FACILITATOR GUIDE

DETECTION, MANAGEMENT AND SURVEILLANCE OF ARSENICOSIS IN SOUTH-EAST ASIA REGION

Edited by Deoraj Caussy, New Delhi 2005
This facilitator guide complements the WHO Technical Publication No. 30 — A Field Guide for Detection, Management and Surveillance of Arsenicosis. It provides teaching material and recommendations for a three-day training course, designed mainly for managers of health-care establishments, public health professionals and policy makers.
ACKNOWLEDGMENTS

This guide has been developed by a consortium of arsenic experts listed in Appendix 5. It was conceived and developed with the active participation of the intended users of healthcare providers, policy makers and nongovernmental organizations that are actively involved in this area.

Acknowledgment is made to all the contributors, the participants of the workshops and countless number of patients whose materials have been used in this guide. Funding for this project was provided by the WHO Regional Office for South-East Asia.
Globally, arsenicism, also referred to as arsenism, is an important non-communicable disease resulting from the ingestion of groundwater containing unsafe level of arsenic. Groundwater contamination, in excess of the WHO guideline value, has been observed in some countries of WHO's South-East Asia Region. The affected countries are: Bangladesh, India, Myanmar, Nepal and Thailand. Over 10 million tube wells are in use in the Region, potentially exposing between 40 to 50 million people to unsafe levels of arsenic.

To mitigate the health effects of arsenic in the South-East Asia Region, WHO published a Field Guide for the Detection, Management and Surveillance of Arsenicism in 2003 (WHO Technical Publication No. 30; ISBN 92 9022 2405). The Facilitator's Guide and Participants Course Handout were developed to complement the WHO Field Guide for the Detection, Management and Surveillance of Arsenicism. The materials were developed and field-tested in regional and national workshops in Bangladesh, India and Thailand.

This publication is primarily to facilitate human resource development in the area of arsenic mitigation in the Region.
INTRODUCTION ................................................................................................. 1
   1.1 Background and Objectives of WHO’s Arsenic Programme .................. 1
   1.2 Expected Outcomes of the Workshop ............................................... 1
   1.3 Intended Beneficiaries ...................................................................... 2
   1.4 Conducting a Training Workshop .................................................... 2

PART I : PLANNING AND PREPARATION ................................................. 5
   1.1 Contents of the Arsenicosis Training Workshop ............................... 6
   1.2 Guidelines on Planning and Preparation ......................................... 8
   1.3 Teaching Methods ........................................................................ 12
   1.4 Evaluation Methods for the Training Workshop ............................. 13

PART II : GUIDELINES FOR CONDUCTING INDIVIDUAL CORE MODULES .... 15
1. Core Module One: Introduction to Arsenic Problem in South-East Asia .... 17
   1.1 Objectives of the Module .............................................................. 17
   1.2 Checklist for Module One Specific Materials .................................. 17
   1.3 Suggested Time and Sequence for Module One ............................ 18
   1.4 Workshop Pre-test .................................................................... 19
   1.5 Lecture One: Introduction to the Course ...................................... 19
   1.6 Pre-Test Questionnaire ............................................................... 20
2. Core Module Two: Epidemiology of Arsenicosis in South-East Asia ........ 25
   2.1 Objectives of the Module .............................................................. 25
   2.2 Checklist for Module Two Specific Materials .................................. 25
   2.3 Suggested Time and Sequence for Module Two ............................ 26
   2.4 Exercise A: Introduction and Epidemiology of Arsenicosis .............. 26
3. Core Module Three: Clinical Aspects of Arsenicosis ............................ 31
   3.1 Objectives of the Module .............................................................. 31
   3.2 Checklist for Module Three Specific Materials .............................. 31
   3.3 Suggested Time and Sequence for Module Three .......................... 32
3.4 Exercise B: Drill on Clinical Aspects of Arsenicosis .................. 33
3.5 Exercise C: Clinical Aspects .......................................... 34

4. Core Module Four: Case Definition .................................. 37
4.1 Objectives of the Module .............................................. 37
4.2 Checklist for Module Four Specific Materials ...................... 37
4.3 Suggested Time and Sequence for Module Four ................ 38
4.4 Exercise D: Case Definition ......................................... 39
4.5 Exercise E: Case Studies and Photograph Exercise Session .... 46

5. Core Module Five: Laboratory Support ............................. 55
5.1 Objectives of the Module .............................................. 55
5.2 Checklist for Module Five Specific Materials .................... 55
5.3 Suggested Time and Sequence for Module Five ................. 56
5.4 Exercise F: Laboratory Support ..................................... 57

6. Core Module Six: Case Management of Arsenicosis .............. 61
6.1 Objectives of the Module .............................................. 61
6.2 Checklist for Module Six Specific Materials ..................... 61
6.3 Suggested Time and Sequence for Module Six ................. 62
6.4 Exercise G: Case Management ..................................... 63

7. Core Module Seven: Case Surveillance ............................... 67
7.1 Objectives of the Module .............................................. 67
7.2 Checklist for Module Seven Specific Materials .................. 67
7.3 Suggested time and sequence for Module seven ............... 68
7.4 Exercise H: Case Surveillance ...................................... 69

8. Core Module Eight: Workshop Summary and Closure ............ 77
8.1 Objectives of the Module .............................................. 77
8.2 Checklist for Module Eight Specific Materials .................. 77
8.3 Suggested Time and Sequence for Module Eight ............... 78
8.4 Post-Test ................................................................. 79
8.5 Summary and Review of Workshop .................................. 84
8.6 Certificate Distribution and Closing Ceremony .................... 84

PART III : LIST OF OPTIONAL MODULES ............................ 85

9. Supplementary Module Nine: Practicum and Exercises .......... 87
9.1 Overall Objectives of the Module ................................ 87
9.2 Checklist for Module Nine-specific Materials ................ 87
9.3 Modality of Optional Module ...................................... 88
9.4 Option 1: CASE IDENTIFICATION AND DEMONSTRATION ........................................89
   9.4.1 Objectives of Option 1 .................................................................89
   9.4.2 Checklist for Option 1 .................................................................89
   9.4.3 Suggested Time and Sequence for Option 1 .................................90
   9.4.4 Option 1 Part 1: Clinical Demonstration ......................................91
   9.4.5 Option 1 Part 2: Clinical Practice ...............................................92
   9.4.6 Summary of Field Visit for Case Identification .............................92
9.5 Option 2: CASE MANAGEMENT .........................................................93
   9.5.1 Objectives of Option 2 .................................................................93
   9.5.2 Checklist for Option 2 .................................................................93
   9.5.3 Suggested Time and Sequence for Option 2 .................................94
   9.5.4 Option 2 Part 1: Demonstration of Clinical Management Strategies ....95
   9.5.5 Option 2 Part 2: Supplementary Exercise on Case Management ..........97
9.6 Option 3: LABORATORY EXPERIENCE ..............................................100
   9.6.1 Objectives of Option 3 .................................................................100
   9.6.2 Checklist for Option 3 .................................................................100
   9.6.3 Suggested Time and Sequence for Option 3 .................................101
   9.6.4 Option 3 Part 1: Specimen Handling ...........................................102
   9.6.5 Option 3 Part 2: Demonstration of Field Kits .................................103

PART IV: LIST OF APPENDICES ..........................................................105

Appendix 1: Detailed Checklist for Workshop Preparation and Planning ............107
Appendix 2: Flow Chart of Case Definition Algorithm .................................111
Appendix 3: Photograph Reading Form ..................................................113
Appendix 4: Clinical Practice Form for Field Exercise ..................................115
Appendix 5: List of Contributors .........................................................123
Appendix 6: Suggested Agenda ............................................................125
INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES OF WHO'S ARSENIC PROGRAMME

Globally, arsenicism, also referred to as arsenism, is an important non-communicable disease resulting from drinking arsenic contaminated groundwater. Groundwater contamination, in excess of the WHO guideline value, has been observed in some countries of WHO's South-East Asia Region namely - Bangladesh, India, Myanmar, Nepal and Thailand. Over 10 million tube wells are in use in the Region, potentially exposing between 40 to 50 million people to unsafe levels of arsenic. The associated disease burden could affect around 12 million people within 10 years.

Critical gaps in case-detection, case-reporting and case-management remain to be addressed. A uniform case-definition is the cornerstone of both case-reporting and assessing the efficacy of any management protocol. In the absence of proven therapy for clinical management of chronic arsenic poisoning, a number of unsubstantiated therapeutic measures are used for treating arsenicosis cases.

The WHO field guide for detection, management and surveillance of arsenicosis serves to fill these gaps. It can be used to produce a critical mass of trained healthcare professionals who can respond to national needs and properly diagnose and manage arsenicosis patients. They can also effectively manage the national programme for mitigation of arsenicosis. The WHO guide will be the basis for training trainers, either at the institutional, university or control programme levels. Eventually, it will help in programme implementation by national governments, donor agencies and NGOs alike. One practical way to train trainers is by conducting a workshop and this Facilitator's Guide will be of use during such workshops.

1.2 EXPECTED OUTCOMES OF THE WORKSHOP

At the end of the training, the participants would have acquired the skills and competence to organize similar workshops in their own settings, using local materials and resources to specifically be able to:

- Understand and describe the programme strategy for arsenic mitigation;
- Understand and describe the epidemiology of arsenicosis in South-East Asia;
- Recognize the clinical aspects of arsenicosis, including its pathogenesis, and identify the clinical manifestations of arsenicosis cases from actual patients or photographs;
- Understand the rationale of case definition and be able to identify and classify cases on the basis of WHO algorithm;
- Maximally use laboratory support to collect relevant specimens, order appropriate tests and interpret the results;
INTRODUCTION

- Understand the various strategies for patient management and accordingly manage, follow up or refer cases of arsenicosis; and
- Understand the strategies for and develop skills relating to surveillance of arsenicosis, exchange of information and how to provide feedback.

1.3 INTENDED BENEFICIARIES

The course is targeted at healthcare providers involved in arsenicosis management. The main professional categories are:

(1) Officials of national or regional authorities involved in developing policies on arsenicosis management;

(2) Healthcare workers including doctors, nurses and policy makers involved in training of arsenicosis management, and

(3) Environmental or health and safety regulators

1.4 CONDUCTING A TRAINING WORKSHOP

RESOURCE MATERIALS SUPPLIED IN THE WORKSHOP PACKAGE

The Facilitator’s Guide and the Compact Disc provide the following resource materials for conducting a workshop:

1. A CD of the WHO Field Guide, Facilitator’s and Participants Handbooks and PowerPoint presentations of all lectures

2. Hard copies of the WHO Field Guide, Facilitator’s and Participants Handbooks and PowerPoint presentations of all lectures

3. Guidelines for planning and preparation of the workshop, given in Part I

4. Detailed instructions for teaching each module, given in Part II

5. Exercises and Answers for all modules

6. Optional Modules and Exercises for extended workshop.
ADDITIONAL RESOURCE MATERIALS NEEDED (NOT SUPPLIED WITH THE WORKSHOP PACKAGE)

The following additional resource materials are needed for conducting the workshop:

1. Resource persons - lecturer and facilitator

2. Supplementing the lecture for each module with local information on epidemiology, practice and policy, wherever needed

3. Materials and audiovisual equipment
PART-I

PLANNING AND PREPARATION
1.1 CONTENTS OF THE ARSENICOSIS TRAINING WORKSHOP

The materials are divided into modules to facilitate organization and teaching. Each module consists of a lecture, reading and problem-based exercises.

The materials in this guideline are comprehensive enough to cover the eight basic core modules of an introductory four-day course or an expanded five-day course which would include optional modules and field visits. The contents and suggested time for each module are summarized in Table 1.
Table 1: Proposed course contents on mandatory modules for a four-day course

**Table 1: Proposed course contents on mandatory modules for a four-day course**

<table>
<thead>
<tr>
<th>TIME</th>
<th>DAY 1</th>
<th>TIME</th>
<th>DAY 2</th>
<th>TIME</th>
<th>DAY 3</th>
<th>TIME</th>
<th>DAY 4</th>
</tr>
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<tbody>
<tr>
<td>Session 1*</td>
<td>INTRODUCTION</td>
<td>Session 4</td>
<td>CASE DEFINITION</td>
<td>Session 8</td>
<td>CONCLUDING SESSION</td>
<td>Session 9</td>
<td>OPTIONAL MODULES</td>
</tr>
<tr>
<td>15 min</td>
<td>Pre-test</td>
<td>20 min</td>
<td>Formal presentation 4</td>
<td>15 min</td>
<td>Formal presentation 8</td>
<td>15 min</td>
<td>Introduction and objectives for all modules</td>
</tr>
<tr>
<td>10 min</td>
<td>Introduction of facilitators and participants</td>
<td>20 min</td>
<td>Participants read through section 4</td>
<td>15 min</td>
<td>Post-test</td>
<td>50 min</td>
<td>Option 1 Part 1, Clinical Demonstration</td>
</tr>
<tr>
<td>20 min</td>
<td>Introduction of the formal course presentation 1</td>
<td>50 min</td>
<td>Exercise D: Case definition</td>
<td>60 min</td>
<td>Option 1 Part 2, Clinical practice</td>
<td>50 min</td>
<td>Option 2 Part 1, Demonstration of clinical management strategies</td>
</tr>
<tr>
<td>10 min</td>
<td>Participants read through section 1 + Module 1 summary</td>
<td>60 min</td>
<td>Exercise E: Case studies and photo exercise session + Module 4 summary</td>
<td>15 min</td>
<td>Summary of all Modules</td>
<td>40 min</td>
<td>Option 2 Part 2, Supplementary Exercise on Case Management</td>
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<tr>
<td>Total Time: 55 min</td>
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<td>Total Time: 150 min</td>
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<td>Total Time: 90 min*</td>
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<td>45 min</td>
<td>Option 3 Part 1, Specimen Handling</td>
</tr>
<tr>
<td>Session 2</td>
<td>EPIDEMIOLOGY OF ARSENICOSIS</td>
<td>Session 5</td>
<td>LABORATORY SUPPORT</td>
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<td></td>
<td>70 min</td>
<td>Option 3 Part 2, Demonstration of field kit</td>
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<tr>
<td>35 min</td>
<td>Formal presentation 2</td>
<td>20 min</td>
<td>Formal presentation 5</td>
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<td>30 min</td>
<td>Wrap up</td>
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<tr>
<td>10 min</td>
<td>Participants read through section 2</td>
<td>20 min</td>
<td>Participants read through section 5</td>
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<tr>
<td>20 min</td>
<td>Exercise A: Introduction and Epidemiology of Arsenicosis + Module 2 summary</td>
<td>50 min</td>
<td>Exercise F: Laboratory diagnosis, review answers + Module 5 summary</td>
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<tr>
<td>Total Time: 65 min</td>
<td></td>
<td>Total Time: 90 min</td>
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<tr>
<td>Session 3</td>
<td>CLINICAL ASPECTS</td>
<td>Session 6</td>
<td>CASE MANAGEMENT</td>
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<tr>
<td>20 min</td>
<td>Formal presentation 3</td>
<td>20 min</td>
<td>Formal presentation 6</td>
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<tr>
<td>10 min</td>
<td>Participants read through section 3</td>
<td>10 min</td>
<td>Participants read through section 6</td>
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<tr>
<td>15 min</td>
<td>Exercise B: Drill on clinical aspects</td>
<td>20 min</td>
<td>Exercise G: Case management</td>
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<td>20 min</td>
<td>Exercise C: Clinical aspects + Module 3 summary</td>
<td>40 min</td>
<td>Exercise H: Case studies on case management + Module 6 summary</td>
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<td>Total Time: 65 min</td>
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<td>Total Time: 90 min</td>
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<tr>
<td>Session 7</td>
<td>CASE SURVEILLANCE</td>
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<tr>
<td>20 min</td>
<td>Formal presentation 7</td>
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<tr>
<td>20 min</td>
<td>Participants read through section 7</td>
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<tr>
<td>100 min</td>
<td>Exercise H: Case surveillance</td>
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<tr>
<td>50 min</td>
<td>Exercise H – Group work</td>
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<tr>
<td>10 min</td>
<td>Module 7 summary</td>
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<tr>
<td>Total Time: 200 min</td>
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1.2 GUIDELINES ON PLANNING AND PREPARATION

Advance planning and preparation are key components of a successful workshop. These include both logistic and technical aspects. Preparations should ideally start 8 to 10 weeks before the due date of the workshop. It is recommended that a small group of 2-3 individuals form the planning group to review the proposed list attached in appendix 1 and distribute the responsibilities to facilitators 6-8 weeks prior to the workshop.

The flow chart below outlines both the logistics and technical aspects.

Schedule A: Flow chart for planning and preparation

<table>
<thead>
<tr>
<th>8-10 weeks</th>
<th>Date Initiated</th>
<th>2 weeks before</th>
<th>Date Initiated</th>
<th>1 week before</th>
<th>Date Initiated</th>
<th>1 day before</th>
<th>Date Initiated</th>
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<tbody>
<tr>
<td>Draft Agenda of workshop</td>
<td></td>
<td>Check availability of required documents</td>
<td></td>
<td>Confirm availability of guest for opening ceremony.</td>
<td></td>
<td>Check workshop meeting room</td>
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<tr>
<td>Contact facilitators and delegate responsibilities</td>
<td></td>
<td>Make transparency slides/power point projection</td>
<td></td>
<td>Confirm the number of participants</td>
<td></td>
<td>Check equipment available in the workshop room</td>
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<tr>
<td>Select participants</td>
<td></td>
<td>Check workshop equipment</td>
<td></td>
<td>Confirm venue and accommodation arrangements</td>
<td></td>
<td>Check participants’ materials in workshop room</td>
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<tr>
<td>Arrange accommodation and meals</td>
<td></td>
<td>Confirm availability of facilitators</td>
<td></td>
<td>Confirm catering arrangements</td>
<td></td>
<td>Provide a briefing note for the participants on arrival</td>
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<td>Check workshop facility</td>
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<td>Greet participants who arrive early</td>
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<td>Arrange for photocopying and computers</td>
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<td>Procure workshop equipment</td>
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<tr>
<td>Collate participants’ materials</td>
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<td>1. Field Guide</td>
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<td>2. Facilitator’s Guide</td>
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<td>3. Participants Handouts</td>
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<tr>
<td>Notify participants of dates and venue</td>
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The role of the coordinator

The course co-coordinator is responsible for the overall organization of the course. The coordinator’s main tasks are:

- Follow the steps given in the checklist.
- Use Schedule A to ensure that the required preparations take place on time.
- Write the date and put a tick (✓) mark in the space provided next to the activity in Schedule A to indicate that the activity has been completed.
- Ensure availability of materials not supplied with the course package.
- Distribute materials supplied in the course package.
- Cross-check the sub tasks for each activity in the schedule given below as illustrated in the attached checklist (Appendix 1).
- Contact the course lecturer / facilitator etc.
- Collect daily feedback on each module and give them to the lecturer.

