIN PINCH: 10 points
SCORE OBTAINED BY STUDENT: 2 points
PERCENTAGE SCORE: 2/10 = 20%

This scoring approach takes into due consideration the fact that, even if the task was performed as in this case, it had some deficiencies with potential implications for the management of the child. As the assessment of a child with diarrhoea entails many other tasks, this method of scoring individual tasks will result in a more accurate overall score than if one had given just one score for a task done or not done, or had given the same score weight for a task done/not done and done correctly/not done correctly. It also removes the chances of giving a good score if there is a good guess (e.g. skin is pinched incorrectly but the student 'correctly' concludes that it goes back normally).

Example 2: Child with cough
Skill: Counting the respiratory rate
Score: 10 points distributed as follows:

– *Respiratory rate counted:* score = points 2 if done (0 if not done)
– *Child calm (before and during count):* score = points 2 if child calm (0 if child restless, crying etc.)
– *Respiratory rate counted for a full minute:* score = points 2 if 1-minute count (0 if not)
– *Conclusion agreeing with standard* (respiratory rate as counted by student leads to the same conclusion as the observing evaluator's, e.g. child has or does not have fast breathing): score = points 4 (0 if different conclusion).

Let us assume that the student counts the respiratory rate (2 out of 2 points) in a 3-year-old child, but counts it while the child is crying (0 out of 2 points), for 20 seconds—multiplying it by 3 to get a 60 minute value—(0 out of 2 points) and reports a high rate of 75/min while the evaluator will independently report a count of 28 min which is within normal values (0 out of 4 points). Then, we would have the following percentage score:

TOTAL MAXIMUM SCORE FOR RESPIRATORY RATE: 10 points
SCORE OBTAINED BY STUDENT: 2 points
PERCENTAGE SCORE: 2/10 = 20%

If the same student had instead concluded that the child count was 32/min (e.g., normal count, as assessed also by the evaluator independently) and received an additional 4 points for this, this student would have obtained the following percentage score:

TOTAL MAXIMUM SCORE FOR RESPIRATORY RATE: 10 points
SCORE OBTAINED BY STUDENT: 6 points
PERCENTAGE SCORE: 6/10 = 60%

Despite a correct conclusion of normal breathing, this score would still be less than a full score, thus clearly pointing to some important deficiencies to be corrected that in clinical practice might have implications for the management of the child. This is useful feedback to the teaching programme.

The proposed scoring approach also tries to find some balance in the distribution of the total score between assessment, classification, identification of treatment and advice on home care. For example, assessment usually includes several tasks for each condition, whether cough or difficult breathing, diarrhoea, fever, etc. Each child selected for this evaluation is supposed to have at least two conditions; so, points are assigned for the assessment tasks for each of these two conditions, in addition to the tasks which are to be performed in each child irrespective of the condition (checking for general danger signs, malnutrition and anaemia, checking the immunization and vitamin A supplementation status and for other problems). This would overall already give many points to just the assessment tasks. On the other hand, classifying a condition is only one task. So, a relatively high score is assigned to correct classification, to apply some weight to each step of the case management process and reflect in a more balanced way the importance of each step. If a student performs all assessment tasks well but selects a wrong classification (which would have implications for the treatment and overall management of the child), all the points assigned to correct classification will be lost in the total score of the overall management of the child. Again, as seen for assessment, this will highlight an important deficiency to be addressed in teaching.

Analysing and presenting results

1. Knowledge (MCQs and case scenarios)

The results of the MCQs and case scenario tests provide some information on student knowledge and on how students are able to apply that knowledge to given situations, respectively.

For IMCI pre-service education evaluations, one overall indicator on knowledge summarizes the results of MCQs and case scenarios. It can be broken down into two separate indicators, one specifically for MCQs and one for case scenarios. A more in-depth analysis of the results by student performance and by question can be carried out for a more detailed interpretation of the test results, to identify teaching areas requiring strengthening and revise the test based on item facility, discrimination and distractor analysis.

The indicator is called "*knowledge percentage score*". It is expressed as the proportion of students taking the test who passed the test obtaining the required minimum threshold score or more. This threshold is a percentage of the maximum score allotted to the test. For example, let us assume that the threshold value is a score of 85% of the maximum score and that 58% of students obtained this score or more in the test. The results will be presented as "58% of students obtained at least 85% score in the overall student knowledge test". The level of the cut-off percentage score should be agreed upon before the test based on the difficulty of the test itself. This indicator could be broken down into the MCQ student knowledge percentage score (e.g. "75% of students obtained at least 85% score in the MCQ test") and case scenario student knowledge percentage score (e.g. "60% of students obtained at least 85% score in the case scenario test"). The reason for having separate results is that case scenarios usually prove more difficult for students to answer than MCQs, as students have to apply their knowledge, and as answers to each question tend to build on the answers to previous questions as in real life (assessment → classification → treatment and advice).

