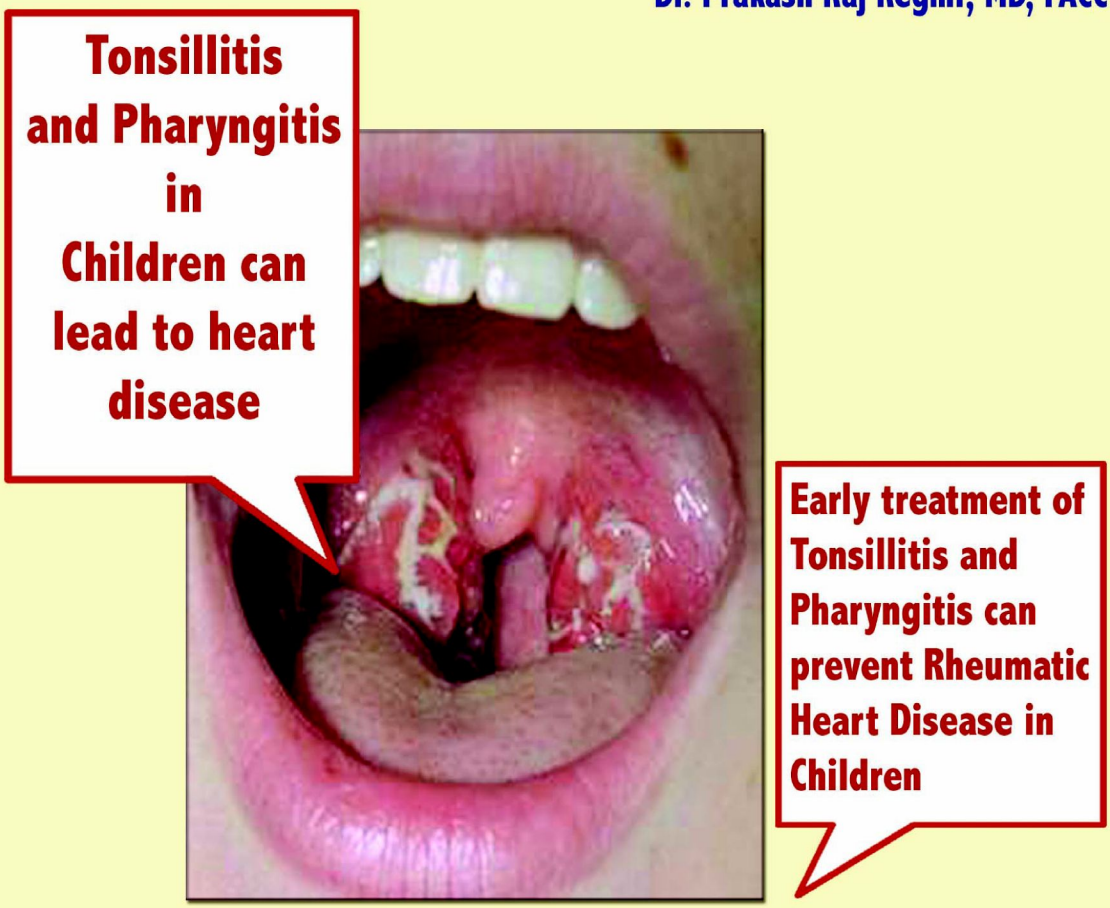
Rheumatic Fever
Rheumatic Heart Disease

Diagnosis, Management and Prevention

(Nepal Heart Foundation's Recommendations for Health Professionals)

Training Manual

Dr. Prakash Raj Regmi, MD, FACC



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Training Manual
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Dedicated to

Dr. Mrigendra Raj Pandey
Puspa Man Kayastha and
Him Kanta Sharma Neupane

(Who initiated research, clinical and community activities in the field of RHD Prevention and Control in Nepal)

Acknowledgment

Preparing a training manual on RHD with latest information and guidelines is a difficult task. We could complete this manual only with the important inputs from many indivisuals. The editor wishes to acknowledge the following indivisuals whose invaluable contributions made this publication possible:

Prof. Dr. Prachanda Pradhan

Dr. Satya Narayan Suwal

Dr. Jigyasa Regmi Paudyal

Roshani Tui Tui

Jhalak Sharma Poudel

Alice Grainger Gasser

Gabriele Mallapaty

Bijaya Mallapaty

Anmol Maharjan

Preface

Rheumatic Fever (RF) and Rheumatic Heart Disease (RHD) in children and adults continue to remain one of the major public health problems in Nepal. Prevention of RF/RHD is possible and cost effective. Efforts are being made by Nepal Heart Foundation (NHF) to address this issue by implementing RHD control program in collaboration with the Government of Nepal (GoN) which is supported by Foreign Partners like World Heart Federation, Rotary International, Australian Aid, Medtronic Philantropy and Edwards Lifesciences Foundation.