The workshop planning team should work with the organizations to be invited in helping them select appropriate candidates. It is recommended to invite a cross-section of healthcare providers representing different organizations and settings such as the Ministry of Health, universities or the private sector. This would enhance the opportunity of networking during the workshop, as well as post-workshop communication such as collaboration and exchange of experiences. If a follow-up workshop is to be held, the area of inter-organizational collaboration might be further discussed.

One of the first tasks is to set an agenda for the meeting depending on the objectives, the needs of the participants and the duration of the workshop (Appendix 6). Decide whether this will be a 4-day or a 5-day workshop. A decision is needed on whether any optional exercises and modules will be used in addition to the core modules, and necessary preparation made accordingly.
**Preparations 8-10 weeks before the workshop**

Most of the preparations will be logistical and will cover:

1. Selecting and inviting the participants
2. Initiating work on venue, accommodation and meals
3. Ensuring workshop materials by procuring:
   ✓ Sufficient copies of the WHO Field Guide for Detection, Management and Surveillance of Arsenicosis
   ✓ Sufficient copies of the WHO Guide for Facilitators
   ✓ Sufficient copies of WHO Handouts for the participants
   ✓ Sufficient copies of the pre- and post-test questionnaires
   ✓ Sufficient number of photographs for module four on case-definition
   ✓ Standard materials and equipment
4. Send a complete set of course materials to each lecturer, facilitator and coordinator.

**Technical preparations 8-10 weeks before the workshop**

The advance technical preparations will consist of:

✓ Drafting the agenda for the workshop.
✓ Informing the lecturers about their role. Sending them the relevant materials and asking them to review the lecture and incorporate their own notes in the space provided. Also ask them to review the exercises relevant to their topics.
✓ Make sure you collect local materials, data and information on the strategies, practices and norms for arsenicosis in the given country or district.

**Logistic preparation 2 weeks before the workshop make sure you have:**

✓ Sufficient copies of the WHO Field Guide for Detection, Management and Surveillance of Arsenicosis
✓ Sufficient copies of the WHO Guide for Facilitators
✓ Sufficient copies of WHO handouts for the participants
✓ Sufficient number of photographs for module four on case-definition
✓ All standard materials and equipment or have ordered them
✓ Confirmed the availability of facilitators
Logistic preparation 1 week before the workshop

✓ Confirm the availability of speaker, guests and participants for the opening ceremony
✓ Confirm venue and accommodation arrangements
✓ Confirm catering arrangement
✓ Confirm if the lecturers have incorporated the relevant materials in their own notes in the materials provided and whether they have reviewed the exercises relevant to their topics

Logistic Preparation 1 day before the workshop

✓ Make sure all workshop tools and materials have been delivered to the venue
✓ Check the sitting arrangements at the venue
✓ Test the projectors, computers and other audio-visual aids
✓ Provide briefing notes to participants about the exact time and venue of the meeting

Technical Preparation 1 day before the workshop

All course coordinators, lecturers, and facilitators must meet one day before the workshop if possible to review the progress on all lectures and decide on the modality of the course so as to ensure coordination and prevent duplication and contradiction.

Guidelines for a formal opening ceremony

The formal opening is an opportunity to reflect on the importance accorded to arsenicosis mitigation at the national or regional level and to reiterate the need for such programmes.

When planning a formal opening, invite the speakers well in time and provide them with a copy of the provisional programme and the time available for speeches. The keynote-speakers should provide factual information on arsenicosis, the resources available and ways of strengthening arsenic mitigation.

To minimize the risk that speeches at the opening ceremony run into the time allocated for the modules, arrange for a coffee break immediately after the opening session: this provides a target in terms of time, as well as an opportunity for guests and dignitaries to leave before the working sessions begin.
1.3 TEACHING METHODS

All teachers and facilitators must be clearly briefed to teach the course using the style of problem-based, interactive methods to promote active learning by the participants. At least one tutor must be a clinical doctor, preferably a specialist in dermatology or arsenicosis detection and management. The following methods will be used during the training:

(A) FORMAL PRESENTATIONS

Each module will be taught by a lecturer who is preferably an expert in the selected topics but who is briefed about the objectives and philosophy of each module. The lecturer must use the standard presentation that is supplied and may add local information on epidemiology and policies of their country in the slides designated for this purpose. The presentations will be followed by discussions. It is also important for the facilitators to time their session in advance to avoid the risk of running short of time.

(B) READING SESSIONS

Each module has been assigned a reading section from the Field Guide. Give the participants enough time to read these sections. Take the opportunity to re-read these sections with the participants as you will have to clarify any issues that they may have.

(C) EXERCISES

Each module is accompanied by a set of problem-based exercises to reinforce the concepts developed in the course. Exercises A to I pertain to the core modules. The participants must complete these on their own, except where otherwise indicated. At the end of the session, provide the right answers and indicate the relevant section of the Guide to which the questions refer. Supplementary exercises on case management and surveillance are provided in Module 3 for those participants requiring extra practice.

(D) GROUP DISCUSSIONS

This will provide an opportunity for all the participants to reflect on issues where there may be differences in practice and where a consensus may be needed. This will be coordinated by the facilitator according to the instructions of each module.
(E) CASE STUDIES AND PHOTOGRAPH SESSION

In these, the hypothetical scenario described is followed by certain questions which enable the participants to discuss the issues and become familiar with the use of the WHO algorithm. The emphasis is on using a problem-based approach to develop the skills in differentiating arsenicosis from other conditions that resemble the disease.

(F) FIELD PRACTICAL SESSION

This is an optional module to provide the participants hands-on experience in applying the knowledge and skills they have developed in this workshop towards diagnosing and managing arsenicosis cases. Four options are presented: option one is on case definition, option two is on case management, option three is on specimen handling and option four is on the use of field kits. It is recommended that at least one option be chosen for each course. The choice of optional modules will depend on the needs of the participants and the duration of the course.

1.4 EVALUATION METHODS FOR THE TRAINING WORKSHOP

In this workshop, the following evaluation methods will be used:

(A) PRE- AND POST-TESTS

The impact of the training workshop in imparting new knowledge or skills to the participants will be assessed by pre- and post-tests. A set of 20 questions have to be administered at the beginning and at the end of the workshop.

(B) DAILY MULTIPLE CHOICE QUESTIONS

Except for the introductory module, multiple-choice questions have been incorporated in each module. These enable the tutor to assess how much the participants have assimilated.
PART-II

GUIDELINES FOR CONDUCTING INDIVIDUAL CORE MODULES
1

Core Module One

Introduction to Arsenic Problem in South-East Asia

1.1 Objectives of the Module

At the end of the course, the participants should be able to:

- Explain the rationale of the course
- Outline the learning objectives
- List the goals and strategies of the WHO Arsenic Mitigation Programme
- Understand the learning modalities and course logistics.

1.2 Checklist for Module One Specific Materials

In addition to the checklist given in section 1.2 of Part I of this Guide, the following module-specific preparations are needed:

- Make sure that the facilitators are clear about their role in delivering the lecture on Introduction to the Arsenic problem in South-East Asia.
- Send them relevant materials and ask them to review the lecture and incorporate their own notes in the space provided.
- Ask them to review the exercises relevant to their topics.
- Review the list of the participants before to familiarize yourself with their names and work areas.
- Take the pre-test yourself.
- Check that the CD is compatible with your system and that the projection system is working.
1.3 SUGGESTED TIME AND SEQUENCE FOR MODULE ONE

Follow the sequence of presentation given in Figure 1:

**Sequence of events and suggested time duration**

1. **Introduction of course participants and staff** - 10 min
2. **Administer Workshop Pre-test** - 15 min
3. **Deliver the Introductory lecture on Goal of Arsenic Program Describe Objectives and teaching modality of the workshop** - 15 min
4. **Participants read through section 1 on Introduction from the Guide** - 10 min
5. **Wrap-up Module one** - 5 min

*Figure 1: Organisation of Module One*
First, introduce yourself as a facilitator of the course and write your name on the blackboard or flipchart. Ask the participants and other facilitators to introduce themselves, their places of work and experience in dealing with arsenicosis. Leave the list of names at a place where everyone can see it to help you and the participants learn each other’s names.

First, introduce yourself as a facilitator of the course and write your name on the blackboard or flipchart. Ask the participants and other facilitators to introduce themselves, their places of work and experience in dealing with arsenicosis. Leave the list of names at a place where everyone can see it to help you and the participants learn each other’s names.

1.4 WORKSHOP PRE-TEST

Ask the participants to answer the pre-test questionnaire from module one of their handouts. Read the instructions for answering the multiple choice questions.

Give the participants 10 minutes to finish the task. Thereafter, collect all the forms. Do not discuss the answers. Evaluate the forms at the end of the day and compile the findings.

1.5 LECTURE ONE: INTRODUCTION TO THE COURSE

Third, deliver lecture one, following the sequence of slides in lecture one of the Compact Disk provided. Immediately after the lecture ask the participants to read section 1 “Introduction” of the Field Guide for Detection, Management and Surveillance of Arsenicosis. After everyone has finished reading, ask the participants if they have any questions about what they have read in this module or heard in the opening session. Answer their questions pertaining to this module only and defer other questions to the relevant module of the course.
1.6 PRE-TEST QUESTIONNAIRE

Training Workshop on Detection, Management and Surveillance of Arsenosis

Batch no.: ____________________________________________

Venue: ____________________________________________

Date: ____________________________________________

Instructions: Kindly fill the details regarding batch number, venue and date in the space provided above. Do not write your name. All questions have a single answer. Put a tick mark against the chosen option in the box provided. All questions should be answered.

**Question 1:** Which current WHO guidelines value for arsenic-contaminated ground water is in excess of?

- a) 10 mg/litre  
- b) 50 µg/litre  
- c) 0.01 mg/litre  
- d) 25 mg/litre  
- e) None of the above

**Question 2:** Which are the countries known for arsenic-contaminated ground water?

- a) Timor-Leste
- b) Sri Lanka
- c) India, Bangladesh, Myanmar, Thailand, Canada
- d) b and c only
- e) All of the above

**Question 3:** Which one of the following describes the epidemiology of arsenic best in South-East Asia?

- a) The main source of arsenic is from the alluvium of the Brahmaputra-Ganges river basin
- b) At least 30 million people may be at risk for arsenic disease in the Region
- c) Prolonged exposure to non-lethal dose ranging from 0.005 to 0.09 mg/kg of body Weight/day can result in arsenicosis
d) All of the above

e) None of the above

**Question 4:** The type of health impact resulting from arsenic exposure depends on:

a) Dose of arsenic
b) Modality of exposure
c) Chemical forms of arsenic
d) All of the above
e) None of the above

**Question 5:** The hallmark of arsenicosis is:

a) Melanosis
b) Keratosis
c) Melanosis or keratosis
d) Melanosis and keratosis
e) None of the above

**Question 6:** Which one of the following statements is true of arsenic-related melanosis?

a) It can occur as fine-freckled or spotted pattern on the trunk and extremities
b) Melanosis can occur as diffused or generalized pigmentation
c) Pigmentation of the oral mucosa may occur in combination with localized or patchy pigmentation on the body
d) All of the above
e) None of the above

**Question 7:** Which one of the following statements is true of keratosis in arsenicosis course?

a) It is characterized by thickening of skin and appearance of papules or nodules
b) It can be sub-categorized as mild, moderate or severe depending on the size of elevations
c) In severe keratosis, the elevation is less than 5 mm on the palms and soles
d) All of the above
e) a and b only
Question 8: The major diagnostic criteria for case definition include:
   a) Presence of pigmentary / keratotic skin lesions
   b) Nutritional status
   c) Exposure to elevated levels of arsenic
   d) Age
   e) a & c

Question 9: According to WHO algorithm, a probable case of arsenicosism is a case:
   a) With definite keratosis
   b) With keratosis and melanosis
   c) Melanosis or keratosis after excluding other skin lesions mimicking arsenicosism
   d) With raindrop pigmentation
   e) b & c

Question 10: According to WHO algorithm, a clinically confirmed case of arsenicosism is a case with:
   a) Keratosis and Melanosis
   b) Skin lesion and history of exposure
   c) History of exposure
   d) Skin lesions and laboratory test positive
   e) Probable case in whom the presence of other arsenicosism simulating skin lesions has been ruled out

Question 11: Which one of the following laboratory methods is the gold standard for testing arsenic?
   a) Calorimetric method
   b) Gravimetric method
   c) Atomic Absorption Spectrophotometry
   d) All of the above
   e) None of the above

Question 12: Which one of the following specimens can help decide chronic exposure to arsenic?
   a) Blood
   b) Nails
   c) Hair
d) Urine

e) b and c

**Question 13:** The nail clippings of a patient with typical raindrop pigmentation and palmo-plantar keratosis and history of exposure to arsenic for over 8 years reveal a negative result from laboratory A. Two repeat samples are sent to laboratory A and laboratory B. Laboratory A reports negative and B reports positive test. What would you do?

a) Classify the patient as not a case

b) Send a third sample to laboratory A

c) Check the standard operating procedures of the laboratory A

✓

d) Repeat another test later

e) None of the above

**Question 14:** Which one of the following skin symptoms in arsenicosis requires treatment with local applicants?

a) Melanosis alone

b) Keratosis alone

c) Melanosis and Keratosis both

✓

d) b and c

e) None of the above

**Question 15:** What is the management of a “probable case” in whom it is not possible to clinically confirm or rule out diagnosis of arsenicosis by a dermatologist or a specialist?

a) Patient should retain the diagnosis of probable case

b) Patient should be labelled as ‘not a case of arsenicosis’

c) Re-evaluation of case by medical specialist periodically

✓

d) a and c only

e) b and c only

**Question 16:** What are the available safe water options to prevent exposure to arsenic?

a) Arsenic-free tube well

b) Rain water harvesting

c) Filter for removing arsenic

✓

d) a, b and c

e) None of the above
Question 17: Which one of the following non-dermatological manifestations of arsenicosis requires specific management?

a) Chronic cough and respiratory distress
b) Sensorineural peripheral neuropathy and peripheral vascular disease
c) Hematuria and non-pitting oedema
d) All of the above
e) None of the above

Question 18: Which type of surveillance system is most suitable for routine detection of arsenicosis?

a) An active surveillance system
b) A passive surveillance system
c) A sentinel surveillance system from arsenic clinics
d) b and c only
e) a, b and c

Question 19: What minimum data set should be collected for an arsenicosis case?

a) Whether the case is suspected, probable or confirmed
b) The age of the case
c) The geographical location of the case
d) Only b and c
e) a, b, and c

Question 20: What are the main surveillance tasks at the intermediate level of healthcare?

a) To clinically confirm all the “suspected” and “probable” cases
b) To provide clinical management of Bowen’s disease and other systemic disorders
c) Provide feedback to the primary level on trends of the disease
d) None of the above
e) All of the above
2.1 OBJECTIVES OF THE MODULE

At the end of the session, the participants should be able to:

• Know the epidemiology of arsenicosis in South-East Asia
• Understand the pathway for exposure to arsenic
• Recognize the different health impacts of arsenic exposure

2.2 CHECKLIST FOR MODULE TWO SPECIFIC MATERIALS

In addition to the checklist given in section 1.2 of Part I of this guide, the following module-specific preparations are needed:

✓ Make sure that the facilitators are clear about their role in delivering the lecture on Epidemiology of Arsenicosis in South-East Asia
✓ Send them the relevant materials and ask them to review the lecture and incorporate their own notes in the space provided
✓ Ask them to review the exercises relevant to their topics
✓ Update the slide on local epidemiology of arsenic
✓ Rehearse the lecture to time yourself
✓ Read section 1 to anticipate any ambiguity
✓ Take Exercise "A" on Introduction and Epidemiology of Arsenicosis yourself
✓ Check that the CD is compatible with your system and that the projection system is working
2.3 SUGGESTED TIME AND SEQUENCE FOR MODULE TWO

Follow the sequence of steps outlined in Figure 2.

**Sequence of events and suggested time duration**

1. Describe objectives and teaching modality of module two (10 min)
2. Deliver Lecture Epidemiology of Arsenicosis in South East Asia (10 min)
3. Participant read section 2 of the Guide (15 min)
4. Participant Do Exercise A (10 min)
5. Review Answer of Exercise A and cross-reference with relevant parts of the Guide (10 min)

*Figure 2: Organisation of Module Two*

2.4 EXERCISE A: INTRODUCTION AND EPIDEMIOLOGY OF ARSENICOSIS

**INSTRUCTIONS TO FACILITATORS**

Ask the participants to take out Exercise A from the Participants’ Course Handout. They should read the questions and tick mark the appropriate answers individually. On completion of the exercise
each individual participant is given a feedback by one of the facilitators. While providing feedback, encourage the participants to identify the mistakes and search the right solutions. Keep the feedback short and focussed. Do not go into any theoretical details or controversies. The questions and answers to the exercise are as given below:

**Question 1:** Select the countries where groundwater contamination with unsafe levels of arsenic has been reported.

- a) Argentina
- c) Bangladesh
- e) India
- g) Timor Leste
- i) Viet Nam
- k) Canada
- m) Nepal
- b) Chile
- d) Maldives
- f) Thailand
- h) Myanmar
- j) Cambodia
- l) Sri Lanka

**Question 2:** The current WHO guideline value for groundwater contamination with arsenic is in excess of

- a) 10 mg/litre
- c) 10 µg/litre
- d) 25 mg/litre
- e) None of the above

**Question 3:** Which one of the following statements applies to the WHO Field Guide for Detection, Management and Surveillance of Arsenicosis?