MCQs and case scenarios

► **Indicator:**	**Knowledge percentage score.** Proportion of students who obtained at least the required minimum percentage score (e.g. "85%") in the MCQs and case scenarios.
Numerator:	Number of students who obtained at least the required minimum percentage score in the MCQ and case scenario test.
Denominator:	Number of students who took the MCQ and case scenario test.
Example:	58% of students obtained at least 85% score in the MCQ and case scenario test.

A user-friendly electronic program has been developed by the Regional Office and is provided on the companion CD-ROM together with a guide to its use. It can be used to:

- adapt or develop anew the MCQs and case scenarios for the test;
- enter student answers after the test; and
- generate analysis reports on the above indicators automatically and assist in their interpretation.

The findings can be summarized in tables for analysis and presented in graphs. An example follows.

Example on findings of student outcome

Assessment of student knowledge

Do the students know IMCI?

A total of 8 out of 30 students (26.7%) who took the test obtained at least 85% of the total score assigned to the knowledge test (including both MCQs and case scenarios). While most students did well in the MCQ test, the major difficulty was in students' applying their IMCI knowledge, as shown in the case scenario test. "Assessment and identification of feeding problems" and "identification of treatment" created some problems; however, it was learned that these areas, although included in the curriculum, were, in fact, not addressed in the teaching programme.

Overall test (MCQs and case scenarios)

Test	Percentage score level	Students *n* = 30	%	Remarks
MCQs	Percentage score of at least 85%	24	80.0	–
Case scenarios	Percentage score of at least 85%	4	13.3	Most had difficulty with the treatment plan and case scenario 4
Total for student knowledge	Percentage score of at least 85%	8	26.7	Overall score affected by case scenarios

Breakdown of results by test (MCQs and scenarios)

Results of multiple-choice questions

Do the students know the information contained in the IMCI chart booklet?

A total of 24 out of 30 students (80%) who took the test obtained at least 85% of the maximum total score assigned to the MCQ test. Several questions were answered correctly by all students. Below are the details of the test results by category of questions.

A. IMCI guidelines

Question no.	Subject	*n* = 30	%	Remarks
A1	Five main health problems	21	70.0	Ear problem listed by many students instead of measles
A2	IMCI approach is action-oriented, uses empirical treatment, provides standardized protocol	3	10.0	Only 11 students chose “action-oriented”; only 6 chose “using empirical treatment”; but almost all (28) chose “provides a standardized protocol”
A3	IMCI guidelines used at OPD and first level health facilities	23	76.7	
A4	Age group targeted by IMCI guidelines	28	93.3	

B. Assessment and classification

Question no.	Subject	*n* = 30	%	Remarks
Assessment and classification				
B1	General danger signs	28	93.3	
B2	Classify (10-month-old child with "Anaemia or Very low weight")	28	93.3	
B3	Cut-off rate for fast breathing (12-month-old child)	27	90.0	
B4	Conditions checked in every child in IMCI	28	93.3	
B5	Questions to be asked to classify children with diarrhoea (duration and blood in stools)	29	96.7	
B6	Classify (3-year-old child with cough, fast breathing and chest indrawing)	29	96.7	
B7	Signs to classify as "Very Severe Febrile Disease" – Low malaria risk area	27	90.0	
B8	Classify (1-year-old child with cough, fast breathing and history of convulsions)	30	100	
B9	Classify (7-month-old child with fever) – High malaria risk area	30	100	
B10	Classify (4-year-old child with fever and stiff neck) – Low malaria risk area	30	100	
B11	Signs to classify the dehydration status of child with diarrhoea	28	93.3	
B12	Signs to classify a child with mastoiditis	30	100	
B13	Classify (2-year-old child with fever and pus coming from the ear for 5 days)	30	100	
B14	When to assess a child using the "fever box"	29	96.7	
B15	Which children to check for malnutrition and anaemia	30	100	
B16	True/false statements on contra-indications to immunization	11	36.7	15 students considered high fever a contraindication to immunization
B17	Criteria for good attachment to the breast	26	86.7	

C, D, E. Feeding problems, treatment and follow-up

Question no.	Subject	*n* = 30	%	Remarks
Feeding problems				
C1	Which children to assess for feeding problems	28	93.3	
C2	True/False statements on feeding	19	63.3	Nine students considered a very thin cereal gruel as nutritious complementary food
Treatment				
D1	Three home care rules for home treatment of diarrhoea	27	90.0	
Follow-up				
E1	When to follow up children with "Acute ear infection" and "Anaemia"	25	83.3	
25 MCQs: total	***Percentage score of at least 85%***	**24**	**80.0**	

Results of "Case scenarios"

Can students apply their knowledge to a case study?