Training of health professionals on diagnosis, management and prevention at RF/RHD is one of the main components of the RHD control program. We had to travel a long way from East to West and North to South in Nepal for training of health professionals. Then came the idea of preparing more trainers from different parts of Nepal. A five to six days training course was designed for this purpose. NHF took the initiative to conduct the first ever Training of Trainers (ToT) on RHD in Nepal in March 2015. We were able to produce 24 New Trainers on RHD who came from different districts of Nepal. We searched for a training manual on RHD but could not find any. We could find only guidelines, slides, articles, journals and books on RHD. We strongly felt the need of a training manual on RHD. Then we took the challenge to prepare this important document.

The aim of this manual is to provide knowledge and skills to the participant on diagnosis, management and prevention of RF and RHD. This manual focuses on different aspects of RF/RHD, related Cardiovascular Disease, Heart Healthy Lifestyle and Trainer's Skill Development. Every effort has been made to ensure that this document presents an accurate representation of the latest evidence based knowledge on diagnosis, management and prevention of RHD. I hope this manual will be useful for the ToT on RHD and to all those having a little or larger interest in RF/RHD.

I like to extend my heartfelt thanks to the contributors of the document, Rotary Club of Patan for the global grant funding, staff of NHF and District Public Health Office, Lalitpur, and the GoN for the valuable contribution in bringing out this important document.

Dr. Prakash Raj Regmi
Project Director-Nepal Heart Foundation
Executive Director- Nepal RHD Control Program
December, 2017

Forward

I am honoured to write a few words on the Training Manual on the Diagnosis, Management and Prevention of Rheumatic Fever (RF) and Rheumatic Heart Disease (RHD).

This comprehensive Training Manual is the first of its kind in Nepal, and can serve as a reference book in many parts of the world where Rheumatic Heart Disease in children is still a major public health issue.

The Training Manual is unique as it not only provides easy to understand and comprehensive knowledge on the subject matters, but also explains strategies for the prevention of RF and RHD and the modalities of the unique RHD control program in Nepal.

Through the relatively modest grant funding provided through the Rotary Global Grant #1418291 much has been achieved due to the dedicated work of members of the Nepal Heart Foundation under the leadership of Dr. Prakash Raj Regmi and the staff at the Lalitpur District Public Health Office.

The grant of US$31000 was made possible through the generous contribution and collaboration of the Rotary Club of Patan, the Rotary Club of Delhi Chanakyapuri, India, the District 3292 of Nepal and Bhutan, the District 3690 in South Korea and the Rotary Foundation of Rotary International.

The Primary Prevention Programme for Rheumatic Fever and Rheumatic Heart Disease has established many 'firsts', such as innovative Radio and TV spots to raise awareness among the general pubic; engagement of health professionals, community mobilisers and educators to spread the word about primary prevention on RHD to the respective beneficiaries; and the use of a school educator who used specifically designed educational material to raise awareness among students and teachers.

The Rotary Club of Patan is proud to be associated with this very successful endeavour, which achieved its objectives of educating and mobilizing local communities to prevent RHD and increasing the number of children that are treated for throat infections. The project also managed to generate substantial additional funding from other donors to expand the Primary Prevention and Screening Programme beyond the pilot District of Lalitpur to many other remote Districts of Nepal.

My sincere congratulation to all involved in making this RHD Prevention Programme a success and for preparing this excellent Training Manual.

Gabriele Mallapaty
Primary Coordinator (Contact) of the Rotary Global Grant Project No. 1418291
President Elect 2017/18 - Rotary Club of Patan
December, 2017

Message

It is my immense pleasure to write few words in this training manual on Rheumatic heart disease prepared by Nepal Heart Foundation. District Public Health Office, Lalitpur (DPHO) is pleased to support and be a continuous part of Rheumatic Heart Disease Control Program which has been designed to save countless Nepalese children from Rheumatic Heart Disease.