- a) Ensure consistency in the diagnosis and management of arsenicosis
- b) Provide a set of objective criteria for the evaluation of any intervention measures
- c) It is based on evidence reviewed by an expert group
- d) All of the above
- e) None of the above

**Question 4:** When did WHO first assess the risk of arsenic in drinking water?

- a) 1958
- b) 1981
- c) 1996
Question 6: Exposure to arsenic in the environment may be through:

a) Ingestion of soil and food items
b) Ingestion of traditional medicine
c) Ingestion of contaminated water
d) a & c only
e) a, b & c

Question 7: The application of the health risk paradigm for responding to the arsenic hazard consists of:

a) Exposure assessment
b) Risk characterization
c) Risk management
d) All of the above
e) None of the above

Question 8: The types of health impact resulting from arsenic exposure depend on:

a) Dose of arsenic
b) Modality of exposure
c) Chemical forms of arsenic
d) All of the above
e) None of the above

Question 5: Match the correct monitoring criteria with the following strategic goals for arsenic mitigation:

<table>
<thead>
<tr>
<th>Monitoring criteria</th>
<th>Strategic goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratories</td>
<td>Strengthening Infrastructure</td>
</tr>
<tr>
<td>Risk elimination</td>
<td>Responding to Arsenic hazard</td>
</tr>
<tr>
<td>Arsenic network</td>
<td>Strengthening Infrastructure</td>
</tr>
<tr>
<td>Human resources</td>
<td>Capacity building</td>
</tr>
<tr>
<td>Exposure assessment</td>
<td>Responding to Arsenic hazard</td>
</tr>
</tbody>
</table>

d) 2002
e) None of the above

Question 5: Match the correct monitoring criteria with the following strategic goals for arsenic mitigation:

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</tr>
<tr>
<td>Exposure assessment</td>
<td>Responding to Arsenic hazard</td>
</tr>
</tbody>
</table>

d) 2002
e) None of the above

Question 6: Exposure to arsenic in the environment may be through:

a) Ingestion of soil and food items
b) Ingestion of traditional medicine
c) Ingestion of contaminated water
d) a & c only
e) a, b & c

Question 7: The application of the health risk paradigm for responding to the arsenic hazard consists of:

a) Exposure assessment
b) Risk characterization
c) Risk management
d) All of the above
e) None of the above

Question 8: The types of health impact resulting from arsenic exposure depend on:

a) Dose of arsenic
b) Modality of exposure
c) Chemical forms of arsenic
d) All of the above
e) None of the above
Question 9: Which of the following best describes the epidemiology of arsenic in South-East Asia?

a) The main source of arsenic is from the alluvium of the Brahmaputra-Ganges river basin
b) At least 30 million persons may be at risk for arsenicosis in the Region
c) Prolonged exposure to a non-lethal dose ranging from 0.005 to 0.09 mg/kg of body weight/day can result in arsenicosis
d) All of the above

e) None of the above

Question 10: Cancers observed in subjects exposed to arsenic-contaminated water include:

a) Skin
b) Lungs
c) Bladder
d) Kidney
e) All of the above
3

CORE MODULE THREE

CLINICAL ASPECTS OF ARSENICOSIS

3.1 OBJECTIVES OF THE MODULE

At the end of the course, the participants should be able to:

• Understand the pathogenesis of arsenicosis
• Describe and recognize the clinical features of arsenicosis
• Distinguish arsenicosis from other common skin conditions

3.2 CHECKLIST FOR MODULE THREE SPECIFIC MATERIALS

In addition to the checklist given in section 1.2 of Part I of this Guide, the following module-specific preparations are needed.

• Make sure that the facilitators are clear about their role in delivering the lecture on Clinical Aspects of Arsenicosis
• Send the relevant material and ask them to review the lecture and incorporate their own notes in the space provided.
• Ask them to review Exercise B on Drill in Clinical Aspects and Exercise C on Clinical Aspects relevant to their topics.
• Update the slide on common local clinical manifestations of arsenicosis e.g. black foot disease etc.
• Rehearse the lecture to time yourself
• Read section 3 to anticipate any ambiguity
• Take Exercises “B” and “C” on Clinical Aspects yourself
• Check that the CD is compatible with your system and that the projection system is working.

HAVE YOU GOT THE FOLLOWING MATERIALS?
3.3 SUGGESTED TIME AND SEQUENCE FOR MODULE THREE

Follow the sequence of steps outlined in Figure 3:

**Sequence of events and suggested time duration**

1. Describe objectives and teaching modality of module three (10 min)
2. Deliver the Lecture on Clinical Aspects of Arsenicosis (10 min)
3. Participant Read section 3 of the Guide (15 min)
4. Participant should complete Drill B in group and Exercise C alone (20 min)
5. Review answers of Exercise B & C and cross-reference with relevant parts of the Guide (10 min)

*Figure 3: Organisation of Module Three*
3.4 EXERCISE B: DRILL ON CLINICAL ASPECTS OF ARSENICOSIS

Tell the participants that they have to answer whether the statement is true or false when their turn comes.

Illustrate what they will be doing in the drill by asking a question from the other facilitator. Begin by asking, “Arsenic deposited in the nails and hair is bound to keratin”. The answer is true. Start the drill after this example by asking the first question. Call on a participant to provide the answer. He/she should answer as quickly as possible. Then ask the next question and call on another participant to answer. If a participant gives an incorrect answer, ask the next participant if he can answer. Continue the drill until all participants can answer correctly. The questions given in the drill can be repeated to expose the participants to some of the questions that are difficult.

Exercise B: Drill on Clinical Aspects

<table>
<thead>
<tr>
<th>Statement</th>
<th>Answers - True/False</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic deposited in the nails and hair is bound to keratin.</td>
<td>True</td>
</tr>
<tr>
<td>Arsenic is excreted from the body mainly through urine.</td>
<td>True</td>
</tr>
<tr>
<td>Leg pain and intermittent cramps in the leg are uncommon perivascular complications in South-East Asia.</td>
<td>False</td>
</tr>
<tr>
<td>Arsenic is sometimes associated with neurological, haematological, cardiovascular or CNS abnormalities.</td>
<td>True</td>
</tr>
<tr>
<td>Cancer generally develops after a mean duration of 10 years of exposure to high levels of arsenic.</td>
<td>True</td>
</tr>
<tr>
<td>Arsenic is cleared rapidly from the blood after absorption during its “first pass phase” in the liver.</td>
<td>True</td>
</tr>
<tr>
<td>The hallmark of chronic arsenicosis is either melanosis or keratosis alone.</td>
<td>False</td>
</tr>
<tr>
<td>The most common skin lesion in arsenicosis is “raindrop pigmentation” followed by emergence of hyperkeratotic changes.</td>
<td>True</td>
</tr>
<tr>
<td>Arsenic hyperkeratosis predominantly appears on the dorsum of hands and feet.</td>
<td>False</td>
</tr>
<tr>
<td>Patterns of melanosis in arsenicosis may include diffuse hyperpigmentation, patchy pigmentation or leuko-melanosis.</td>
<td>True</td>
</tr>
</tbody>
</table>
3.5 EXERCISE C: CLINICAL ASPECTS

INSTRUCTIONS TO PARTICIPANTS

Tell the participants that they are now going to do Exercise C on the clinical aspects of arsenicosis. Ask the participants to open Exercise C on Clinical Aspects in their course handouts. Ask them to choose the correct answer and put a tick (✓) mark in the appropriate box. Tell the participants to complete the exercise independently. Give them five minutes. After everyone has finished, discuss the answers and give feedback.

**Question 1:** Which one of the following statements is true of arsenic-related melanosis?

a) It can occur as fine-freckled or spotted pattern on the trunk and extremities
b) Melanosis can occur as diffuse or generalized pigmentation
c) Pigmentation of the oral mucosa may occur in combination with localized or patchy pigmentation on the body
d) All of the above

**Question 2:** Which one of the following statements is true about keratosis in arsenicosis?

a) It is characterized by thickening of skin and appearance of papules or nodules
b) It can be sub-categorized as mild, moderate or severe depending on the size of the elevations
c) In severe keratosis the elevation is less than 5 mm on the palms and soles
d) All of the above
e) a and b only

**Question 3:** Which one of the following statements is true of Bowens disease?

a) The lesions may appear as multiple macules, papule or plaque
b) They usually occur in sun-exposed areas
c) They are usually scaly, crusted and erythematous plaques
d) a, b, and c
e) a and c only
**Question 4:** Which one of the following conditions needs to be differentiated from arsenicosis lesions?

- a) Diffused melanosis
- b) Leuko-melanosis
- c) Nodular keratosis
- d) All of the above
- e) None of the above

**Question 5:** What type of skin cancer occurs in patients with longstanding arsenicosis?

- a) Squamous cell carcinoma
- b) Basal cell carcinoma
- c) a and b
- d) Adenocarcinoma
- e) None of the above

---

**STOP : END OF MODULE CHECKLIST**

1) Review all answers to Module 3 on Clinical Aspects
2) Course coordinator to summarize all points of confusion for clarification in Module 8
3) Meet the Facilitators to plan the next day's lecture on Case Definition
4.1 OBJECTIVES OF THE MODULE

At the end of the course, the participants should be able to
• Define arsenicosis
• Be able to identify and classify arsenicosis cases on the basis of the WHO algorithm
• List the common conditions for the differential diagnosis of arsenicosis

4.2 CHECKLIST FOR MODULE FOUR SPECIFIC MATERIALS

In addition to the checklist given section 1.2 of Part I of this Guide, the following module-specific preparations are needed.

• Make sure that the facilitators are clear about their role in delivering the lecture on Case Definition
• Send them the relevant materials and ask them to review the lecture and incorporate their own notes in the space provided
• Ask them to review Exercise D on Case Definition and Exercise E on Case Studies and Photograph Reading Session for their topics
• Update the slide on common local practice and policy for case definition
• Rehearse the lecture to time yourself
• Read section 4 to anticipate any ambiguity
• Take Exercises D and E yourself
• Check that the CD is compatible with your system and that the projection system is working
• Check that the CD is reading in your system and the projection is working
4.3 SUGGESTED TIME AND SEQUENCE FOR MODULE FOUR

Follow the sequence of steps in Figure 4:

**Sequence of events and suggested time duration**

1. **Describe Objectives and teaching modality of module four**
   - 5 min

2. **Deliver the Lecture on Case Definition Arsenicosis**
   - 15 min

3. **Participants should read section 4 of the guide**
   - 20 min

4. **Participant to complete Exercise D**
   - 20 min

5. **Review answers of Exercise D and cross-reference with relevant parts of the Guide, then administer Exercise E**
   - 30 min

6. **Review answers of Exercise E and cross-reference with relevant parts of the Guide, then summarize with the last slide**
   - 60 min

**Figure 4: Organisation of Module Four**
4.4 EXERCISE D: CASE DEFINITION

Let the participants complete the exercise individually. When finished, read the questions one by one and ask for the correct answer from the group. If someone has a wrong answer, go over the confusing point and reinforce the correct point by reference to the Guide.

**IMPORTANT**: MAKE SURE THE WHO ALGORITHM IS PROJECTED FOR THE WHOLE DURATION OF EXERCISE D AND E.

**Question 1: Arsenicosis is defined as:**

- a) A chronic health condition arising from prolonged ingestion of arsenic above the safe dose for the last twelve months, usually manifested by melanosis and/or keratosis
- b) A chronic health condition arising from prolonged ingestion of arsenic above the safe dose, for at least six months, manifested by characteristic skin lesions of keratosis only
- c) A chronic health condition arising from prolonged ingestion of arsenic above the safe dose for at least six months, usually manifested by characteristic skin lesions of melanosis and/or keratosis always with the involvement of internal organs
- d) A chronic health condition arising from prolonged ingestion of arsenic above the safe dose for at least six months, usually manifested by characteristic skin lesions of melanosis and/or keratosis with or without the involvement of internal organs
- e) None of the above

**Question 2: The major diagnostic criteria for case definition include:**

- a) Presence of pigmentary / keratotic skin lesions
- b) Presence of similar cases in the neighbourhood
- c) Evidence of exposure to elevated levels of arsenic
- d) Age of the patient
- e) a & c
Question 3: According to the WHO algorithm, a probable case of arsenicosis is a case:
   a) With any type of keratosis
   b) With both keratosis and melanosis
   c) Melanosis or keratosis after excluding other skin lesions mimicking arsenicosis
   d) With rain drop pigmentation
   e) b & c

Question 4: According to the WHO algorithm, a confirmed case of arsenicosis may be classified as:
   a) Clinically confirmed
   b) Laboratory confirmed
   c) Clinically and laboratory confirmed
   d) All of the above
   e) None of the above

Question 5: According to the WHO algorithm, a clinically confirmed case of arsenicosis is a case with:
   a) Any type of Keratosis or Melanosis
   b) Skin lesion and history of exposure to arsenic
   c) History of exposure to arsenic
   d) Skin lesions and positive laboratory test
   e) Probable case in which the presence of other arsenicosis simulating skin lesions has been ruled out
**Question 6:** Fill in the blanks of the WHO algorithm in the shaded boxes only. Do not fill in the blank boxes that are not shaded.

**Answer:** They should fill in the word “suspected”.

---

**FLOW CHART: CASE DEFINITION ALGORITHM**

1. **Presence of Melanosis / Keratosis**
   - Yes: Suspected Case

2. **Melanosis or Keratosis**
   - Yes: Suspected Case
   - No: Are some other skin lesions that mimic arsenicosis present?
     - Yes: Conduct Arsenic Test
     - No: Conduct Arsenic Test

3. **Melanosis & Keratosis**
   - Yes: Are some other skin lesions that mimic arsenicosis present?
     - Yes: Conduct Arsenic Test
     - No: Conduct Arsenic Test

4. **Are some other skin lesions that mimic arsenicosis present?**
   - Yes: Conduct Arsenic Test
   - No: Conduct Arsenic Test

---

**Answer:** They should fill in the word “suspected”.
**CORE MODULE – 4: CASE DEFINITION**

**Question 7:** Fill in the blanks of the WHO algorithm in the shaded boxes only. Do not fill the blank boxes that are not shaded.

**Answer:** They should fill in the word “Probable”.

**FLOW CHART: CASE DEFINITION ALGORITHM**

![Flow Chart Diagram](image-url)
**Question 8**: Fill in the blanks of the WHO algorithm in the shaded boxes only. Do not fill in the blank boxes that are not shaded.

**Answer**: they should fill in the words “Clinically Confirmed”.

---

**FLOW CHART: CASE DEFINITION ALGORITHM**

```
PRESENCE OF MELANOSIS / KERATOSIS

Suspected Case

Melanosis or Keratosis

Yes

Suspected Case

No

Are some other skin lesions that mimic arsenicosis present?

Yes

Probable Case

No

Melanosis & Keratosis

Yes

Probable Case

No

Are some other skin lesions that mimic arsenicosis present?

Yes

Clinically Confirmed

No

Conduct Arsenic Test

Negative

Positive

Conduct Arsenic Test
```
**Question 9:** Fill in the blanks of the WHO algorithm in the shaded boxes only. Do not fill in the blank boxes that are not shaded.

**Answer:** They should fill in the words: “Clinically and Laboratory Confirmed”.

---

**FLOW CHART: CASE DEFINITION ALGORITHM**
**Question 10:** Fill in the blanks of the WHO algorithm in the shaded boxes only. Do not fill in the blank boxes that are not shaded.

**Answer:** They should fill in the words: “Laboratory Confirmed”.

**FLOW CHART: CASE DEFINITION ALGORITHM**
4.5 EXERCISE E: CASE STUDIES AND PHOTOGRAPH EXERCISE SESSION

INSTRUCTIONS TO THE FACILITATOR

This is a problem-based exercise in applying the WHO case-definition algorithm for the diagnosis of arsenicosis. This session can be conveniently organized into groups of 3-4 participants, each with a clinical facilitator. Each group should complete the exercises on the 10 cases.

- Project the WHO case-definition algorithm and the table of differential diagnosis for the whole period of the exercise
- Encourage a problem-based approach when probed for questions by the participants
- Use the photograph reading form and history taking form to maintain objective criteria in diagnosis.
- Let the participants do the exercise in groups of 3-4. When finished, read the questions one by one and ask for correct answers from the group. If someone has a wrong answer, go over the confusing point and reinforce the correct point by reference to the Guide.

CASE STUDY 1:

Mr Basunta, a 38-years-old agriculturist, is a male patient from Chapai Nawabganj village in Bangladesh. He has a skin condition, which he has noticed for the past nine months. He consulted a local practitioner in the village who prescribed some ointment but there has been no relief. He contacted the doctor in the primary health centre who found that he has hyperpigmentation on the chest, abdomen and back, shown in photograph 1.

Look at photograph 1 and fill in the photograph reading form.

**Question 1.1:** In what category should his disease be classified?
**Answer:** Following the WHO algorithm, he should be classified as a case of suspected arsenicosis.

**Question 1.2:** What are the criteria for making your diagnosis?
**Answer:** There was presence of only hyper-pigmentation with no sign of keratosis.

**Question 1.3:** On clinical examination, his palms and soles were normal. Would you change your diagnosis based on the clinical findings?
**Answer:** He remains a suspected case of arsenicosis.
**Question 1.4:** On taking further history, Mr. Basunta says that he drinks water from a tube well and several others in his village suffer from similar skin disease. Would you change your diagnosis based on the history?

**Answer:** The skin lesion describes melanosis of chest, abdomen and back. No keratosis is seen. There is history of drinking tube well water though there is no information on the arsenic content of water. In view of the clinical examination and unknown exposure history, he remains a suspected case of arsenicosis.

**Question 1.5:** What should the doctor do to improve the diagnosis?

**Answer:** In order to confirm the clinical diagnosis, he should refer the case to secondary level for detailed clinical examination and differentiation from other skin lesions that may mimic arsenicosis.

**Question 1.6:** What are the differential diagnoses that you may want to rule out in this case?

**Answer:** Diseases due to pigmentary changes in e.g. pityriasis diversicolor, eczema (refer to Section 8 of Guide) have to be ruled out.

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**CASE STUDY 2:**

Mrs. Sultana is a 45-years-old female patient from a village in Bogra district in Bangladesh. For the last eight years she has noticed a skin problem that is slowly spreading. She seeks advice from the primary health care centre where you are posted. Your resident has examined the patient and observed spotted pigmentation on the trunk and extremities and raised keratotic lesions on the palms.

Look at photograph 2 and fill in the photograph reading form.

**Question 2.1:** What is the diagnosis made by you?

**Answer:** The diagnosis is probable case of arsenicosis according to the WHO algorithm.

**Question 2.2:** What are the criteria for making your diagnosis?

**Answer:** The diagnosis is based on spotted pigmentation on the trunk and extremities and raised keratotic lesions on the palms i.e. there is presence of keratosis and melanosis.