A total of 4 out of 30 students (13.3%) who took the test obtained at least 85% of the total score assigned to the scenario test. Scenario 4 was rather challenging for many students as it included several conditions and adversely affected overall performance. Many students had difficulty in answering questions on the treatment plan but, as noted earlier, it was learned that this task had not been addressed in the teaching programme. Below are the details of the test results by case scenario.

Scenario 1

Scenario no.	Subject	*n* = 30	%	Issues
1. Fatima	*25-month-old child with general danger signs, severe dehydration, living in area with cholera*			
	All fully correct answers (score of 100%)	13	43.3	Elements of the treatment plan (S1.4)
	Percentage score of at least 85%	22	73.3	
S1.1	General danger signs	30	100	
S1.2	Classification	30	100	
S1.3	Which treatment plan for dehydration	30	100	
S1.4	What should be included in the treatment plan?	13	43.3	

Scenario 2

Scenario no.	Subject	*n* = 30	%	Issues
2. Ahmed	*18-month-old child with pneumonia*			
	All fully correct answers (score of 100%)	25	83.3	Elements of the treatment plan (S2.1)
	Percentage score of at least 85%	26	86.6	
S2.0	Classification	26	86.7	
S2.1	What should be included in the treatment plan?	25	83.3	

Scenario 3

Scenario no.	Subject	*n* = 30	%	Issues
3. Sumaia	*3-year-old child with diarrhoea, some dehydration, severe persistent diarrhoea and dysentery*			
	All fully correct answers (score of 100%)	16	53.3	Elements of the treatment plan (S3.1)
	Percentage score of at least 85%	21	70.0	
S3.0	Classification	25	83.3	Five chose "Persistent diarrhoea" rather than "Severe persistent diarrhoea"
S3.1	What should be included in the treatment plan (including follow-up)	17	56.7	

Scenario 4

Scenario no.	Subject	*n* = 30	%	Issues
4. Mohammed	*3-year-old very low weight child with pneumonia, malaria, measles, anaemia*			
	All fully correct answers (score of 100%)	1	3.3	Elements of the treatment plan (S4.4). The number of conditions present in this child may have been the reason leading many students to consider it a severe case requiring urgent referral to hospital
	Percentage score of at least 85%	5	16.6	
S4.0	General danger signs	6	20.0	24 confused about history of convulsions not related to this illness
S4.1	Classification for cough	9	30.0	21 chose a severe classification for cough rather than "pneumonia"
S4.2	Classification for fever	6	20.0	20 ticked a severe classification for fever
S4.3	Classification for nutritional status and anaemia	26	86.7	
S4.4	What should be included in the treatment plan?	1	3.3	Only 13 included an oral antibiotic; 22 chose "urgent referral to hospital" for this non-severe case

Scenario 5

Scenario no.	Subject	*n* = 30	%	Issues
5. Rania	*5-month-old very low weight child with a cold, acute ear infection, severe malnutrition and anaemia (and feeding problems)*			
	All fully correct answers (score of 100%)	**2**	**6.7**	Elements of the treatment plan (S5.3); identification of feeding problems (S5.4)
	Percentage score of at least 85%	**16**	**53.3**	
S5.0	Classification for cough	29	96.7	
S5.1	Classification for ear problem	27	90.0	
S5.2	Classification of nutritional status and anaemia	29	96.7	
S5.3	What should be included in the treatment plan	18	60.0	11 forgot paracetamol for pain
S5.4	Feeding problems	4	13.3	16 thought that other food should be given to this 5-month-old breastfed child receiving cow's milk; seven did not select "feeding by bottle" as a problem; using cow's milk in a child who could be exclusively breastfed was considered a problem only by seven students

Individual results by student, expressed as percentage score obtained by each student in each test (MCQs and case scenarios)