Although there is a decreasing trend of Rheumatic heart disease prevalence in high income countries, it is still a big challenge and major public health issue in low income countries like Nepal. Even these days large number of people are reported to die prematurely due to this disease. As per the report from National Heart Center, every year more than 1000 RHD patients undergo valve replacement surgery and still there are lots of patients in the waiting list. Government of Nepal is providing support to undergo valve surgery making it free of cost to all RHD patients, but still many patients were left untreated.

Morbidity and mortality from RHD is a major challenging issue to the developing countries like Nepal. Government of Nepal in partnership with Nepal Heart foundation has been working together in the prevention and control of RHD. This program has been able to raise awareness among the public, identify RHD in early stages, provide necessary treatment and support to the RHD patients. I would like to thank Nepal Heart Foundation for their initiative in preventing RHD in Nepal.

In partnership with Nepal heart foundation and Rotary club of Patan, District Public Health Office Lalitpur has been working on a pilot project on primary prevention of Acute Rheumatic Fever since 2014. The results are very encouraging. I hope this will help formulate strategy on primary prevention of ARF in Nepal.

Training of health professionals on RHD issues are of great importance. This training manual prepared by Nepal heart foundation will be of great help in the training programs. This manual will be helpful to provide comprehensive knowledge and skills to the trainers and trainees. The lack of a good training manual has been now fulfilled by the publication of this document.

RHD is the heart disease of the poor. The government of Nepal is very much concerned in preventing RHD and supporting for treatment of the poor.

I like to extend my sincere thanks and best wishes to Nepal Heart Foundation for the valuable works that it has been doing for the prevention of RHD and other cardiovascular diseases in Nepal. Government of Nepal will always be supportive in such endeavor.

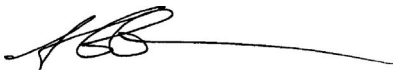
Mr. Jhalak Sharma Poudel
Chief Public Health Admistrator
District Public Health Office, Lalitpur
Government of Nepal
December, 2017

Message

For those who have tapped the benefits of economic growth and health care, rheumatic heart disease has, over the past few decades, faded back into medical history. For many, the progress has masked the painful reality that RHD has changed very little among the marginalized and the poorest of the poor; for over two decades, RHD has been neglected on both global and national health agendas. Now, 33 million people still have rheumatic heart disease and over 300,000 of them die from it each year. That such a devastating preventable disease still persists at this scale is a critical issue of social and health equity. Counted as one of the primary NCDs of poverty by the Lancet NCDI Poverty Commission, RHD has become a reliable marker for showing who is failed by our systems, and where.

Over the past decade, a growing network of governments, NGOs and champions has built global momentum for ending RHD. Australia and New Zealand have developed strong domestic programs for RHD prevention and control, and a number of countries (including Egypt and Fiji) are making progress integrating RHD control into their health systems. RHD Action has created a global civil society alliance for RHD control and, working under the leadership of New Zealand, has joined a growing number of countries to support adoption of a resolution on RHD at the 71th World Health Assembly in 2018. The resolution proposed urges governments of countries still affected by the disease to implement and resource RHD programs and to foster multi-sectoral work focused on prevention, surveillance and data collection, and asks WHO to help Member States do it. This effort is galvanizing government's commitment to action: now is the time to tackle RHD and take the final steps for truly eliminating the disease.

Working with the Nepal Heart Foundation to set up an RHD control program, the Nepal Ministry of Health has led regional commitment to tackle RHD. The program, which now covers over half of the country, has mobilized a broad range of partners including Rotary Club, the Australian and US embassies and Edwards LifeSciences Foundation. Working through local branches of the heart foundation, schools, community groups and the media, the program is a model for the multi-sectoral action called for in the RHD resolution. If the resolution passes, it should help garner the political will, technical support and funding needed to expand this program to reach Nepal's most isolated regions and to generate the data needed to track country progress in eliminating the disease. Trainer Training will be a most critical element for strengthening the program where it exists now, and for expanding it further to reach the country's most vulnerable populations. This manual provides an invaluable tool for strengthening Nepal's health system capacity, delivering on its commitment to reduce the burden of disease in Nepal, and supporting global efforts to end the disease.