**Question 2.3:** She was sent to the medical college where a skin specialist examined her. The specialist agreed with the diagnosis made by you and did not find any evidence of other skin diseases. What was the case as defined by the specialist?

**Answer:** Clinically confirmed case of Arsenicosis.
Question 2.4: Is it necessary to perform arsenic testing to confirm the case?
Answer: Since the case is already clinically confirmed it is not necessary to perform any laboratory testing unless the policy and practice of your country require laboratory testing as part of confirmation.

CASE STUDY 3:

Mrs. Taslima is a 40-years-old female patient from Comilla district in Bangladesh. For the past one year she has a skin condition that is increasing. She comes to seek guidance from the skin specialist at the district hospital. The skin specialist finds that the patient has hypo-pigmented macules on the neck and back.

Look at photograph 3 and fill in the photograph reading form.

Question 3.1: How would you classify the patient, based on the available information?
Answer: The patient will be classified as suspected arsenicosis according to the WHO algorithm since there is evidence of only pigmentary changes of melanosis - hypo-pigmented macules on the back and neck but no keratosis.

Question 3.2: On further clinical examination, the skin specialist notices that there is fine scaling in some lesions and the patient says these lesions are itchy. The pigmentation shows yellow fluorescence when light is shined on them. Microscopy of the lesions reveals fungal elements. How would you classify the patient now?
Answer: Possible case of Tinea versicolor.

Question 3.3: What other procedures should be performed to confirm the mixed diagnosis of arsenicosis and tinea versicolor?
Answer: The diagnosis of tinea versicolor has been made by the skin specialist. To confirm the presence of arsenicosis in the same patient, the skin specialist will have to perform a complete physical examination for evidence of keratotic changes in the palms and soles and the presence of pigmentary changes unrelated to Tinea Versicolor. Accurate history of exposure to arsenic supplemented with laboratory testing may also be helpful in this case.
CASE STUDY 4:

Mrs. Norma is a 44-years-old female patient from Baruipur village in West Bengal. She works barefoot in the rice fields and also as a village washerwoman. She has noticed thickening of the skin on the soles of her feet for the past three years as documented by the private doctor. Look at photograph 4 and fill in the photograph reading form.

Question 4.1: What is your diagnosis, based on the picture?
Answer: Based on the information provided, it is a case of suspected arsenicosis since keratosis on soles of the foot is present.

Question 4.2: The patient is sent to district hospital where you are posted as an arsenic expert. Your medical resident has taken the history for you and established the following facts: Mrs Norma has tried a few home remedies, but the treatment has not helped. There are no pigmentary changes and no keratosis of the palms on physical examination. Accurate history of arsenic exposure cannot be established. What is your diagnosis now?
Answer: The diagnosis is still suspected arsenicosis at this point.

Question 4.3: What further procedures would you perform?
Answer: Clinically examine the patient.

Question 4.4: On clinical examination, you find that the patient has multiple, sieve-shaped, pitted lesions exclusively on the soles of the foot. There are no other signs of any keratotic lesions or pigmentary changes on the palms or other parts of the body. What will be your final diagnosis on the patient now?
Answer: The final diagnosis will be pitted keratolysis as in arsenicosis the keratotic soles are not pitted and there is no presence of pigmentation.

CASE STUDY 5:

Mr. Paitoon is a 52-years-old male patient from Ron Phibun district in Thailand. He noticed lesions on the skin that were pigmented and his palms and soles started to feel rough. During the past six months, he has noticed a lesion, which is increasing and is slightly elevated on the abdomen.
Look at photograph 5A and fill in the photograph reading form.

**Question 5.1:** What will be your diagnosis according to the WHO algorithm?
**Answer:** Suspected arsenicosis case, possibly Bowen’s disease.

**Question 5.2:** What other skin conditions would you rule out to narrow your diagnosis?
**Answer:** Psoriasis or other skin conditions where the skin flakes off.

He was referred to a skin specialist in the tertiary hospital who examined him. The doctor noticed rounded hypo-pigmented patches on a hyper-pigmented background. The soles and palms had large keratotic elevations (>5mm in size). There was a hyper-pigmented sharply demarcated, round crusted papule nearly 8 mm in size on the abdomen. There were no signs or symptoms of any fungal infections, allergies or systemic skin disorders. During history taking, it was established that the patient had seen a traditional healer in the neighbourhood, but the treatment was of no avail and the problem gradually worsened.

Look at photograph 5B and 5C and fill in the photograph reading form.

**Question 5.3:** What diagnosis can you make based on the findings of the specialist?
**Answer:** Clinically confirmed case of arsenicosis with Bowen’s disease.

**CASE STUDY 6:**

Mr. Prasad is 36-years-old male patient from Mirpur village in Bangladesh. He has noticed hardening of skin on his palms for the past eight years. He contacts the doctor, who notices lesions documented in the photograph.

Look at photograph No. 6 and record your observations in the photograph reading form.

**Question 6.1:** What is your diagnosis in this case?
**Answer:** This is a suspected case based on the WHO algorithm

**Question 6.2:** What were your criteria for diagnosis?
**Answer:** There is presence of keratosis and no melanosis.

**Question 6.3:** What further questions would you like to ask the patients?
**Answer:** The nature of this lesion, 1) the occupation of the patients, 2) the presence of other keratotic
lesions or pigmentary changes in other parts of the body, 3) Presence of congenital lesions and 4) any hormonal diseases etc.

**Question 6.4:** On enquiring, the doctor finds that the patient is involved in tilling of soil in the fields. He has been drinking tube well water but the arsenic level is not known. On further physical examination, no other pigmentary changes are noted and the keratotic lesions were absent in the center of the palm. What is your final diagnosis now and why?

**Answer:** This is a non-arsenic case clinically. The reasons favoring the diagnosis include presence of keratotic lesions on the pressure points in the hand sparing the central part. The history of occupation also favors the diagnosis of non-arsenosis.

**CASE STUDY 7:**

Mrs. Soleman, a resident of Agragaon in Bangladesh is a 26-years-old farmer. For the past eight years she has noticed white rounded spots on her thigh. These lesions are asymptomatic and are gradually increasing. She also has hardening skin on both palms and soles.

Look at photograph 7 and fill in the photograph reading form.

**Question 7.1:** What diagnosis would you give this case?

**Answer:** A suspected case according to the WHO algorithm

**Question:** 7.2: What are the criteria for your diagnosis?

**Answer:** Presence of only keratosis with no signs of melanosis.

**Question 7.3:** What further steps would you take to confirm the case?

**Answer:** Complete physical examination for dermatological manifestations and arsenic exposure history.

**Question 7.4:** On physical examination the patient also showed multiple raised keratotic elevations measuring 2-5 mm on both palms and soles. How would you classify the case now?

**Answer:** A probable case of arsenicosis based on the WHO algorithm as there is presence of both keratotic and pigmentary changes.

**Question 7.5:** The patient was referred to an arsenic expert who found no presence of systemic skin disease or conditions that can mimic arsenicosis. How do you classify the case now?
**Answer:** This is a clinically confirmed case of arsenicosic since there is presence of both keratosis and melanosis and absence of other skin conditions mimicking arsenicosic.

**Question 7.5:** On further enquiry the patient informs that for the last two years he has been consuming water from a tube well painted red indicating arsenic content above safe levels, as there are no alternate water options in the village. How would you classify the case now?

**Answer:** Based on the information provided, the case is classified as a clinically and laboratory confirmed case of arsenicosic.

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**CASE STUDY 8:**

Mrs. Naseeba is a 30-year-old lady living in Ramnagar village in West Bengal, India. She visits the PHC doctor with the complaint of white spots on her thighs for the last 3 years. There is no itching, no hyper pigmentation or loss of sensation and not associated with use of any drugs.

Look at the picture 8 in the photo booklet and record your findings in the photograph reading form.

**Question 8.1:** What is your diagnosis?

**Answer:** It is a suspected case of arsenicosic due to the presence of hypo-pigmented macules on the thigh.

**Question 8.2:** What further steps would you take to confirm the case?

**Answer:** complete physical examination for dermatological manifestations and exposure history.

**Question 8.3:** On examination, the doctor finds that there are rounded porcelain white macules with distinct margins. On palpation, the macules are depressed. There is no evidence of keratosis or other melanosis. How would you classify the case?

**Answer:** This is a case not a case of arsenicosic. The patient has depressed porcelain white macules. There is no other evidence of melanosis and keratosis. In arsenicosic the hypo pigmented macules are not depressed.

**Question 8.4:** What likely differential diagnosis would give this case?

**Answer:** Idiopathic Guttate Hypomelanosis.
CASE STUDY 9:

Mrs. Ranee is a 36-years-old female patient from Bardawan village in West Bengal, India. She visits the doctor with complaint of brown patches on the face.

Look at photograph 9 and fill in the photograph reading form.

Question 9.1: What is your diagnosis?
Answer: It is a suspected case of arsenicosis due to the presence of pigmentary changes on the face.

Question 9.2: What further steps would you take to confirm the case?
Answer: Complete physical examination for dermatological manifestations and arsenic exposure history.

Question 9.3: On examination, the dermatologist found that the brown patches were confined to malar prominence of the face and forehead and the pigmented patches were sharply demarcated. There was no other evidence of keratosis or other melanosis. On further investigation it was found that the patient had a history of ovarian dysfunction and the patches increased during pregnancy. Over the last two years, she had been drinking tube well water that was painted green. How would you classify the case?
Answer: This is not a case of arsenicosis. Patchy pigmentation in arsenicosis is uncommon on the face and does not vary with pregnancy. There is no other evidence of melanosis and keratosis.

Question 9.4: What likely differential diagnosis would you give this case?
Answer: Possibly Melasma.

CASE STUDY 10:

Mr. Mital is a 24-years-old male patient who works in a pharmacy in Nawal Parasi village in the Terai districts of Nepal. He presented to the PHC doctor with discrete, erythematous, papulo-pustular lesion on the sole of the feet. He was given some ointment and the pustules disappeared and he was photographed at this stage.
Look at photograph 10 and fill in the photograph reading form.

**Question 10.1:** What is your diagnosis?
**Answer:** It is a suspected case of arsenicosis due to the presence of keratosis on the soles.

**Question 10.2:** What further steps would you take to confirm the diagnosis?
**Answer:** Complete physical examination for dermatological manifestations and arsenic exposure history.

**Question 10.3:** As an arsenic expert you examine the patient and find that he is showing plaque-type lesions on the middle portion of the palm and sole. There are silvery white patches on the back and the nails of the patient showing signs of pitting. There is no evidence of other types of keratosis or other melanosis. The patient has not noticed the source of water he drinks. How would you classify the case?
**Answer:** This is not a case of arsenicosis. The patient showed erythematous and papulo-pustular features that are not characteristic features of arsenicosis.

**Question 10.4:** What likely differential diagnosis would give this case?
**Answer:** Possibly Psoriasis
5.1 OBJECTIVES OF THE MODULE

At the end of the course, the participants should be able to:

• List the various laboratory tests used for diagnosis of arsenicosis
• Know the specimen handling for each types of specimen, their collection, shipment and storage
• Be able to order the appropriate laboratory test and Interpret the laboratory results
• Be able to institute and interpret Quality control measures in the laboratory

5.2 CHECKLIST FOR MODULE FIVE SPECIFIC MATERIALS

In addition to the checklist given in section 1.2 of Part I of this Guide, the following module-specific preparations are needed.

• Make sure that the facilitators are clear about their role in delivering the lecture on laboratory support
• Send the relevant materials and ask them to review the lecture and incorporate their own notes in the space provided.
• Ask them to review Exercise F on laboratory support for inclusion in the lecture.
• Update the slide on common local practice and policy for laboratory support to include types of test used, role of national control authorities, use of kits and a list of references and national laboratories
• Rehearse the lecture to time yourself
• Read section 4 to anticipate any ambiguity
• Take Exercise F yourself
• Check that the CD is compatible with your system and that the projection is working

5.3 SUGGESTED TIME AND SEQUENCE FOR MODULE FIVE

Follow the sequence of steps in Figure 5:

**Sequence of events and suggested time duration**

1. Describe Objectives and teaching modality of module five - 5 min
2. Deliver the Lecture on Laboratory Support - 15 min
3. Participants read section 5 of the Guide - 20 min
4. Participant to complete Exercise F - 20 min
5. Review answers of Exercise F and cross-reference with relevant parts of the Guide - 20 min
6. Review answer and summarize the session with the last slide - 10 min

*Figure 5: Organisation of Module Five*
5.4 EXERCISE F: LABORATORY SUPPORT

Let the participants complete the exercise individually. When finished, read the questions one by one and ask for the correct answer from the group. If someone has a wrong answer, clarify the confusion and reinforce the correct point by reference to the Guide.

Question 1: Categorize the usefulness of the following specimens in establishing exposure to arsenic in humans.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types</td>
<td>Recent exposure</td>
</tr>
<tr>
<td>Blood</td>
<td>✓</td>
</tr>
<tr>
<td>Urine</td>
<td>✓</td>
</tr>
<tr>
<td>Nails</td>
<td>✓</td>
</tr>
<tr>
<td>Hair</td>
<td>✓</td>
</tr>
<tr>
<td>Stools</td>
<td>✓</td>
</tr>
<tr>
<td>Sputum</td>
<td></td>
</tr>
</tbody>
</table>

Question 2: Which one of the following statements is true for testing arsenic in urine?

a) Only inorganic arsenic is excreted in urine
b) The subjects from whom urine is to be tested must eat seafood for four days before giving a sample of urine
c) A urine arsenic level of more than 50 µg/l is indicative of recent exposure to arsenic
d) Only a and b
e) None of the above

Question 3: Mention the levels of arsenic that are usually considered harmful for human health in the diagnosis of arsenicosis.

- Drinking water: >10 µg/litre
- Urine: >50 µg/litre
- Hair: >0.8 mg/kg dry weight of hair
- Nails: >1.3 mg/kg dry weight of nails
**Question 4:** Which of the following precautions are necessary for collection of specimens?

a) Plastic container should be washed with acid

b) Add concentrated hydrochloric or nitric acid to urine sample (1ml in 100 ml of urine)

c) Add oxidising agent to the container if you want to speciate the arsenic

d) a & b

e) a, b & c

**Question 5:** Which one of the following laboratory methods is the gold standard for testing arsenic?

a) Atomic Absorption Spectrophotometry ✓

b) Calorimetric method

c) Gravimetric method

d) All of the above

e) None of the above

**Question 6:** Which of the following statements apply to the use of kits in the diagnosis of arsenic?

a) It can be used for mass screening under field conditions

b) Before a test-kit can be used its validity has to be established by comparison with the Atomic Absorption Spectrophotometric (AAS) method

c) A National Control Authority (NCA) can set the policy and guidelines for the import and use of commercial kits

d) All of the above ✓

e) Only a and b above

**Question 7:** Which one of the following statements is true for accepting the validity of the arsenic-testing results on a biomarker?

a) Testing of biomarker is only undertaken when the results of previously consumed water are unavailable

b) The tests must be performed by trained personnel

c) The laboratory must meet the national standards and practice standard operating procedures (SOP)

d) All of the above ✓

e) None of the above
Question 8: Which one of the following is true for the quality control of a laboratory?

a) The laboratory must practice internal quality control
b) The laboratory must practice external quality control
c) The laboratory must practice nationally or internationally accepted Standard Operating Procedures (SOP)
d) None of the above
e) All of the above

Question 9: Which one of the following applies to laboratory network?

a) Usually the testing of arsenic is within the water authorities’ jurisdiction in a country
b) Testing can also be done in a private laboratory following accepted SOP
c) Testing can be done in Universities or institutions following accepted SOP
d) All of the above
e) None of the above

Question 10: The nail clippings of a patient with typical raindrop pigmentation and palmoplantar keratosis and history of exposure to arsenic over 8 years reveal a negative result from laboratory A. Two repeat samples are sent to laboratory A and laboratory B. Laboratory A reports negative and B reports positive test. What would you do?

a) Classify the patient as not a case
b) Send a sample to the laboratory A
c) Check the standard operating procedures of the laboratory A
d) Repeat another test later
e) None of the above

STOP : END OF MODULE CHECKLIST

1) Review all answers to Module 5 on Laboratory Support
2) Course coordinator to summarize all points of confusion for clarification in Module 8
3) Meet the Facilitators to plan next day’s materials on Case Management of Arsenicosis
4) Remind the participants that there are practice in gaining laboratory experience in Module 9, options 1 and 2
6.1 OBJECTIVES OF THE MODULE

At the end of the course, the participants should be able to:

- List all management strategies available for arsenicosis cases
- List the management strategy for each level of healthcare delivery
- Acquire skills for counselling on preventive measures

6.2 CHECKLIST FOR MODULE SIX SPECIFIC MATERIALS

In addition to the checklist given in section 1.2 of Part I of the Guide, the following module-specific preparations are needed:

- Make sure that the facilitators are clear about their role in delivering the lecture on Case-Management of Arsenicosis
- Send the relevant materials and ask them to review the material and incorporate personal notes in the space provided
- Ask them to review Exercise G on Case Management of Arsenicosis
- Update the slide on common local policies and strategies for management of arsenicosis patients and places where these may be available in the country
- Rehearse the lecture to time yourself
- Read section 6 to anticipate any ambiguity
- Take Exercise G yourself
- Check that the CD is compatible with your system and the projection system is working
6.3 SUGGESTED TIME AND SEQUENCE FOR MODULE SIX

Follow the sequence of steps in Figure 6

**Sequence of events and suggested time duration**

- **Describe Objectives and teaching modality of module six** 5 min
- **Deliver Lecture on Case Management** 15 min
- **Participants should read section 6 of the guide** 20 min
- **Participant to complete Exercise G** 20 min
- **Review answers of Exercise G and cross-reference with relevant parts of the Guide** 20 min
- **Review answer and summarize the session with the last slide** 10 min

*Figure 6: Organisation of Module Six*
**6.4 EXERCISE G: CASE MANAGEMENT**

Let the participants complete the exercise individually. When finished, read the questions one by one and ask for the correct answer from the group. If someone has a wrong answer, clarify the confusing point and reinforce the correct point by reference to the Guide.