Student no.	MCQs	Case scenarios	Knowledge (MCQs and scenarios)
1	85.6	70.4	77.7
2	88.0	74.8	81.2
3	92.8	72.6	82.3
4	96.8	71.9	83.8
5	93.6	69.6	81.2
6	88.8	65.9	76.9
7	94.4	77.8	85.8
8	89.6	75.6	82.3
9	86.4	94.1	90.4
10	90.4	81.5	85.8
11	88.0	85.2	86.5
12	87.2	77.8	82.3
13	84.0	52.6	67.7
14	91.2	80.7	85.8
15	88.8	76.3	82.3
16	89.6	75.6	82.3
17	76.8	54.1	65.0
18	94.4	88.1	91.2
19	85.6	82.2	83.8
20	80.8	85.9	83.5
21	87.2	84.4	85.8
22	75.2	68.1	71.5
23	92.8	65.9	78.8
24	94.4	71.9	82.7
25	96.8	31.1	62.7
26	94.4	76.3	85.0
27	94.4	73.3	83.5
28	81.6	58.5	69.6
29	83.2	54.1	68.1
30	96.8	64.4	80.0

2. Skills (case management)

The observation of students' management of sick children provides valuable information on the clinical and communications skills that students have acquired as a result of practical and clinical teaching.

One overall indicator summarizes the results of student case management skills, namely the **"case management percentage score"**. It is expressed as the proportion of students participating in the case management skill test who obtained the required minimum threshold score or more. This threshold is a certain percentage of the maximum total score allotted to the test. The level of the cut-off percentage score should be agreed upon before the test based on the complexity of the cases to be selected for the students. For example, "50% of students obtained at least 85% percentage score in the student case management skill test". The rationale for using this approach is described earlier in this section under "Scoring answers and tasks – Skills (case management)".

This indicator is the result of students correctly performing a number of tasks related to the assessment, classification and identification of treatment for the child, including advice on home care. The indicator can be broken down to answer questions such as "How did the students do (score) on assessment tasks?", "How did they do (score) on classification?", etc. which are an important feedback to teaching. The following indicators help understand the process followed by the student and his/her skills:

- **Correct assessment**
  [Proportion of students who perform clinical assessment tasks on the sick child correctly]
- **Correct classification**
  [Proportion of students who classify the sick child correctly]
- **Correct identification of treatment**
  [Proportion of students who identify the correct treatment for the sick child]
- **Correct assessment of feeding practices and identification of feeding problems**
  [Proportion of students who correctly assess feeding practices and identify feeding problems in the sick child]
- **Advice on fluids and feeding**
  [Proportion of students who give advice on fluids and feeding]

Each of the above indicators is a compound indicator combining information from a sub-set of several indicators (sub-indicators). A list of the main indicators, sub-indicators and their definitions with examples is given below.

An electronic program has been developed by the Regional Office and is provided on the companion CD-ROM together with a guide to its use:

- to enter student performance data of the skill test; and
- to generate analysis reports on the main indicators automatically and assist in their interpretation.

The analysis helps to identify teaching areas which may require strengthening.

The indicators can be expressed as the proportion of students who correctly performed the task considered—so, "fully correctly"—or as percentage scores—so, "mostly correctly"—similarly to the student case management percentage score. The use of the percentage score method takes into consideration the whole process followed by the student, as each task is scored. For this reason, it is used for the overall indicator on case management and, for

consistency, for the five indicators it refers to provided in the examples below. The other method, by referring to the task correctly performed in full, focuses only on the result, although it is often more easily understood by teaching staff, who are interested in knowing the proportion of students who perform clinical tasks correctly. It is obvious that there is a close relationship between the two. If a student obtains a 100% percentage score for a given indicator (e.g. overall case management), this means that the student has performed all the related tasks correctly (has managed the sick child correctly). If a student obtains an 85% percentage score on overall case management, of which 100% on assessment, 100% on classification and 70% on identification of treatment, it means that the student assessed and classified the child correctly but made some mistakes in the identification of treatment. Below is an example about how definitions would differ if either type of indicators were used for the indicator of assessment of a sick child.

Indicator: "Correct assessment"

A) Expressed as percentage score:

Proportion of students who obtained at least the required minimum percentage score (e.g. 85%) in the assessment of a sick child, i.e. in performing all the expected clinical assessment tasks for the conditions present in the child and checking for general danger signs, anaemia, nutritional status, immunization and vitamin A supplementation status and other problems.

Example: 52% of students obtained at least an 85% percentage score in the assessment of the sick child.

B) Expressed as a percentage:

Proportion of students who correctly performed all the expected clinical assessment tasks for the conditions present in the child and correctly checked for general danger signs—anaemia, nutritional status, immunization and vitamin A supplementation status and other problems.

Example: 38% of students correctly assessed a sick child.

Observation of case management

► **Indicator:**	**Case management percentage score.** Proportion of students who obtain at least the required minimum percentage score (e.g. 85%) in the case management skill test, including assessment, classification, identification of treatment of sick children and advice of caregivers on home care.
Numerator:	Number of students who obtained at least the required minimum percentage score in the case management skill test, including assessment, classification, identification of treatment and advice on home care.
Denominator:	Number of students who managed a sick child.
Example:	62% of students obtained at least an 85% percentage score in the case management skill test.

The tasks scored, related to assessment, classification, identification of treatment and advice on home care are listed below in detail. The definitions are based on the IMCI standards.

(1) ASSESSMENT

► **Indicator:** **Correct assessment.** Proportion of students who obtain at least the required minimum percentage score (e.g. 85%) in the assessment of a sick child.

Numerator: Number of students who obtained at least the required minimum percentage score when performing the expected, observed[1] clinical assessment tasks for the conditions present in the sick child and checking for general danger signs, nutritional status, anaemia, immunization and vitamin A supplementation status and other problems, and whose findings agree with the evaluator's.

Denominator: Number of students who managed a sick child.

Example: 53% of students obtained at least an 85% percentage score in the assessment of a sick child.

[1] These include only the tasks that an evaluator can judge reliably through observation. Tasks vary according to the conditions that the child managed by a student has.

The numerator of the above indicator on assessment more specifically includes performing the following tasks:

- correctly checking for general danger signs: asking/checking correctly about ability to drink or breastfeed, vomiting everything, convulsions, and lethargy if child not awake;
- asking about cough or difficult breathing and: a) not entering the "cough box" for a child with no cough or difficult breathing; or b) if the child has cough or difficult breathing, counting the respiratory rate correctly (i.e. in a calm child and for a full minute) and with conclusions on breathing (normal/fast) and chest indrawing agreeing with evaluator's;
- asking about diarrhoea and: a) not entering the "diarrhoea box" for a child with no diarrhoea; or b) if the child has diarrhoea, asking about duration of diarrhoea and the presence of blood in the stools, offering something to drink to the child, pinching the skin correctly, and with findings on restlessness/irritability, thirst and skin pinch agreeing with evaluator's;
- asking/checking about fever and: a) not entering the "fever box" for a child with no fever; or b) if the child has fever, asking about duration of fever and looking/feeling for stiff neck correctly and with findings on the presence of stiff neck agreeing with evaluator's;
- checking for sore throat: asking if the child has sore throat, checking for lymph nodes on the front of the neck and examining the child's throat;
- asking about ear problem and: a) not entering the "ear problem box" for a child with no ear problem, or b) if the child has an ear problem, asking about ear pain and ear discharge (and, if present, asking about its duration), and feeling for tender swelling behind the ear;
- correctly checking for the nutritional status: checking for visible severe wasting and oedema of both feet, with findings agreeing with evaluator's, and checking weight against a growth chart;
- correctly checking for palmar pallor and with findings agreeing with evaluator's;
- checking the child's immunization status and with conclusions on the need for immunization agreeing with the evaluator's;

- checking the child's vitamin A supplementation status and with conclusions on the need for vitamin A supplementation agreeing with the evaluator's; and
- asking about other problems.

Sub-indicators on assessment can be measured also for the performance of each set of clinical tasks as described below. Attention should be paid to the fact that in this case denominators may vary, as they may refer to either all students who manage a sick child in some cases or students who manage a child with a given condition in other cases. The sub-indicators are expressed as proportion of students who performed the required tasks correctly.

Sub-indicator: Students who correctly check for general danger signs.

Numerator: Number of students who ask/check correctly about ability to drink or breastfeed, vomiting everything, convulsions, and lethargy if child not awake.

Denominator: Number of students who manage a sick child.

Example: 91% of students who managed a sick child correctly checked for the presence of all the general danger signs as applicable.

Sub-indicator: Students who correctly assess a child with cough or difficult breathing.

Numerator: Number of students who ask about duration of cough, count the respiratory rate correctly (i.e. in a calm child and for a full minute) and whose conclusion on breathing (normal/fast) and chest indrawing agree with evaluator's.

Denominator: Number of students who manage a child with cough or difficult breathing.

Example: 68% of students who managed a child with cough or difficult breathing correctly performed all the observed clinical assessment tasks for cough or difficult breathing.

Sub-indicator: Students who correctly assess a child with diarrhoea.

Numerator: Number of students who ask about duration of diarrhoea and the presence of blood in the stools, offer something to drink to the child, pinch the skin correctly, and whose findings on restlessness/irritability, thirst and skin pinch agree with evaluator's.

Denominator: Number of students who manage a child with diarrhoea.

Example: 72% of students who managed a child with diarrhoea correctly performed all observed clinical assessment tasks for diarrhoea.

Sub-indicator: Students who correctly assess a child with fever.