**Question 1:** Which one of the following approaches is/are being used for management of arsenicosis?

- a) Cessation of exposure to arsenic through drinking water or contaminated food
- b) Administration of drugs for symptomatic relief or nutrients for hastening recovery
- c) Non-specific supportive care for physical symptoms or treating selected complications
- d) Secondary prevention through surveillance and counselling to address psychological sequelae
- e) All of the above  

**Question 2:** Which one of the following skin symptoms in arsenicosis requires treatment with local ointments?

- a) Melanosis alone
- b) Keratosis alone
- c) Melanosis and Keratosis both
- d) b and c
- e) None of the above

**Question 3:** Which one of the following can be used for symptomatic treatment of Keratosis?

- a) 5-10% salicylic acid
- b) 10-20% urea based treatment
- c) 20% salicylic acid
- d) a and b only
- e) a, b and c

**Question 4:** How should a “probable case” of arsenicosis be managed at the primary health care level?

- a) Refer for second evaluation by a dermatologist or an arsenic expert
- b) Send for arsenic test at primary health care level
c) The primary health care personnel should clinically confirm the case

d) b and c only

e) None of the above

Question 5: What is the management for a “probable case” in whom it is not possible to clinically confirm or rule out diagnosis of arsenicosis by a dermatologist or a specialist?

a) Patient should retain the diagnosis of probable case.

b) Patient should be labelled as ‘not a case of arsenicosis’.

c) Re-evaluation of case by medical specialist periodically.

d) a and c only

e) b and c only

Question 6: The management facilities provided at the primary health care level should include:

a) Taking history of and examining for detection of arsenicosis

b) Provision of supportive care for keratosis, advice on nutrition and treatment of symptoms of systemic manifestation

c) Follow up rehabilitation services and surveillance

d) Counselling and education to patient and community and record keeping

e) All of the above

Question 7: The management facilities provided at the secondary health care level should include:

a) Confirmation of diagnosis

b) Management of Bowen’s disease, skin cancer and systemic complication

c) Monitoring of biological and water samples

d) Training and support for primary health care providers

e) All the above in addition to services at primary health care level

Question 8: What are the management facilities that should be included at the tertiary care level?

a) Management of skin and other cancers

b) Monitoring of surveillance system

c) Training of trainers for case detection, management and surveillance
d) Research on case management including epidemiology, natural history and therapeutic regimens and interventions

e) All of the above, in addition to services at secondary level

**Question 9:** Which one of the following non-dermatological manifestations of arsenicosis requires specific management?

a) Chronic cough and respiratory distress and cirrhosis
b) Sensori-neural peripheral neuropathy and peripheral vascular disease
c) Hematuria and non-pitting oedema
d) All of the above

e) None of the above

**Question 10:** What are the available safe water options to prevent exposure to arsenic?

a) Using arsenic-free tube well
b) Harvesting rain water
c) Using filter for removing arsenic
d) a, b and c

e) None of the above
7

Core Module Seven

Case Surveillance

7.1 Objectives of the Module

At the end of the course, the participants should be able to:

- Describe the various types of surveillance systems for arsenicism disease.
- List the surveillance task at each level of the healthcare delivery system.
- Design and fill in a surveillance report.
- Analyse data and give feedbacks.

7.2 Checklist for Module Seven Specific Materials

In addition to the checklist given in section 1.2 of Part I of this Guide, the following module-specific preparations are needed:

- Make sure that the facilitators are clear about their role in delivering the lecture on Case Surveillance of Arsenicism
- Send the relevant materials for review and incorporation in their own notes in the space provided
- Ask them to review Exercise H on Case Surveillance of Arsenicism
- Update the slide on common local policies and strategies for case surveillance of arsenicism patients and places where these may be available in the country.
- Rehearse the lecture to time yourself
- Read section 7 to anticipate any ambiguity
- Take Exercise H yourself
- Check that the CD is compatible with your system and that the projection system is working
7.3 SUGGESTED TIME AND SEQUENCE FOR MODULE SEVEN

Follow the sequence of steps outlined in Figure 7:

**Sequence of events and suggested time duration**

1. Describe Objectives and teaching modality of Module Seven - 5 min
2. Deliver Lecture on Case Surveillance - 15 min
3. Participants should read section 7 of the Guide - 20 min
4. Participant to complete Exercise H - 130 min
5. Review answers of Exercise H and cross-reference with relevant parts of the Guide - 20 min
6. Review the answer and summarize the session with the last slide - 10 min

*Figure 7: Organisation of Module Seven*
7.4 EXERCISE H: CASE SURVEILLANCE

INSTRUCTIONS TO TUTORS:

- Complete the preparatory work on case classification in the plenary session
- Do the calculations for questions 1-10 in small groups or individually
- Project the WHO algorithm and the tables of differential diagnosis constantly for participants to refer to during this exercise
- When the exercise is over, read the questions one by one and ask for the correct answer from the group. If someone has a wrong answer, clarify the confusing point and reinforce the correct answer by reference to the Guide.

THE FOLLOWING INFORMATION PERTAINS TO QUESTIONS 1-10

You are a doctor working in a peripheral unit in the village of Arsenicopur with a population of 1000, and you are expected to periodically send a report to the higher authorities on cases of arsenicosis. The following table shows the data gathered by your healthcare worker for the last three months. The reporting criteria of your country require cases to be reported only as “negative”, “probable” or “confirmed”. Your task is to reconcile the national and WHO case classifications

PREPARATORY WORK FOR QUESTIONS 1-10, USING THE TABLE BELOW: (60 min)

(i) First, classify the cases according to the WHO algorithm as “suspected”, “probable”, “clinically confirmed”, “laboratory confirmed” and “clinically and laboratory confirmed”, based on the clinical diagnosis and history of arsenic exposure.

(ii) Second, using the surveillance criteria of your country, re-classify the cases as “probable”, “confirmed” or “negative” based on clinical diagnosis and history of arsenic exposure.

Answers: Given in the following Table.
TABLE 7.1: EXAMPLE OF “LINE LISTING” DATA REQUIRED AT THE PERIPHERAL LEVEL

<table>
<thead>
<tr>
<th>Case ID</th>
<th>Clinical Diagnosis at the Peripheral healthcare level</th>
<th>History of exposure to arsenic</th>
<th>Age</th>
<th>Sex</th>
<th>Date of Diagnosis</th>
<th>Date Report sent</th>
<th>Case status according to WHO algorithm (suspected, probable, clinically confirmed, or clinically and laboratory confirmed)</th>
<th>Case status according to reporting criteria of national surveillance system i.e. negative, probable or confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Diffuse thickening of palms and soles</td>
<td>Drinking water from a tube well for 8 months</td>
<td>45</td>
<td>M</td>
<td>1 Jan 2000</td>
<td>1 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>002</td>
<td>Hypopigmentation on top of pigmented lesions</td>
<td>Not known</td>
<td>36</td>
<td>F</td>
<td>2 Jan 2000</td>
<td>2 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>003</td>
<td>Thickening of palms and feet with tiny lesions that feel gritty to the touch</td>
<td>Not known</td>
<td>42</td>
<td>M</td>
<td>5 Jan 2000</td>
<td>7 Jan 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>004</td>
<td>Nodular lesions on the palms and soles. Skin on the lesion shows pigmentation. None arsenic mimicking lesions ruled out by arsenic expert</td>
<td>Drinking water from an arsenic positive tube well for 8 years</td>
<td>30</td>
<td>F</td>
<td>10 Jan 2000</td>
<td>11 Jan 2000</td>
<td>Clinically and laboratory confirmed</td>
<td>Confirmed</td>
</tr>
<tr>
<td>005</td>
<td>Diffuse hypo-pigmented macules on chest with moderate keratosis on both palms. Differential diagnosis to rule out non-arsenical mimicking lesions.</td>
<td>Not known</td>
<td>26</td>
<td>M</td>
<td>15 Jan 2000</td>
<td>17 Jan 2000</td>
<td>Clinically confirmed</td>
<td>Confirmed</td>
</tr>
<tr>
<td>006</td>
<td>Multiple keratotic lesions measuring 3 mm on the palms.</td>
<td>Drinking tube well water for 3 months</td>
<td>33</td>
<td>M</td>
<td>17 Jan 2000</td>
<td>19 Jan 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>007</td>
<td>Round hypo pigmented macules on the chest.</td>
<td>Drinking water from well</td>
<td>52</td>
<td>M</td>
<td>22 Jan 2000</td>
<td>23 Jan 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>008</td>
<td>Tiny papular lesions on the palms with a gritty feeling.</td>
<td>Not known</td>
<td>50</td>
<td>F</td>
<td>28 Jan 2000</td>
<td>28 Jan 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>009</td>
<td>Rain drop pigmentation on chest and keratotic nodules on the palms</td>
<td>Drinking water from tube well for 12 years</td>
<td>47</td>
<td>F</td>
<td>27 Jan 2000</td>
<td>28 Jan 2000</td>
<td>Probable</td>
<td>Probable</td>
</tr>
<tr>
<td>010</td>
<td>Patchy pigmentation generally in the body</td>
<td>Not known</td>
<td>20</td>
<td>M</td>
<td>30 Jan 2000</td>
<td>31 Jan 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
</tbody>
</table>
Diffuse hyperpigmentation on arms and legs

Fine freckled lesions on trunk and extremities with papules on palms seen by dermatologist. Differential diagnosis of non-arsenic mimicking lesions ruled out.

Slight thickening of skin of palms

Patchy pigmentation on the back

Grit like texture of palms with minute papules.

Nodular lesions on the palms and soles, with diffuse hyperpigmentation on back and chest.

Minute papules on palms and soles

Rain drop pigmentation on arms and nodular wart like lesions on palms. Seen by arsenic expert and non-arsenic mimicking lesions ruled out.

<table>
<thead>
<tr>
<th>Case ID</th>
<th>Clinical Diagnosis at the Peripheral healthcare level</th>
<th>History of exposure to arsenic</th>
<th>Age</th>
<th>Sex</th>
<th>Date of Diagnosis</th>
<th>Date Report sent</th>
<th>Case status according to WHO algorithm (suspected, probable, clinically confirmed, or clinically and laboratory confirmed)</th>
<th>Case status according to reporting criteria of national surveillance system i.e. negative, probable or confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>011</td>
<td>Diffuse hyperpigmentation on arms and legs</td>
<td>Drinking water from river</td>
<td>29</td>
<td>F</td>
<td>1 Feb 2000</td>
<td>2 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>012</td>
<td>Fine freckled lesions on trunk and extremities with papules on palms seen by dermatologist. Differential diagnosis of non-arsenic mimicking lesions ruled out.</td>
<td>Not known</td>
<td>46</td>
<td>M</td>
<td>6 Feb 2000</td>
<td>8 Feb 2000</td>
<td>Clinically confirmed</td>
<td>Confirmed</td>
</tr>
<tr>
<td>013</td>
<td>Slight thickening of skin of palms</td>
<td>Not known</td>
<td>43</td>
<td>F</td>
<td>6 Feb 2000</td>
<td>8 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>014</td>
<td>Patchy pigmentation on the back</td>
<td>Drinking water from bore well for 6 years</td>
<td>38</td>
<td>F</td>
<td>10 Feb 2000</td>
<td>11 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>015</td>
<td>Diffuse hypopigmentation on the chest.</td>
<td>Not known</td>
<td>31</td>
<td>M</td>
<td>11 Feb 2000</td>
<td>13 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>016</td>
<td>Grit like texture of palms with minute papules.</td>
<td>Drinking water from tube well for 8 years</td>
<td>35</td>
<td>F</td>
<td>13 Feb 2000</td>
<td>18 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>017</td>
<td>Nodular lesions on the palms and soles, with diffuse hyperpigmentation on back and chest.</td>
<td>Drinking water from tube well</td>
<td>41</td>
<td>F</td>
<td>16 Feb 2000</td>
<td>18 Feb 2000</td>
<td>Probable</td>
<td>Probable</td>
</tr>
<tr>
<td>018</td>
<td>Minute papules on palms and soles</td>
<td>Drinking water from tube well</td>
<td>18</td>
<td>M</td>
<td>18 Feb 2000</td>
<td>19 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>019</td>
<td>Rain drop pigmentation on arms and nodular wart like lesions on palms. Seen by arsenic expert and non-arsenic mimicking lesions ruled out.</td>
<td>Not known</td>
<td>45</td>
<td>M</td>
<td>22 Feb 2000</td>
<td>24 Feb 2000</td>
<td>Clinically confirmed</td>
<td>Confirmed</td>
</tr>
</tbody>
</table>
TABLE 7.1: CONT'D.

<table>
<thead>
<tr>
<th>Case ID</th>
<th>Clinical Diagnosis at the Peripheral healthcare level</th>
<th>History of exposure to arsenic</th>
<th>Age</th>
<th>Sex</th>
<th>Date of Diagnosis</th>
<th>Date Report sent</th>
<th>Case status according to WHO algorithm (suspected, probable, clinically and laboratory confirmed)</th>
<th>Case status according to reporting criteria of national surveillance system i.e. negative, probable or confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>020</td>
<td>Rain drop pigmentation on trunk</td>
<td>Drinking water from tube well</td>
<td>54</td>
<td>M</td>
<td>26 Feb 2000</td>
<td>28 Feb 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>021</td>
<td>Hyper-pigmented lesions on pigmented background</td>
<td>Not known</td>
<td>32</td>
<td>F</td>
<td>2 Mar 2000</td>
<td>3 Mar 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
<tr>
<td>022</td>
<td>Diffuse hypo-pigmented macules. No mimicking lesions reported by dermatologist.</td>
<td>Not known but arsenic test on hair is positive.</td>
<td>43</td>
<td>M</td>
<td>3 Mar 2000</td>
<td>5 Mar 2000</td>
<td>Laboratory confirmed</td>
<td>Confirmed</td>
</tr>
<tr>
<td>024</td>
<td>Rain drop pigmentation on chest and nodular warts on the palm. Case confirmed by arsenic expert.</td>
<td>Not known</td>
<td>33</td>
<td>F</td>
<td>8 Mar 2000</td>
<td>9 Mar 2000</td>
<td>Clinically confirmed</td>
<td>Confirmed</td>
</tr>
<tr>
<td>026</td>
<td>Fine freckled lesions on trunk and extremities with papules on palms, patient confirmed by a visiting dermatologist from the secondary level of health care.</td>
<td>Not known</td>
<td>45</td>
<td>M</td>
<td>11 Mar 2000</td>
<td>13 Mar 2000</td>
<td>Clinically confirmed</td>
<td>Confirmed</td>
</tr>
<tr>
<td>027</td>
<td>Multiple keratotic lesions measuring 3 mm on the palms and hyperpigmentation on palms.</td>
<td>Drinking tube-well water for 3 months</td>
<td>30</td>
<td>M</td>
<td>12 Mar 2000</td>
<td>18 Mar 2000</td>
<td>Probable</td>
<td>Probable</td>
</tr>
<tr>
<td>028</td>
<td>Round hypo-pigmented macules on hyper-pigmented skin on the chest.</td>
<td>Drinking water from well</td>
<td>31</td>
<td>F</td>
<td>18 Mar 2000</td>
<td>20 Mar 2000</td>
<td>Suspected</td>
<td>Negative</td>
</tr>
</tbody>
</table>
TABLE 7.1: CONTD.

<table>
<thead>
<tr>
<th>Case ID</th>
<th>Clinical Diagnosis at the Peripheral healthcare level</th>
<th>History of exposure to arsenic</th>
<th>Age</th>
<th>Sex</th>
<th>Date of Diagnosis</th>
<th>Date Report sent</th>
<th>Case status according to WHO algorithm (suspected, probable, clinically confirmed, laboratory confirmed, or clinically and laboratory confirmed)</th>
<th>Case status according to reporting criteria of national surveillance system i.e. negative, probable or confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>029</td>
<td>Rain drop pigmentation on arms and nodular wart-like lesions on palms. Seen by arsenic expert who ruled out other arsenic mimicking conditions.</td>
<td>Not known</td>
<td>45</td>
<td>F</td>
<td>16 Mar 2000</td>
<td>23 Mar 2000</td>
<td>Clinically confirmed</td>
<td>Confirmed</td>
</tr>
<tr>
<td>030</td>
<td>Rain drop pigmentation only. Other arsenic mimicking lesions ruled out by an arsenic expert.</td>
<td>Drinking water from tube-well which was arsenic positive for the last 12 months</td>
<td>28</td>
<td>F</td>
<td>20 Mar 2000</td>
<td>21 Mar 2000</td>
<td>Laboratory confirmed</td>
<td>Confirmed</td>
</tr>
</tbody>
</table>

**Question 1:** What effects (bias) do the national classification scheme have compared to the WHO classification scheme on the results of the reporting? (10 min)

**Answer:** Using the surveillance criteria of the country instead of the WHO classification will have the following effects:

(i) Since all suspected cases have been taken as negative or not as a case, there is a chance of missing certain cases, which have melanosis or keratosis alone. This would result in under-reporting.

(ii) Secondly, “confirmed” cases refer to laboratory confirmed cases. If the laboratory is not following standard operating procedures, the false positive cases will be taken as confirmed cases as it does not require clinical confirmation. This will result in some over-reporting.

**Question 2:** What is the prevalence of arsenicosis cases for the whole three-month period? (10 min)

**Answer:** Prevalence of arsenicosis in the three-month period.

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic description</td>
<td>All cases counted in a single survey or period of time — n</td>
<td>All Individual examined including cases and non-cases — N</td>
<td>n/N — (can be expressed as percentage or ratio)</td>
</tr>
<tr>
<td>Numeric example</td>
<td>10 (number of clinically, laboratory and clinically and laboratory confirmed cases)</td>
<td>1000 (total Population of the village)</td>
<td>10/1000=.01 or 1% or 1000 per 100,000</td>
</tr>
</tbody>
</table>
**Question 3:** In what format would you send the data to the next administrative level assuming the national case classification is used? (10 min)

**Answer:** At the peripheral level, every case may have to be further investigated or followed up for clinical management, therefore, the data has to be kept case by case or by line listing as shown in Table 7.1. However, at the intermediate level, there is no need for details of every case. Only details of trends are required. For this purpose, the data of several cases can be grouped by age, sex and case classification. Therefore, the data will be compiled and grouped accordingly before being submitted to the intermediate level. Table 7.2 shows an example of age and sex-wise compilation of data.