Numerator: Number of students who ask/check about fever, ask about its duration, (request a blood film or perform a rapid diagnostic test for malaria, if relevant), correctly look or feel for stiff neck and whose findings on stiff neck agree with evaluator's.

Denominator: Number of students who manage a child with fever.

Example: 59% of students who managed a child with fever correctly performed all observed clinical assessment tasks for fever.

Sub-indicator: Students who correctly check for sore throat.

Numerator: Number of students who ask if the child has sore throat, check for lymph nodes on the front of the neck and examine the child's throat.

Denominator: Number of students who manage a sick child.

Example: 43% of students who managed a sick child correctly checked for sore throat.

Sub-indicator: Students who correctly assess a child with an ear problem.

Numerator: Number of students who ask about ear pain and ear discharge (and, if present, ask about its duration), and feel for tender swelling behind the ear.

Denominator: Number of students who manage a child with an ear problem.

Example: 43% of students who managed a child with an ear problem correctly performed all observed clinical assessment tasks for ear problem.

Sub-indicator: Students who correctly check for nutritional status.

Numerator: Number of students who correctly check for visible severe wasting and oedema of both feet, whose findings agree with evaluator's, and check weight against a growth chart.

Denominator: Number of students who manage a sick child.

Example: 43% of students who managed a sick child correctly checked the child's nutritional status.

Sub-indicator: Students who correctly check for anaemia.

Numerator: Number of students who correctly check for palmar pallor and whose findings agree with evaluator's.

Denominator: Number of students who manage a sick child.

Example: 54% of students who managed a sick child correctly checked for anaemia.

Sub-indicator: Students who correctly check the child's immunization status.

Numerator: Number of students who check the child's immunization status and whose conclusions on the need for immunization agree with the evaluator's.

Denominator: Number of students who manage a sick child.

Example: 89% of students who managed a sick child correctly checked the child's immunization status.

Sub-indicator: Students who correctly check the child's vitamin A supplementation status.

Numerator: Number of students who check the child's vitamin A supplementation status and whose conclusions on the need for vitamin A supplementation agree with the evaluator's.

Denominator: Number of students who manage a sick child of the target age group.

Example: 86% of students who managed a sick child checked the child's vitamin A supplementation status.

Sub-indicator: Students who ask about other problems.

Numerator: Number of students who ask about other problems.

Denominator: Number of students who manage a sick child.

Example: 41% of students who managed a sick child asked about other problems.

(2) CLASSIFICATION

► **Indicator:**	**Correct classification.** Proportion of students who obtain at least the required minimum percentage score (e.g. 85%) in the classification of a sick child.
Numerator:	Number of students who obtained at least the required minimum percentage score when classifying a sick child.
Denominator:	Number of students who managed a sick child.
Example:	53% of students obtained at least an 85% percentage score in the assessment of a sick child.

The numerator of the above indicator on classification more specifically includes correctly classifying children:

- for the presence or absence of general danger signs;
- with cough or difficult breathing;
- with diarrhoea;
- with fever;
- for sore throat;
- with ear problem;
- for their nutritional status;
- for anaemia.

Sub-indicators on classification can be measured also for each individual condition as described below. Attention should be paid to the fact that in this case denominators may vary, as they may refer to either all students who manage a sick child in some cases or students who manage a child with a given condition in other cases.

Sub-indicator:	Students who correctly classify children for the presence or absence of general danger signs.
Numerator:	Number of students whose classification on the presence or absence of general danger signs agrees with evaluator's.
Denominator:	Number of students who manage a sick child.
Example:	91% of students who managed a sick child classified the child's conditions in relation to the presence or absence of general danger signs correctly.

Sub-indicator:	Students who correctly classify children with cough or difficult breathing.
Numerator:	Number of students whose classification of children with cough or difficult breathing agrees with evaluator's.
Denominator:	Number of students who manage a child with cough or difficult breathing.
Example:	78% of students who managed a child with cough or difficult breathing classified the child correctly for this condition.

Sub-indicator: Students who correctly classify children with diarrhoea.

Numerator: Number of students whose classification of children with diarrhoea agrees with evaluator's.

Denominator: Number of students who manage a child with diarrhoea.

Example: 78% of students who managed a child with diarrhoea classified the child correctly for this condition.

Sub-indicator: Students who correctly classify children with fever.

Numerator: Number of students whose classification of children with fever agrees with evaluator's.

Denominator: Number of students who manage a child with fever.

Example: 82% of students who managed a child with fever classified the child correctly for this condition.

Sub-indicator: Students who correctly classify children's throat condition.

Numerator: Number of students whose classification of children's throat condition agrees with evaluator's.