**TABLE 7.2: EXAMPLE OF “GROUPED” DATA REQUIRED AT THE INTERMEDIATE LEVEL**

<table>
<thead>
<tr>
<th></th>
<th>Negative</th>
<th>Probable</th>
<th>Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20 yrs</td>
<td>Male</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>&gt;20-35 yrs</td>
<td>Male</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>&gt;35-50 yrs</td>
<td>Male</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>&gt;50 yrs</td>
<td>Male</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

**Question 4:** Design a reporting form to send the results to the intermediate level. (10 min)

**Answer:** A minimum core data set should be used. The data may consist of who is a case specified by age and sex. The type of case, classified according to the WHO algorithm of suspected, probable, confirmed.

*Arsenic Surveillance Report Table, Parganas of East-West, Arsenicopure For The Period: 24/01/2000 to 24/03/2000*

<table>
<thead>
<tr>
<th>Village</th>
<th>Suspected</th>
<th>Probable</th>
<th>Confirmed</th>
<th>Dead</th>
<th>Under treatment</th>
<th>Arsenic contaminated positive water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current Quarter</td>
<td>Cumulative to Date</td>
<td>Current Quarter</td>
<td>Cumulative to Date</td>
<td>Current Quarter</td>
<td>Cumulative to Date</td>
</tr>
<tr>
<td>Village A</td>
<td>10</td>
<td>20</td>
<td>05</td>
<td>15</td>
<td>10</td>
<td>00</td>
</tr>
<tr>
<td>Village B</td>
<td>05</td>
<td>10</td>
<td>05</td>
<td>10</td>
<td>05</td>
<td>10</td>
</tr>
<tr>
<td>Village C</td>
<td>08</td>
<td>10</td>
<td>02</td>
<td>04</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Village D</td>
<td>10</td>
<td>12</td>
<td>03</td>
<td>05</td>
<td>08</td>
<td>10</td>
</tr>
<tr>
<td>Village E</td>
<td>06</td>
<td>08</td>
<td>02</td>
<td>07</td>
<td>06</td>
<td>08</td>
</tr>
<tr>
<td>Village F</td>
<td>00</td>
<td>02</td>
<td>08</td>
<td>10</td>
<td>07</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>62</td>
<td>25</td>
<td>51</td>
<td>48</td>
<td>55</td>
</tr>
</tbody>
</table>
clinically confirmed, clinically and laboratory confirmed, unclassified. Where is the case located, based on geographical location. The condition of the case, whether it is alive, dead, or has other major complications.

**Question 5: What action will you take at the peripheral level?** (5 min)

**Answer:** There is an upsurge in the number of confirmed cases in March. As a medical officer, one needs to follow up and verify the application of case definition and confirm its appropriate use. The medical officer may need support from higher authorities to investigate the matter.

**Note:** You are a District or Provincial Health Officer at the intermediate level of the surveillance system of the country and you receive the above report from the peripheral levels.

**Question 6: How would you analyse the data?** (10 min)

**Answer:** At the district level, the District/Provincial Health Officer would like to analyse the month-wise prevalence of arsenosis cases.

![Monthwise Prevalence of Arsenosis Cases](image)

<table>
<thead>
<tr>
<th>Period</th>
<th>No. of confirmed arsenosis cases</th>
<th>Total population</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>2</td>
<td>1000</td>
<td>0.2%</td>
</tr>
<tr>
<td>February</td>
<td>2</td>
<td>1000</td>
<td>0.2%</td>
</tr>
<tr>
<td>March</td>
<td>6</td>
<td>1000</td>
<td>0.6%</td>
</tr>
</tbody>
</table>
Question 7: What feedback would you give to the peripheral units? (5 min)

Answer: The District Health Officer should inform the peripheral units about the change in the prevalence trends from January to March. There has been a three-fold increase in the number of confirmed cases in March as compared to January and February. This change in trend needs to be investigated further.

Question 8: What other question would you ask? (5 min)

Answer: After analysing the data, the District Health Officer would like to know details on the following issues:

- Has there been any change in manpower? Have more health workers been posted in the area who have picked up cases that were missed earlier?
- Did a new dermatologist who has been able to clinically confirm cases move into the area?
- Was any training workshop held recently which has led to better case identification and reporting?

Question 9: What follow-up actions will you take? (5 min)

Answer: As follow-up action, the District Health Officer should make a field visit to verify the application of the WHO case definition. It is essential to verify that the case definition is properly applied. Also, the issues listed regarding change in manpower or training need to be investigated.

Question 10: How would you report this to the next level of surveillance in your country? (5 min)

Answer: The next level of surveillance should be informed that there is an apparent upsurge in the number of arsenicosis cases observed from Arsenicopur village. An investigation team has been sent to establish this observation and will report shortly. However, at this point there is no need to alert the nation. The concerned authorities may take appropriate action.

STOP

1) Review all answers to Module 7 of the Case Surveillance
2) Course coordinator to summarize all point of confusion for inclusion in clarification in Module 8
3) Meet the Facilitators to plan the next day materials. Field visit, if this option has been chosen. If not, prepare the wrap up lecture to incorporate any changes or confusion noted during the workshop.
8.1 OBJECTIVES OF THE MODULE

- To provide an overview of what has been taught in this course
- To review the daily feedback and incorporate it in your presentation
- To clarify any confusion in the participants’ minds
- To suggest a possible way forward
- To administer the post-test
- To close the workshop

HAVE YOU GOT THE FOLLOWING MATERIALS?

8.2 CHECKLIST FOR MODULE EIGHT SPECIFIC MATERIALS

In addition to the checklist given in section 1.2, the following module-specific preparations are needed.

- The lecturer for the final session should preferably be the course coordinator
- Make sure that the facilitator is clear about delivering his lecture, summarizing the whole workshop
- Incorporate the most common confusions in each of the slides
- Rehearse the lecture to time yourself
- Check that the CD is compatible with your system and that the projection system is working
- Make sure that the names of all participants have been correctly entered in the certificates and all certificates have been signed by the appropriate authorities
- Confirm the participation of dignitaries for the closing ceremony and prepare briefs for them
8.3 SUGGESTED TIME AND SEQUENCE FOR MODULE EIGHT

Follow the sequence of steps given in Figure 8:

<table>
<thead>
<tr>
<th>Sequence of events and suggested time duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present a Summary of the workshop</td>
</tr>
<tr>
<td>Have participant complete the post-test</td>
</tr>
<tr>
<td>Review any other training issues</td>
</tr>
<tr>
<td>Formal closure, if any and presentation of certificates</td>
</tr>
</tbody>
</table>

Figure 8: Organisation of Module Eight

8.4 POST-TEST

Inform the participants that they have completed all the modules on arsenicosis. They will now take the post-test, which is a set of multiple-choice questions. The participants have to tick (✓) mark the correct answer/s as was done in the pre-test.

Allow them 10 minutes to finish the task. After that, collect the forms. Evaluate the results and compare with the post-test.
POST-TEST QUESTIONNAIRE

Training Workshop on Detection, Management and Surveillance of Arsenicosis:

Batch no: ___________________________________________________________________________

Venue: __________________________________________________________________________

Date: ______________________________________________________________________________

Instructions: Kindly fill the details regarding batch number, venue and date in the space provided above. Do not write your name. All questions have a single answer. Put a tick mark against the chosen option in the box provided. All questions should be answered.

**Question 1:** The current WHO guidelines value for arsenic-contaminated ground water is in excess of?

- a) 10 mg/litre
- b) 50 mg/litre
- c) 10 µg/litre
- d) 25 mg/litre
- e) None of the above

**Question 2:** Which are the countries known for arsenic-contaminated ground water?

- a) Timor-Leste
- b) Sri Lanka
- c) India, Bangladesh, Myanmar, Thailand, Canada
- d) b and c only
- e) All of the above

**Question 3:** Which one of the following describes the epidemiology of arsenic best in South-East Asia?

- a) The main source of arsenic is from the alluvium of the Brahmaputra-Ganges river basin
- b) At least 30 million people may be at risk for arsenic disease in the Region
- c) Prolonged exposure to non-lethal dose ranging from 0.005 to 0.09 mg/kg of body weight/day can result in arsenicosis
d) All of the above  

e) None of the above  

**Question 4:** The type of health impact resulting from arsenic exposure depends on:

a) Dose of arsenic  
b) Modality of exposure  
c) Chemical forms of arsenic  
d) All of the above  

**Question 5:** The hallmark of arsenicosis is:

a) Melanosis  
b) Keratosis  
c) Melanosis or keratosis  
d) Melanosis and keratosis  

**Question 6:** Which one of the following statements is true of arsenic-related melanosis?

a) It can occur as fine-freckled or spotted pattern on the trunk and extremities  
b) Melanosis can occur as diffused or generalized pigmentation  
c) Pigmentation of the oral mucosa may occur in combination with localized or patchy pigmentation on the body  
d) All of the above  

**Question 7:** Which one of the following statements is true of keratosis in arsenicosis course?

a) It is characterized by thickening of skin and appearance of papules or nodules  
b) It can be sub-categorized as mild, moderate or severe depending on the size of elevations  
c) In severe keratosis, the elevation is less than 5 mm on the palms and soles  
d) All of the above  

**Question 8:** Which one of the following statements is true of keratosis in arsenicosis course?

a) It is characterized by thickening of skin and appearance of papules or nodules  
b) It can be sub-categorized as mild, moderate or severe depending on the size of elevations  
c) In severe keratosis, the elevation is less than 5 mm on the palms and soles  
d) All of the above  

e) a and b only
**Question 8:** The major diagnostic criteria for case definition include:

a) Presence of pigmentary / keratotic skin lesions
b) Nutritional status
c) Exposure to elevated levels of arsenic
d) Age
e) a & c

**Question 9:** According to WHO algorithm, a probable case of arsenicosis is a case:

a) With definite keratosis
b) With keratosis and melanosis
c) Melanosis or keratosis after excluding other skin lesions mimicking arsenicosis
d) With raindrop pigmentation
e) b & c

**Question 10:** According to WHO algorithm, a clinically confirmed case of arsenicosis is a case with:

a) Keratosis and Melanosis
b) Skin lesion and history of exposure
c) History of exposure
d) Skin lesions and laboratory test positive
e) Probable case in whom the presence of other arsenicosis simulating skin lesions has been ruled out.

**Question 11:** Which one of the following laboratory methods is the gold standard for testing arsenic?

a) Calorimetric method
b) Gravimetric method
c) Atomic Absorption Spectrophotometry
d) All of the above
e) None of the above

**Question 12:** Which one of the following specimens can help decide chronic exposure to arsenic?

a) Blood
b) Nails
Question 13: The nail clippings of a patient with typical raindrop pigmentation and palmo-plantar keratosis and history of exposure to arsenic for over 8 years reveal a negative result from laboratory A. Two repeat samples are sent to laboratory A and laboratory B. Laboratory A reports negative and B reports positive test. What would you do?
   a) Classify the patient as not a case
   b) Send a third sample to laboratory A
   c) Check the standard operating procedures of the laboratory A
   d) Repeat another test later
   e) None of the above

Question 14: Which one of the following skin symptoms in arsenicosis requires treatment with local applicants?
   a) Melanosis alone
   b) Keratosis alone
   c) Melanosis and Keratosis both
   d) b and c
   e) None of the above

Question 15: What is the management of a “probable case” in whom it is not possible to clinically confirm or rule out diagnosis of arsenicosis by a dermatologist or a specialist?
   a) Patient should retain the diagnosis of probable case
   b) Patient should be labelled as ‘not a case of arsenicosis’
   c) Re-evaluation of case by medical specialist periodically
   d) a and c only
   e) b and c only

Question 16: What are the available safe water options to prevent exposure to arsenic?
   a) Arsenic-free tube well
   b) Rain water harvesting
c) Filter for removing arsenic
  d) a, b and c
  e) None of the above

**Question 17:** Which one of the following non-dermatological manifestations of arsenosis requires specific management?

  a) Chronic cough and respiratory distress
  b) Sensorineural peripheral neuropathy and peripheral vascular disease
  c) Hematuria and non-pitting oedema
  d) All of the above
  e) None of the above.

**Question 18:** Which type of surveillance system is most suitable for routine detection of arsenosis?

  a) An active surveillance system
  b) A passive surveillance system
  c) A sentinel surveillance system from arsenic clinics
  d) b and c only
  e) a, b and c

**Question 19:** What minimum data set should be collected for an arsenosis case?

  a) Whether the case is suspected, probable or confirmed
  b) The age of the case
  c) The geographical location of the case
  d) Only b and c
  e) a, b, and c

**Question 20:** What are the main surveillance tasks at the intermediate level of healthcare?

  a) To clinically confirm all the “suspected” and “probable” cases
  b) To provide clinical management of Bowen's disease and other systemic disorders
  c) Provide feedback to the primary level on trends of the disease
  d) None of the above
  e) All of the above
8.5 SUMMARY AND REVIEW OF WORKSHOP

Using the summary slide, summarize the workshop highlighting the important point learnt in each module. Use the provided summary slides for each module. You should address any confusing point in the relevant part of the slide and provide reference to the WHO Guidelines and Facilitator’s Guide.

8.6 CERTIFICATE DISTRIBUTION AND CLOSING CEREMONY

Follow the standard practice and procedure for the country.
Part-III

List of Optional Modules
9.1 OVERALL OBJECTIVES OF THE MODULE

At the end of the session, the participants should be able to:

- Gain experience in classifying a case of skin manifestation using the WHO algorithm after taking history and examination
- Be sensitized to practical strategies for managing a case of arsenicosis with or without complications
- Be able to collect, process and ship relevant samples for arsenic testing
- Be able to perform simple testing of water using a commercial kit

This section includes three options as follows:

Option I: Case Identification consisting of two parts
Option II: Case Management consisting of two parts
Option III: Laboratory Experience consisting of two parts

The facilitators may choose one whole option, parts of an option or a combination depending on the resources, time availability and the need of the workshop participants.

9.2 CHECKLIST FOR MODULE NINE-SPECIFIC MATERIALS

In addition to the checklist given in section 1.2 of part 1 of this Guide, additional option-specific materials are required as listed under each of the three options.
9.3 MODALITY OF OPTIONAL MODULE

Follow the sequence of steps outlined in the figure below:

**Sequence of events and suggested time duration**

- **Introduction and Objectives** 10 min
- **Option 1 Part 1: Demonstration of a case and classification according to case definition** 70 min
- **Option 1 Part 2: Clinical practice on case classification by participants** 60 min
- **Option 2 Part 1: Demonstration on management of arsenicosis** 50 min
- **Option 2 Part 2: Supplementary Exercise on Case Management** 40 min
- **Option 3 Part 1: Demonstration on specimen collection** 30 min
- **Option 3 Part 2: Demonstration of the field kits** 70 min
- **Final conclusion** 20 min

*Figure 9: Organisation of Module Nine*
9.4 OPTION 1: CASE IDENTIFICATION AND DEMONSTRATION

9.4.1 OBJECTIVES OF OPTION 1

The objectives of this section is to gain experience in identifying and classifying arsenicosis cases.

9.4.2 CHECKLIST FOR OPTION 1

HAVE YOU GOT THE FOLLOWING MATERIALS?

In addition to the checklist given in section 1.2 of the guideline, the following preparations are required.

- The venue of the clinical session should be decided two weeks in advance and the concerned people should be informed and preparations made to collect patients with/without arsenicosis.
- The participants should also be informed the day before about the timing and venue of the clinical practice session.
- Before the clinical practice session, read the modality of the field practice session.
- The evening before the clinical sessions, the facilitators should meet and decide about conducting this session.
- The session is to be organized at the primary/secondary level hospital or in the community.
9.4.3 SUGGESTED TIME AND SEQUENCE FOR OPTION 1

Follow the sequence of steps given in Figure 9.1.

**Sequence of events and suggested time duration**

1. **PART ONE**
   - Explain objectives then take history of arsenic exposure and record your data on the clinical practice form (5 min)
   - Collect information on self-reported symptoms and perform a skin examination using the clinical practice form (15 min)
   - Do a clinical examination of other systems using the clinical practice form (10 min)
   - Classify the case using the WHO algorithm and explain the Basis for your conclusions (10 min)

2. **PART TWO**
   - Pair up the students in groups of 2 and ask them to Complete the clinical examination on their own based on the Demonstration and recording their results in the practice form (40 min)
   - Go over the results and summarize the findings (10 min)

*Figure 9.1: Organisation of Module 9: Option 1*
9.4.4 OPTION 1 PART 1: CLINICAL DEMONSTRATION

On reaching the site for clinical practice, get all the participants together in a group and give a brief description of the hospital/community where the clinical practice session is to take place.

Tell the participants that there will be one demonstration on clinical examination for case definition and/or on case management. This will be followed by a clinical practice session in which the participants will have hands-on training in evaluating patients.

Demonstration of a case of arsenicosis should be done by a tutor who is a clinician. Explain to the participants that the objective of the demonstration is to assess a case for arsenicosis. Also, explain to the patient what is proposed to be done and get the consent of the patient to participate in the demonstration exercise.

Use the clinical practice form while demonstrating the case. Ask for the patient’s identification including his/her occupation and fill in the form.

Take history of exposure to arsenic through water used for drinking/cooking, food and medicines that might contain toxic levels of arsenic and the duration of exposure. Fill in the information in the form.

Ask for symptoms and duration of illness and write in the appropriate space in the form. Also check for systemic manifestations and ask relevant questions for differential diagnosis as given in the form. Tell the participants that they will now examine the patient. The objective of the physical examination is to evaluate the patient for arsenicosis, consider other conditions and exclude them to the extent possible.

Do a thorough skin examination including inspection and palpation of skin lesions. Care should be taken during the examination of unexposed parts of the skin that can lead to embarrassment. Write the findings and draw on the illustration attached in the clinical form.

Proceed to evaluation of other systems: gastrointestinal (palpation of the abdomen, assessing the enlargement of liver); respiratory system (chest examination); cardiovascular (BP, peripheral pulses and heart); CNS (sensations, muscle power and reflexes); haematological (anaemia), etc. Salient positive findings should be read out to the participants from the clinical practice form.

Use the WHO algorithm to classify the condition based on the findings as suspected or probable cases. State that the doctor, who is not a skin specialist, can only make a diagnosis of arsenicosis as suspected or probable case. The case has to be further evaluated by a dermatologist or arsenic
expert and other differential diagnosis excluded to call it a clinically confirmed case of arsenicosis. Emphasize to the participants that they should always use the algorithm to make a correct diagnosis of the problem and be consistent so that surveillance of the condition is reliable.

Now summarize the demonstration by providing a brief on the patient’s history, positive findings and justify the diagnosis. While summarizing the case do mention about the presence or absence of systemic involvement and the presence or absence of cancer.