Denominator: Number of students who manage a sick child.

Example: 68% of students who managed a sick child classified the child's throat condition correctly.

Sub-indicator: Students who correctly classify children with an ear problem.

Numerator: Number of students whose classification of children with an ear problem agrees with evaluator's.

Denominator: Number of students who manage a child with an ear problem.

Example: 82% of students who managed a child with an ear problem classified the child correctly for this condition.

Sub-indicator: Students who correctly classify children's nutritional status.

Numerator: Number of students whose classification of children's nutritional status agrees with evaluator's.

Denominator: Number of students who manage a sick child.

Example: 73% of students who managed a sick child classified the child's nutritional status correctly.

Sub-indicator: Students who correctly classify children's anaemia.

Numerator: Number of students whose classification of children's anaemia agrees with evaluator's.

Denominator: Number of students who manage a sick child.

Example: 84% of students who managed a sick child classified the child for anaemia correctly.

(3) FEEDING PROBLEMS

► **Indicator:**	**Correct assessment of feeding practices and identification of feeding problems.** Proportion of students who obtain at least the required minimum percentage score (e.g. 85%) in the assessment of feeding practices and identification of feeding problems of a sick child.
Numerator:	Number of students who obtained at least the required minimum percentage score when assessing feeding practices and identifying feeding problems in a sick child.
Denominator:	Number of students who managed a child less than 2 years old without a severe classification.
Example:	39% of students who managed a sick child less than 2 years old without a severe classification obtained at least an 85% percentage score in the assessment of feeding practices and identification of feeding problems.

The numerator of the above indicator on feeding more specifically includes:

- asking whether the child is breastfed, and
  a) if the child is breastfed, asking how many times the child is breastfed, whether s/he is breastfed at night and whether s/he takes any other food/fluids than breastmilk; OR
  b) if the child is not breastfed or is breastfed but not exclusively, asking what food and fluids are usually given, how many times a day and what is used to feed the child; and
- in all cases, asking whether feeding changed during illness and with identification of feeding problems agreeing with evaluator's.

(4) IDENTIFICATION OF TREATMENT

► **Indicator:**	**Correct identification of treatment for the sick child.** Proportion of students who obtain at least the required minimum percentage score (e.g. 85%) in the identification of the required treatment for the sick child, including advice on home care and follow-up.
Numerator:	Number of students who obtained at least the required minimum percentage score when identifying the treatment for a sick child, including advice on home care and follow-up.
Denominator:	Number of students who managed a sick child.
Example:	74% of students obtained at least an 85% percentage score in the identification of the correct treatment for the sick child.

The numerator of the above indicator on identification of treatment more specifically includes identifying whether a child needs:

- pre-referral treatment (prevention of low blood sugar, pre-referral drug);
- referral;
- antibiotics (for pneumonia, dysentery, streptococcal sore throat, acute ear infection);
- bronchodilator;
- rehydration plan and zinc;
- feeding advice and multivitamins/minerals for persistent diarrhoea;
- paracetamol;
- iron;
- ear wicking and topical quinolone eardrops;
- advice on home care and definite or conditional follow-up.

(5) ADVICE ON HOME CARE (fluids and feeding)

► **Indicator:** **Advice on fluids and feeding.** Proportion of students who obtain at least the required minimum percentage score (e.g. 85%) in the advice of child caregiver on home care (fluids and feeding).

Numerator: Number of students who obtained at least the required minimum percentage score when advising child caregiver on increased fluids and continued feeding.

Denominator: Number of students who managed non-severe children.

Example: 88% of students who managed a sick child with a non-severe condition obtained at least an 85% percentage score in the advice on increased fluids and continued feeding.

Example on findings on student outcome

Observation of case management

Sample characteristics of clinical exposures

All clinical exposures but two had two or more conditions and at least one of those conditions was either moderate or severe, providing a good opportunity for assessing students.

Sample characteristics: characteristics of 27 clinical exposures age 2 to 59 months old (based on observer's classification)

Sick child characteristics	*n* = 27	%
Age		
Less than 12 months old	15	56
≥ 12 months old	12	44
Conditions		
General danger signs	0	0
Acute respiratory infections:	21	78
Severe pneumonia or very severe disease	2	7
Pneumonia	4	15
No pneumonia: cough or cold	15	55
Diarrhoeal diseases	14	52
With (some) dehydration	2	7
With no dehydration	12	44
With persistent diarrhoea	0	0
With dysentery	0	0
Fever	24	89
Malaria	12	44
Fever – Malaria unlikely	12	44
Ear problem	2	7
Acute ear infection	2	7
Malnutrition/anaemia	12	44
Severe malnutrition or severe anaemia	1	4
Anaemia or very low weight	11	41
Severity		
Severe (red/pink row of IMCI chart)	3	11
Moderate (yellow row of IMCI chart)	18	67
Mild (green row of IMCI chart)	6	22
No. of conditions in the same child		
1 condition	2	7
2 conditions	11	41
3 conditions	9	33
4 conditions	4	15
5 conditions	1	4

Assessment of student skills

Are students able to manage a sick child?

Seven (26%) of the 27 students obtained at least an overall score of 85% in the case management skill test, based on the IMCI standard protocol as a gold standard. Weak areas affecting performance were "assessment and identification of feeding problems" and "identification of treatment"; however, it was learned that these areas, although included in the curriculum, were in fact not addressed in the teaching programme.

Results on observation of case management

Case management step	No. of students (%) who performed the step correctly[1]
Assessment	10/27 (37.0%)
Classification	9/27 (33.3%)
Identification of treatment	13/27 (48.1%)
Assessment and identification of feeding problems for non-severe cases	12/24 (50.0%)
Advice on fluids and feeding for non-severe cases	18/24 (75.0%)
Overall case management	**7/27 (26.0%)**

[1] Obtained at least an 85% percentage score.

Does the test suggest any areas which would require more emphasis in teaching based on the findings?

Among the assessment and classification steps, tasks that may require more emphasis in teaching were those under the assessment and classification of cases with diarrhoea and of nutritional status.

Clinical skills: details

Task	No. of students (%) who performed the task correctly
GENERAL DANGER SIGNS	
Checked for four general danger signs as applicable (ability to drink or breastfeed, vomiting everything, convulsions, and lethargy if child not awake)	21/27 (77.8%)
Correct classification of cases for the presence or absence of general danger signs	27/27 (100%)
COUGH OR DIFFICULT BREATHING (*n* = 21)	
Clinical tasks performed correctly (Asked about duration of cough, counted the respiratory rate correctly and findings on fast breathing and chest indrawing agreed with evaluator's)	19/21 (90.5%)
Entered cough box by mistake[1]	1/6 (16.7%)
Correct classification of cases with cough or difficult breathing	19/21 (90.5%)
DIARRHOEA (*n* = 14)	
Clinical tasks performed correctly (Asked about duration of diarrhoea and the presence of blood in the stools, offered something to drink, pinched the skin correctly, and findings on restlessness/irritability, thirst and skin pinch agreed with evaluator's)	10/14 (71.4%)
Entered diarrhoea box by mistake[1]	2/13 (15.4%)
Correct classification of diarrhoea cases (tendency to over-classify)	9/14 (64.3%)
FEVER (*n* = 24)	
Clinical tasks performed correctly (Asked/checked about fever and correctly looked/felt for stiff neck and findings on stiff neck agreed with evaluator's)	23/24 (95.8%)
Entered fever box by mistake[1]	0/3 (0%)
Correct classification of cases with fever	23/24 (95.8%)
EAR PROBLEM (*n* = 5)	
Clinical tasks performed correctly (asked about ear pain and ear discharge—and, if present, asked about its duration—and felt for tender swelling behind the ear)	4/5 (80.0%)
Entered ear problem box by mistake[1]	1/22 (4.5%)
Correct classification of cases with ear problem	4/5 (80.0%)
MALNUTRITION AND ANAEMIA	
Checked for malnutrition and anaemia (checked for visible severe wasting, oedema of both feet and palmar pallor, with findings which agreed with evaluator's, and checked weight against a growth chart)	16/27 (59.3%)
Correct classification of nutritional status, including anaemia	22/27 (81.5%)
CHECKED IMMUNIZATIONS STATUS (with conclusions agreeing with evaluator's)	27/27 (100%)
CHECKED VITAMIN A STATUS (with conclusions agreeing with evaluator's)[2]	23/27 (85.2%)
OTHER PROBLEMS (Asked about other problems)	22/27 (81.5%)

[1] For children not showing the symptom/sign.

[2] Not applicable in four cases because of child's age.

Medical and allied health professional schools play a key role in preparing the future cadres of health providers who will be providing child health care services in a country, whether in the public or private sector. Medical schools in the WHO Eastern Mediterranean Region have been taking steps in recent years to introduce the Integrated Management of Child Health (IMCI) approach into their undergraduate teaching programmes, in collaboration with the Regional Office for the Eastern Mediterranean. This IMCI pre-service education package proposes a standard approach to each phase, to assist teaching institutions in introducing, implementing and assessing undergraduate teaching programmes including IMCI.

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