9.4.5 OPTION 1 PART 2: CLINICAL PRACTICE

- Pair up participants in teams of two. Ask them to use the clinical practice forms provided in their Participants’ Course Handout. Let each pair examine a patient together.
- Ask the participants to note the findings in the clinical practice form independently. Each participant should see at least 2-3 patients. The participants should fill a separate form for each case.
- The facilitator should ensure that the participants see a mix of patients with and without arsenicosis.
- Observe the participants while they are examining the patients and giving advice. Each facilitator should be guiding 2-3 pairs of participants.
- In case the diagnosis is wrong, the facilitator should intervene and demonstrate the use of the WHO algorithm to reach the correct diagnosis. Individual feedback should be given only after the patient has left.

9.4.6 SUMMARY OF FIELD VISIT FOR CASE IDENTIFICATION

After the field visit, all participants should meet at the training venue. Put flipcharts on the walls of the room. Ask the participants to fill in their names and the number of cases seen in each category. A sample of the format is given below:

<table>
<thead>
<tr>
<th>Name of the participant</th>
<th>Total patients seen</th>
<th>Case definition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Suspected</td>
</tr>
<tr>
<td>Dr. X.Y.</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Dr. A.B.</td>
<td>2</td>
<td>—</td>
</tr>
</tbody>
</table>

This will give an estimate of the number of patients seen by each participant in the clinical practice session.
Thereafter, have a group discussion with the participants on the clinical practice session. Let them share their experiences and difficulties. Emphasize that the mistakes made now would help them learn better. Discuss cases that were difficult to diagnose. Ask the participants about their experience regarding management and counseling. Ask if they felt they could counsel the patients regarding referral/adopting alternative water options.

Summarize the field practice session

- Hands-on practice improves the process.
- There may be cases which are difficult to diagnose and may need referral.
- Counseling skills are learnt with practice.

9.5 OPTION 2: CASE MANAGEMENT

9.5.1 OBJECTIVES OF OPTION 2

The objective of this demonstration is to show the participants the various components of treatment of chronic arsenicosis.

9.5.2 CHECKLIST FOR OPTION 2

HAVE YOU GOT THE FOLLOWING MATERIALS?

In addition to the checklist given in section 1.2 of the guideline, the following materials are required.

- Patients in various stages of arsenicosis diseases
- Keratolytic agents (10-20 % of urea and 3-10% salicylic acid)
- IEC poster on nutrition
9.5.3 SUGGESTED TIME AND SEQUENCE FOR OPTION 2

Follow the sequence of steps given in Figure 9.2.

**Sequence of events and suggested time duration**

1. **PART ONE**
   - Explain objectives of case management in the absence of specific therapy: 5 min
   - Demonstrate Management options on the patients: 40 min
   - Summarize the treatment advice: 20 min
   - Take any questions from the participants: 10 min
2. **PART TWO**
   - Divide the participants in groups of 8-10 and do the supplementary exercise on Case management: 40 min
   - Go over the results and summarize the findings: 10 min

*Figure 9.2: Organisation of Module 9: Option 2*
9.5.4 OPTION 2 PART 1: DEMONSTRATION OF CLINICAL MANAGEMENT STRATEGIES

Explain to the participants that they will learn the key steps in mitigation of arsenicosis. It is important to use good communication skills to help reduce the exposure to arsenic, be convinced about the adherence to treatment, accept referral (if needed) and follow up advice.

The patient has to be convinced about the need to reduce the continued exposure to arsenic. This may be the same patient used for the demonstration on case identification. The focus of demonstration is on management. This would consist of the following steps:

(i) Advice on safe water options for drinking and cooking
(ii) Use of Keratolytic agents in case of keratosis
(iii) Nutritional advice
(iv) Counselling on follow-up
(v) Counselling on referral, if required
(vi) Education on early identification of skin cancer or systemic manifestations.

Find out the source of drinking water and its purity. If drinking water has not been tested, ask the patient to approach the village community leader to get the water tested for arsenic content from the competent authority. Discuss the various water options with the patient as given below:

(1) Rain water harvesting
(2) Use of filtration to reduce the arsenic content of water
(3) Microbiologically and chemically safe surface water.

Based on the resources available to the family and their willingness, the facilitator should try to reach an agreement on the option that the family has chosen. Discuss the details of the method selected.

Relief from symptoms due to keratosis can be achieved by local application of keratolytic agents. The recommended agents were urea (10-20%) or salicylic acid (5-10%) in the form of an ointment. Show the patient/attendant the ointment. Explain that it should be applied on the keratotic lesions at least twice in a day regularly for at least three months. Hands should be washed before and after the application. After demonstrating the method of local application, ask the patient/attendant to complete the treatment in your presence. Time invested in following this procedure will help in increasing the treatment adherence.
The treatment and advice are not likely to produce dramatic results since the condition is chronic. Explain that relief and improvement are likely to occur only after several weeks of regular treatment.

The patient/attendant should also be advised not to change the treatment and avoid “doctor shopping”. Medicines other than prescribed in the guidelines may produce side effects, may not be as effective and can be expensive.

Advise the patient to return for a follow-up visit according to the norms. Explain that this is very important to check the response to treatment, help the patient to overcome any problems encountered in adhering to the treatment, and to check for complications. The follow-up visit is also to be used to further educate the patient to develop greater faith in the recommended treatment.

Give advice on good nutrition with high protein value to improve nutritional status and fruits for natural antioxidants. The objective of treatment of systemic manifestations of arsenicosis is to treat the problem(s) identified. If the patient has high blood pressure then this should be treated and exposure to arsenic reduced. If the patient has diabetes mellitus then it should be treated with medicines or insulin injections, dietary advice and exercise and exposure to arsenic reduced. Similar principles should be used in treating cardiovascular, neurologic, gastrointestinal and other problems.

Referral of patients with arsenicosis is needed to (a) confirm the diagnosis (b) investigate the patient for arsenicosis (c) investigate and treat cancer or any other systemic manifestation of arsenicosis. If the doctor has identified the need for referral, then discuss the referral process with the patient/attendant and get an agreement after explaining why referral is proposed: where the patient is expected to go and what it involves in terms of cost, travel, etc. Answer any questions that the patient/attendant may have. Prepare a referral card that identifies the patient, describes the problems identified and why referral is proposed.
9.5.5 OPTION 2 PART 2: SUPPLEMENTARY EXERCISE ON CASE MANAGEMENT

INSTRUCTIONS TO FACILITATORS

- Tell the participants that they will be divided into smaller groups of 8-10 persons each. One facilitator will facilitate each group.
- Each small group will discuss one case study given in the Participants’ Course Handout.
- Ask the participants in each group to choose a rapporteur who would note the responses on the flip chart and present the group work.
- Ask one of the participants to read out the case study. Thereafter discuss each question with the group, giving a chance to all to participate.

At the end of the group work, ask the representatives of each group to read the case study and present the discussion points to the larger group. After each presentation, allow 5-10 minutes of discussions on the management options suggested.

**Case 1**: Mrs Sultana is 45-years-old female patient is from a village in Malda district in West Bengal, India. Since 1993, her family has been drinking water from a tube well dug the same year. For the last eight years, she has noticed a skin problem that is spreading. She has taken treatment from an NGO near her village but it has not helped her. She sought advice from the doctor in the PHC. The doctor noticed spotted pigmentation that resembles raindrops on her trunk and on her extremities. When the doctor examined her palms and soles, he found that she had several skin lesions that were raised and 0.3-0.5 cm in size. These were rough and horny. The doctor suspects arsenosis.

**Question 1**: What should the doctor do to clinically confirm the diagnosis?
**Answer**: The doctor should either refer the case for confirmation to a specialist or order a laboratory test for arsenic to clinically confirm the diagnosis of arsenosis.

**Question 2**: What samples should be collected and where should these be sent for laboratory confirmation of the diagnosis?
**Answer**: The samples to be collected are either water for arsenic test or biomarkers like hair or nail clippings for arsenic content in case it is not possible to test the drinking water used by the patient. These samples should be sent to an approved laboratory for arsenic testing.
Question 3: What should be done to relieve the problem?
Answer: To relieve the symptoms of keratosis and melanosis the following measures are suggested:

- Dietary advice - nutritious, high-protein diet
- Local application - Salicylic acid or urea-based ointment for keratotic lesions.
- Advice on prevention of worsening of signs. Stop consumption of arsenic-contaminated water.

Question 4: Should this patient be referred? If yes, then where and for what purpose?
Answer: The patient should be referred to the secondary level hospital for clinically confirming the diagnosis of arsenicosis.

Case 2: Mr. Hassan, 52-years-old male patient is from a village in district Dhaka, Bangladesh. Eight years ago he noticed lesions on the skin that were pigmented and his palms and soles started feeling rough. The treatment from the village doctor was of no use. He started having diarrhoea, with cramps and cough that became chronic. During the past six months, he has noticed a new skin problem that has started spreading rapidly. He has come to the district hospital for consultation. The doctor noticed rounded, hypo-pigmented patches on a hyper-pigmented background. Examination of the palms and soles showed large keratotic elevations with a gritty appearance. He also had a fungating growth on the palmar surface of the left hand that was ulcerating. The doctor suspects arsenicosis and skin cancer due to prolonged exposure to arsenic. At present there is no dermatologist in the district hospital.

Question 1: Where can the diagnosis of arsenicosis and cancer be made?
Answer: The patient should be referred to a tertiary level hospital for confirming the diagnosis of arsenicosis and cancer.

Question 2: What samples should be collected to confirm a case of arsenicosis?
Answer: To confirm the diagnosis of arsenicosis, collect the following samples:

- Arsenic test on drinking water source or
- Biomarkers - Hair or nail clips
- Biopsy from the fungating growth.

Question 3: How would you manage the patient for relief of symptoms?
Answer: For the relief of symptoms, the patient should be advised to:

(a) Use keratolytic agents like 5-10% alicyclic acid or urea-based ointment.
(b) Recommend a high-protein diet
(c) Advise the patient to stop consumption of arsenic-contaminated water.
(d) Administer symptomatic treatment of complications like diarrhoea, cough etc.
(f) Undertake treatment of skin cancer after confirmation by a biopsy
**Case 3:** Mrs R, 45-years-old female patient who lives in a village where several people suffer from skin problems that resemble those of the patient. The patient had pigmentation on the trunk and the extremities. Roughening of the palms and soles followed the skin manifestations. After a couple of years, these have developed into lesions that feel rough. For the past three months, she has become pale and complains of numbness and tingling in the feet. The doctor, after examining the patient, suspects arsenicosis.

**Question 4:** What should the doctor do to confirm his clinical suspicion?
**Answer:** The patient should be referred to a dermatologist/arsenic expert for clinical confirmation and undergo laboratory tests for arsenic toxicity.

**Question 5:** What should the doctor do to relieve the skin manifestations of the disease?
**Answer:** The skin manifestations can be relieved by:
- Local application - Salicylic acid or urea-based cream for keratotic lesions.
- Dietary advice: High protein diet including vegetables and fruits.

**Question 6:** What is the advice regarding prevention of further problems relating to arsenicosis?
**Answer:** For prevention of further problems relating to arsenicosis, advise the patient to stop drinking arsenic-contaminated water. Discuss alternative water options like rainwater harvesting or use of filters or use of surface water. Advise regular follow-up for surveillance.

**Question 7:** What are the likely systemic manifestations of arsenicosis?
**Answer:** The systemic manifestations in this patient include anaemia (haematological system) and numbness and tingling of feet (peripheral neuropathy).

**Question 8:** What should the doctor advise for relief of systemic manifestations of the disease?
**Answer:** For systemic manifestations, give symptomatic treatment for anaemia and peripheral neuropathy. Advise the patient to decrease exposure to arsenic by stopping consumption of arsenic-contaminated water.
9.6 OPTION 3: LABORATORY EXPERIENCE

9.6.1 OBJECTIVES OF OPTION 3

The objective of this demonstration is show the proper collection, handling and shipment of specimens

9.6.2 CHECKLIST FOR OPTION 3

HAVE YOU GOT THE FOLLOWING MATERIALS?

In addition to the checklist given in section 1.2 of the guideline, the following materials and preparations are required.

- Specimen containers
- Water samples
- Urine samples (depending upon availability)
- Laboratory requisition form
- Plastic bags
- Absorbent Cotton wool
- Adhesive tapes
- Marker Pen
- Nail Cutter
- Scissors
- Arsenic positive and negative samples
- Field kit
- Disposable gloves
9.6.3 SUGGESTED TIME AND SEQUENCE FOR OPTION 3

Follow the sequence of steps given in Figure 9.3.

**Sequence of events and suggested time duration**

- Explain objectives laboratory tests: 5 min
- Demonstrate collection of hair, nails and water: 30 min
- Demonstrate packing and shipment: 10 min
- Demonstrate the use of field kit: 70 min
- Go over any questions and summarize the findings: 10 min

*Figure 9.3: Organisation of Module 9: Option 3*
9.6.4 OPTION 3 PART 1: SPECIMEN HANDLING

After the clinical practice session, take the patients to the laboratory area in the hospital. The main objective of this session is to demonstrate specimen collection, storage and transportation. Select a patient who has been classified as a probable case of arsenicosis and explain the need for laboratory testing. Tell the participants about the possible specimens that can be collected. Demonstrate the collection of biomarkers - hair and nail clippings of the patient.

COLLECTING HAIR

Use an appropriate acid-washed plastic container. Cut 30-50 hairs, 5cm long from the tip. The hair should be washed with arsenic-free water using a shampoo that does not contain arsenic. Put the hair in the container. Replace the lid tightly. Label the specimen with the name of the patient, date of collection and address for return, using a felt-tipped pen.

COLLECTING NAIL CLIPPINGS

Ask the subject to wash hands with arsenic-free water, cleaning the undersurface of nails. Take 2 mm of nail clippings and put them in a plastic container washed with acid. Replace the lid tightly and label the specimen. Write the patient’s name, date of collection and address for return. Do not use adhesive labels.

COLLECTING WATER SAMPLE

Draw and discard the initial few litres of water from the tube well. Then collect 50 ml of water in an acid-washed plastic container. Replace the lid and label as mentioned above.

PACKING

Show how to properly label the specimen. Demonstrate how to pack the specimens in absorbent cotton wool before inserting it in a sealed plastic bag and explain the reasons for your actions.

FILLING UP LABORATORY REQUISITION FORM

Show how to properly fill in the laboratory request form.
9.6.5 OPTION 3 PART 2: DEMONSTRATION OF FIELD KITS

A number of commercial kits are used. Take this opportunity to reiterate that only validated kits can be used. The facilitator should:

i) Demonstrate use of the kit by highlighting the instructions for precautions in the use of the kit

ii) Emphasize the precautions that are required for collection of specimens and in avoiding cross-contamination during processing and testing

iii) Follow the steps and perform the test

iv) Read the result and interpret it

v) Dispose the chemical and arsenic-containing materials in accordance with the accepted practice of the country.
PART-IV

LIST OF APPENDICES
CHECKLIST: WORKSHOP PREPARATION AND PLANNING

8-10 WEEKS BEFORE THE WORKSHOP

• Structure and agenda of the workshop
  — Develop the programme structure and content with the key organizations/individuals involved (See example in Appendix 6)
  — Contact other facilitators to agree on the programme and assign responsibility for each module/session

• Selection of participants
  — Initiate this process in collaboration with the relevant organizations
  — Decide on a deadline to complete the selection process and to notify the participants

• Accommodation, meals and coffee breaks
  — Book accommodation and make arrangements for meals and coffee breaks
  — If participants are from out of town and are staying at a hotel, it is recommended that the workshop be held in the same hotel to save time and expense on commuting
  — If the workshop is for local participants, then the workshop should be held at a venue some way off their places of work, to minimize interruptions

• Workshop facility
  — Select the workshop facility/training room
  — The room for the plenary should be large enough for participants to spread out and work in small groups comfortably without disturbing each other
  — At least one end of the plenary room should be equipped for overhead projections or for PowerPoint presentations
  — If possible, in a hot climate, it is helpful to have air-conditioning, electric fans, or at least lots of windows.
— Ensure the availability of 2-3 small tables for use by the facilitators
— Ensure having the flexibility to rearrange the tables for breaks/small group sessions

• Photocopying and computers
  — Ensure the availability of computers and printers and photocopying facilities on the premises or nearby

• Workshop equipment and tools
  — One flipchart stand or a white board
  — Three to four flipchart paper pads
  — Colour markers for flipcharts/white board
  — An overhead projector or a computer with PowerPoint projection equipment
  — Blank transparencies and pens for the overhead projector
  — A screen or free wall for slide projection

• Participants’ stationery etc.
  — Note pads and pens - one for each participant
  — Name tags for participants and facilitators

• Notify participants of the course objectives, dates and venue

TWO WEEKS BEFORE THE COURSE

• Make available the following documents:
  — WHO Field Guide for Detection, Management and Surveillance of Arsenicosis for participants and facilitators
  — WHO Facilitator’s Guide for Detection, Management and Surveillance of Arsenicosis in South-East Asia
  — WHO Participants’ Handout on detection, management and surveillance of arsenicosis in South-East Asia for all participants
  — Workshop agenda

If possible, it may be advisable to make additional copies of the whole package in case there are unexpected visitors or more participants. This will preclude your doing it during the workshop and also save time.

• Make transparencies from the slides or just have them ready for PowerPoint projection.
• Check that the needed equipment is available:
  — Flipchart stands, sheets or white board and pens
  — Overhead projector, blank transparencies and pens, or a laptop and PowerPoint projection equipment
  — Sufficient seating

• Make arrangements for the field practice session
  — Decide venue for field practice session (hospital, community-based, laboratory)
  — Decide upon the options for clinical practice and make appropriate arrangements for transport and meals.

ONE WEEK BEFORE THE COURSE

• Confirm that those invited to the formal opening ceremony can attend
• Confirm that the participants can all attend
• Confirm venue and accommodation arrangements
• Confirm catering arrangements
• Confirm arrangements for field practice session.

ONE DAY BEFORE THE WORKSHOP

• Check the workshop meeting room/facility
  — Arrange the seating in a circular or U-shape - to ensure that the participants face each other and can also comfortably see the speaker and the projection screen
• Confirm that required equipment is in place and in working order
• Welcome the participants who have arrived early
APPENDIX 2

FLOW CHART OF CASE DEFINITION ALGORITHM

PRESENCE OF MELANOSIS / KERATOSIS

Yes
Suspected Case

Melanosis or Keratosis

Yes
Suspected Case

No
Are some other skin lesions that mimic arsenicosis present?

Probable Case

Melanosis & Keratosis

Yes
Probable Case

No
Are some other skin lesions that mimic arsenicosis present?

Clinically Confirmed

Probable Case

Conduct Arsenic Test

Negative
Probable Case

Positive
Laboratory Confirmed

Conduct Arsenic Test

Clinically and Laboratory Confirmed
**PHOTOGRAPH READING FORM**

Photograph No.________________

Use the objective criteria in the table below to describe your findings of the photographs.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Yes</th>
<th>No</th>
<th>Code†</th>
<th>Mild 1</th>
<th>Moderate 2</th>
<th>Severe 3</th>
<th>Code†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buccal Mucosa and tongue</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>- Melanosis</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- Leukomelanosis</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>- Keratosis</td>
<td></td>
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</tr>
<tr>
<td><strong>Dorsum of hand</strong></td>
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<td></td>
</tr>
<tr>
<td>- Melanosis</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- Leukomelanosis</td>
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<td>- Keratosis</td>
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<td><strong>Front of trunk</strong></td>
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<td>- Melanosis</td>
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<td>- Leukomelanosis</td>
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<td><strong>Back of trunk</strong></td>
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<td>- Leukomelanosis</td>
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<td><strong>Sole</strong></td>
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<td>- Keratosis</td>
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<tr>
<td><strong>Dorsum of Foot</strong></td>
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<td>- Leukomelanosis</td>
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<td>- Keratosis</td>
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<td></td>
</tr>
<tr>
<td>- Malignancies</td>
<td>Yes</td>
<td>No</td>
<td>Code†</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>- Bowen’s disease</td>
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<tr>
<td>- SSC</td>
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<td>- BSC</td>
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</tbody>
</table>

*Guide for Gradations of Skin Lesions: (Do to the extent visually possible)

1. **Mild**: Slight thickening, or minute papules (less than 2 mm) of the palms and soles, often associated with a grit-like texture that may be primarily detectable by palpation.
2. **Moderate:** Multiple, raised keratoses (>2 to 5 mm), appearing mainly or exclusively in a symmetric distribution on the palms and soles.

3. **Severe:** Large discrete or confluent keratotic elevations (> 5 mm) on the palms and soles, with nodular, wart-like or horny appearance. Less commonly, there may also be involvement of the dorsum of the extremities, and the trunk.

Diffuse thickening of the palms and soles may occur, alone or in combination with the keratotic nodules.

† Yes = 1; No = 0

**PROBABLE DIAGNOSIS CASE CLASSIFICATION**

- Suspected Arsenicosis case
- Probable Arsenicosis case
- Clinically Confirmed Arsenicosis case
- Laboratory & Clinically Confirmed Arsenicosis case
- Non-Arsenicosis case
- Indeterminate

**DIAGRAM FOR PICTORIAL NOTING OF DERMAL APPEARANCES**

[Diagram showing dermal appearances on hands and feet]
APPENDIX 4

CLINICAL PRACTICE FORM
FOR FIELD EXERCISE

SECTION A: QUALIFICATION OF CLINICAL EXAMINER

<table>
<thead>
<tr>
<th>Qualification of Clinical Examiner</th>
<th>Tick as appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Practitioner</td>
<td></td>
</tr>
<tr>
<td>Dermatologist</td>
<td></td>
</tr>
<tr>
<td>Arsenic Expert</td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

SECTION B: PATIENT IDENTIFICATION INFORMATION

Name of patient (optional)_________________________ Age_______ Sex_______

Residence:______________________________________________________________________
_____________________________________________________________________________

Rural  ☐  Peri-urban / urban  ☐

Occupation: ___________________________________________________________________

Name of hospital /village where the patient is seen ________________________________
SECTION C: HISTORY OF ARSENIC EXPOSURE

Ascertaining exposure history of arsenic by probing the patients with the following questions:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where do you get your current drinking water from?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube well</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow well or pond</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap water</td>
<td></td>
<td></td>
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<tr>
<td>River water or lake</td>
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<td></td>
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<tr>
<td>Combination of the above (please specify which ones)</td>
<td></td>
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<tr>
<td>How long have you been drinking from the current source?</td>
<td></td>
<td></td>
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<tr>
<td>Less than 6 months</td>
<td></td>
<td></td>
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<tr>
<td>6-12 months</td>
<td></td>
<td></td>
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<tr>
<td>Over a year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do not know</td>
<td></td>
<td></td>
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<tr>
<td>Do you know if the water you drink contains arsenic?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, how do you know this?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Tube well has been painted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A friend or neighbor told me so</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Government has informed this</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The village committee has informed us</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there anybody you know in your locality having similar signs/ symptoms?</td>
<td></td>
<td></td>
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<tr>
<td>Do they drink from the same tube-well?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary of arsenic exposure:

- Over 6 months of exposure
- Less than 6 months of exposure
- Not exposed
- Indeterminate
**SECTION D: GENERAL PHYSICAL EXAMINATION**

**Part 1: General Self-reported questions**

Ask the patients if he/she have any of the following diseases. Depending on the patients’ response, tick the appropriate boxes.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No or Don’t know</th>
<th>If yes, duration in year(s)</th>
<th>*Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
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<tr>
<td>Hypertension</td>
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<tr>
<td>Cough/Breathlessness</td>
<td></td>
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<tr>
<td>Ischemic heart disease</td>
<td></td>
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<tr>
<td>Cerebrovascular disease/ stroke</td>
<td></td>
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<tr>
<td>Paresthesia (Tingling, Numbness, burning of limbs)</td>
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<tr>
<td>Limb weakness/wasting</td>
<td></td>
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<tr>
<td>Generalized weakness</td>
<td></td>
<td></td>
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<tr>
<td>Intermittent claudication / leg cramps</td>
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<tr>
<td>Dyspepsia, pain abd, Anorexia, nausea etc.</td>
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<tr>
<td>Chronic diarrhea</td>
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<tr>
<td>Do you have pigmentation anywhere in the body?</td>
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<tr>
<td>Do you have afine-freckled or spotted pattern on trunk and extremities</td>
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<tr>
<td>Rounded hypo-pigmented or de-pigmented macules on a normal or hyper-pigmented background (raindrop pigmentation; leukomelanosis)</td>
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<tr>
<td>Diffuse/generalized hyper pigmentation</td>
<td></td>
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<tr>
<td>Diffuse thickening of palm and sole</td>
<td></td>
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<tr>
<td>Nodular keratosis of palm/sole/dorsal aspect of limbs</td>
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<tr>
<td>How many years ago did you first notice keratosis and/or pigmentation (year):</td>
<td></td>
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<tr>
<td>In which part of your body did it first appear?</td>
<td></td>
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<tr>
<td>Are you currently using any medication?</td>
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<tr>
<td>Are you a smoker?</td>
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<tr>
<td>Do you drink?</td>
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<tr>
<td>Do you have Past history of jaundice?</td>
<td></td>
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<tr>
<td>Have you ever taken any traditional medicine?</td>
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</tr>
</tbody>
</table>

*Yes = 1; No = 0*
If you have taken traditional medicines complete the table below

<table>
<thead>
<tr>
<th>Type of medicine</th>
<th>Duration of use</th>
<th>Code*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use</td>
<td>Duration</td>
</tr>
</tbody>
</table>

Part 2: Physical Examination

Perform a complete physical examination as detailed below

<table>
<thead>
<tr>
<th>Symptoms - Tick (/✓) as appropriate</th>
<th>Yes</th>
<th>No</th>
<th>Code?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL EXAMINATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pallor</td>
<td>(yes = 1; no = 0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaundice</td>
<td>(yes = 1; no = 0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyanosis</td>
<td>(yes = 1; no = 0)</td>
<td></td>
<td></td>
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<tr>
<td>Clubbing</td>
<td>(yes = 1; no = 0)</td>
<td></td>
<td></td>
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<tr>
<td>Edema</td>
<td>(yes = 1; no = 0)</td>
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<tr>
<td>Pulse/minute</td>
<td>/ / / / / / / /</td>
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<tr>
<td>Blood pressure</td>
<td>/ / / / / / / /</td>
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<tr>
<td>Respiration/minute</td>
<td>/ / / / / / / /</td>
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<tr>
<td>Temperature (deg.C)</td>
<td>/ / / / / / / /</td>
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<tr>
<td>Nail (Mee's line)</td>
<td>(yes = 1; no = 0)</td>
<td></td>
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<tr>
<td>Palpable pulse in the legs</td>
<td>(yes = 1; no = 0)</td>
<td></td>
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</tr>
<tr>
<td><strong>RESPIRATORY SYSTEM</strong></td>
<td></td>
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<tr>
<td>Shortness of breath</td>
<td>(present = 1; absent = 0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ronchi</td>
<td>(present = 1; absent = 0)</td>
<td></td>
<td></td>
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<tr>
<td>Crepitation</td>
<td>(present = 1; absent = 0)</td>
<td></td>
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<tr>
<td>Wheeze</td>
<td>(present = 1; absent = 0)</td>
<td></td>
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<tr>
<td><strong>EYES</strong></td>
<td></td>
<td></td>
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<tr>
<td>Conjunctival congestion</td>
<td>(yes = 1; no = 0)</td>
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</tbody>
</table>

*Contd.*
<table>
<thead>
<tr>
<th>Symptoms - Tick (/) as appropriate</th>
<th>Yes</th>
<th>No</th>
<th>Code*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GASTROINTESTINAL SYSTEM</strong></td>
<td></td>
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<tr>
<td>Gums</td>
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<tr>
<td>(pigmentation = 1, normal = 0)</td>
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<tr>
<td>Liver</td>
<td></td>
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<tr>
<td>(palpable =1; non-palpable = 0)</td>
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<tr>
<td>Spleen</td>
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<tr>
<td>(palpable =1; non-palpable = 0)</td>
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<tr>
<td>Kidneys</td>
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<tr>
<td>(palpable =1; non-palpable = 0)</td>
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<tr>
<td>Ascites</td>
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<tr>
<td>(yes=1; no = 0)</td>
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<tr>
<td>Abnormal veins on abdomen</td>
<td></td>
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<tr>
<td>(yes=1; no = 0)</td>
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<tr>
<td><strong>CARDIOVASCULAR SYSTEM</strong></td>
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<tr>
<td>Heart sound</td>
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<tr>
<td>(abnormal=1; normal = 0)</td>
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<tr>
<td>JVP</td>
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<tr>
<td>(normal = 0; increased = 1)</td>
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<tr>
<td>Ulcer in the limb</td>
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<tr>
<td>(present =1; absent = 0)</td>
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<tr>
<td>Gangrene of toes/finger</td>
<td></td>
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<tr>
<td>(yes = 1; no = 0)</td>
<td></td>
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</tr>
<tr>
<td><strong>ANTHROPOMETRY</strong></td>
<td></td>
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<tr>
<td>Standing height (cm)</td>
<td></td>
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<tr>
<td>Weight (kg)</td>
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</tbody>
</table>

* Yes = 1; No = 0
**SECTION E: IN-DEPTH SKIN EXAMINATION**

Does the participant show signs of pigmentation, keratosis on the body, palms or soles (tick only the positive signs and symptoms AND give the gradation* as per the guideline below)

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Yes</th>
<th>No</th>
<th>Code†</th>
<th>Mild 1</th>
<th>Moderate 2</th>
<th>Severe 3</th>
<th>Code†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buccal Mucosa and tongue</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Diffuse</strong></td>
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<tr>
<td><strong>Spotted</strong></td>
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<tr>
<td><strong>Trick (✓) as appropriate</strong></td>
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<tr>
<td><strong>Palm</strong></td>
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<tr>
<td>— Melanosis</td>
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<tr>
<td>— Leukomelanosis</td>
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<tr>
<td>— Keratosis</td>
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</tr>
<tr>
<td><strong>Dorsum of hand</strong></td>
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<td></td>
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<tr>
<td>— Melanosis</td>
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<td>— Leukomelanosis</td>
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<tr>
<td>— Keratosis</td>
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<tr>
<td><strong>Front of trunk</strong></td>
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<td></td>
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<tr>
<td>— Melanosis</td>
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<tr>
<td>— Leukomelanosis</td>
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<tr>
<td><strong>Back of trunk</strong></td>
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<tr>
<td>— Melanosis</td>
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<td>— Keratosis</td>
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<td><strong>Dorsum of Foot</strong></td>
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<tr>
<td>— Malignancies</td>
<td>Yes</td>
<td>No</td>
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<td>— Bowen’s disease</td>
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*Guide for Gradations of Skin Lesions:

1. **Mild:** Slight thickening, or minute papules (less than 2 mm) of the palms and soles, often associated with a grit-like texture that may be primarily detectable by palpation.

2. **Moderate:** Multiple, raised keratoses (>2 to 5 mm), appearing mainly or exclusively in a symmetric distribution on the palms and soles.

3. **Severe:** Large discrete or confluent keratotic elevations (> 5 mm) on the palms and soles, with nodular, wart-like or horny appearance. Less commonly, there may also be involvement of the dorsum of the extremities, and the trunk. Diffuse thickening of the palms and soles may occur, alone or in combination with the keratotic nodules.

† Yes = 1; No = 0
### POINTERS FOR DIFFERENTIAL DIAGNOSIS

<table>
<thead>
<tr>
<th>Pointers for differential diagnosis</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Presence since birth</td>
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<td>Appearance related to drug intake/occupation/hormone fluctuation</td>
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<td>Involvement of sites subjected to repeated trauma</td>
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<td>Signs of inflammation</td>
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<td>Scaling over lesion</td>
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<td>Involvement of face only</td>
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<tr>
<td>Hyperpigmentation along crease lines</td>
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(Presence of any of the above pointers indicates consideration for other differentials)

### FINAL CASE CLASSIFICATION

**Arsenicosis** .............................................................................................

**Sub-category**

- ■ Suspected .............................................................................................
- ■ Probable ..............................................................................................
- ■ Clinically confirmed .............................................................................
- ■ Laboratory confirmed ...........................................................................
- ■ Clinically & laboratory confirmed ....................................................

Not a case of arsenicosis ...........................................................................
Figure for recording location and distribution of dermal lesions during clinical practice
APPENDIX 5

LIST OF CONTRIBUTORS

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Dr Siriluk Thaicharoen, Director of Leprosy Unit – Dermatologist, Department of disease control Region II, Nakorn Si Thammarat Province, Thailand
## Suggested Agenda

<table>
<thead>
<tr>
<th>Day &amp; Date</th>
<th>Session</th>
<th>Duration</th>
<th>Topic</th>
<th>Presenter</th>
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<tbody>
<tr>
<td><strong>Day 1</strong></td>
<td>Session 1</td>
<td>55 minutes</td>
<td><strong>Mandatory Module One — Introduction</strong>&lt;br&gt;1. Formality/Opening Ceremony&lt;br&gt;2. Module One: Pre-Test&lt;br&gt;3. Module One: Lecture on Introduction to Arsenic in South East Asia&lt;br&gt;4. Participant read and discuss section one&lt;br&gt;5. Summary of module one</td>
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<td>Session 2</td>
<td>65 minutes</td>
<td><strong>Mandatory Module Two — Epidemiology of Arsenicosis</strong>&lt;br&gt;1. Lecture on Module 2: Epidemiology of arsenicosis in South East Asia&lt;br&gt;2. Participants read and discuss section 2&lt;br&gt;3. Participants do Exercise A&lt;br&gt;4. Review of module 2</td>
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<td>Session 3</td>
<td>65 minutes</td>
<td><strong>Mandatory Module Three — Clinical Aspects</strong>&lt;br&gt;1. Formal presentation 3&lt;br&gt;2. Participants read through section 3&lt;br&gt;3. Exercise B: Drill on clinical aspects&lt;br&gt;4. Exercise C: Clinical aspects&lt;br&gt;5. Review of module 3</td>
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<tr>
<td><strong>Day 2</strong></td>
<td>Session 4</td>
<td>150 minutes</td>
<td><strong>Mandatory Module Four — Case Definition</strong>&lt;br&gt;1. Formal presentation 4&lt;br&gt;2. Participants read through section 4&lt;br&gt;3. Exercise D: Case definition&lt;br&gt;4. Exercise E: Case studies and photo exercise&lt;br&gt;5. Review of module 4</td>
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<td>Session 5</td>
<td>90 minutes</td>
<td><strong>Mandatory Module Five — Laboratory Support</strong>&lt;br&gt;1. Formal presentation 5&lt;br&gt;2. Participants read through section 5&lt;br&gt;3. Exercise F: Laboratory diagnosis, review answers&lt;br&gt;4. Review of module 5</td>
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<th>Duration</th>
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<tr>
<td>Day 3</td>
<td>Session 6</td>
<td>90 minutes</td>
<td><strong>Mandatory Module Six — Case Management</strong></td>
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<td>1. Formal presentation 6</td>
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<td>2. Participants read throughs section 6</td>
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<td>3. Exercise G: Case management</td>
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<td>4. Exercise H: Case studies on case management</td>
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<td>5. Review of module 6</td>
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<tr>
<td>Day 4</td>
<td>Session 7</td>
<td>200 minutes</td>
<td><strong>Mandatory Module Seven — Case Surveillance</strong></td>
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<td>1. Formal presentation 7</td>
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<td>2. Participants read through section 7</td>
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<td>3. Exercise H: — Preparatory work (in plenary session)</td>
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<td>4. Review of module 7</td>
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<tr>
<td>Day 5</td>
<td>Session 8</td>
<td>110 minutes</td>
<td><strong>Mandatory Module Eight — Concluding Session</strong></td>
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<td>1. Formal presentation 8</td>
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<td>2. Post-test</td>
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<td>3. Review of all modules</td>
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<td>4. Delivery of certificates</td>
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<td>5. Closure (optional modules may also be inducted on time and interest)</td>
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<td>Day 5</td>
<td>Session 9</td>
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<td><strong>Optional Modules</strong></td>
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<td>1. Option 1, Part 1 — Clinical demonstration</td>
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<td>2. Option 1, Part 2 — Clinical practice</td>
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<td>1. Introduction and objectives for option 1</td>
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<td>2. Option 2, Part 1 — Demonstration of clinical management strategies</td>
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<td>3. Option 2, Part 2 — Supplementary exercise on case management</td>
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<td>4. Option 3, Part 1 — Specimen handling</td>
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<td>5. Option 3, Part 2 — Demonstration of field kit</td>
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