Alice Grainger Gasser
Foreign Member
Nepal Heart Foundation
Advisor
Nepal RHD Control Program
December, 2017

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Chapter I - Trainer's Skills Development

Chapter II - Rheumatic Fever and Rheumatic Heart Disease

List of Abbreviations

ACE: Angiotensin Converting Enzyme

AHA: American Heart Association

AR: Aortic Regurgitation

ARF: Acute Rheumatic Fever

ASA: Acetyl Salicylic Acid

ASD: Atrial Septal Defect

ASOT: Antistreptolysin O Titre

BMV: Balloon Mitral Valvotomy

BP: Blood Pressure

BPG: Benzathine Penicillin G

CCB: Calcium Channel Blocker

CHD: Congenital Heart Disease

CHF: Congestive Heart Failure

CRP: C-reactive Protein

CXR: Chest X-ray

DNAaseB: Deoxyribonuclease B

EDTA: Ethylenediamine Tetra-Acetic Acid

ECG: Electrocardiogram

ESR: Erythrocyte Sedimentation rate

FP: False Positive

GAßHS: Group A ß-hemolytic Streptococci

GAS: Group A Streptococcus

HTN: Hypertension

IU: International Unit

IM: Intra Muscular

JVP: Jugular Venous Pressure

LA: Left Atrium

LMWH: Low Moleculer Weight Heparin

LV: Left Ventricle

MR: Mitral Regurgitation

NCD: Non Communicable Disease

NHF: Nepal Heart Foundation

PDA: Patent Ductus Arteriosus

PCI: Percutaneous Coronary Intervention

PR: Pulse Rate

PRN: When Necessary

PS: Pulmonary Stenosis

PSA: Public Service Announcement

PST: Penicillin Sensitivity Test

PTMC: Percutaneous Transvenous Mitral Commisurotomy

QID: Every 6 hours (4x/day)

RA: Right Atrium

RCP: Rotary Club of Patan

RF: Rheumatic Fever

RHD: Rheumatic Heart Disease

RI: Rotary International

RV: Right Ventricle

RVH: Right Venticular Hypertrophy

SGNHC: Shahid Ganga Lal National Heart Centre

TIPs: Tools for Implementing RHD Control Programs.

ToF: Tetralogy of Fallot

ToT: Training of Trainers

UFH: Unfractionated Heparin

VSD: Ventricular Septal Defect

WBC: White Blood Cell

WHF: World Heart Federation

WHO: World Health Organization

Notes for Trainers / Facilitators

This Training Manual is meant to provide knowledge to the designated trainer on how to provide training in general and Training of Trainers in particular. This manual will provide some tips on how to effectively run the training. This manual will elaborate the fact that training is not dominantly dependant on the use of lectures as it would be less productive and monotonous. The training will be rewarding to both the trainer as well as the trainee if the trainer uses following techniques, which will generate more interest in training and make it more fruitful. Those techniques would be:

(i) **Brain storming:** In this session, the trainer will ask the trainees to think of any ideas without evaluation or judgment. In this session, rather than quality, quantity matters. Ideas presented by the trainees can be discussed with practical consideration as sometimes 'unwanted' or seemingly ridiculous ideas lead to a more practical idea, which otherwise would not have been considered.

(ii) **Interactive talk:** Trainees are encouraged to be active and analytical in their learning approach. They are encouraged to ask questions to explore alternatives.

(iii) **Illustrative talk:** Trainer presents the lectures on the topic to illustrate the topic using proper training material including audio/video presentation, telling success stories or even presenting case studies.

(iv) **Group discussion:** Trainer encourages the trainees to have a group discussion regarding the topic where trainer will perform his role as a group promoter, group advisor, a group facilitator or even a group torch bearer.

(v) **Panel discussion:** The use of this method is marked by greater involvement of the trainees in promoting participatory learning. The trainer's role is limited to be the moderator of the discussion, in which the trainees as panelists act as catalyst and agents of the learning process.

(vi) **Role play exercise:** The trainees will be asked to perform the work in virtual scenario where the information learned by the trainee through lectures or by other means will be utilized practically.

(vii) **Demonstration:** The trainer will first make the demonstration, then the trainees will be asked to make similar demonstration.

(viii) **Workshop method:** Trainees are arranged into a number of groups, keeping in view their interests and areas of learning. Each group is assigned a theme of discussion, gets a leader to coordinate the discussions and presents the decisions arrived at to the larger audience. For obvious reasons, this method is used at an advanced stage of training, often at the conclusion of the session.

(ix) **Classroom practical:** Trainees will be asked to use their skills learned in the classroom.

(x) **Field practical:** Trainees will be taken outside for field visits e.g. a hospital where they will be provided with the opportunity to use the skills that they have learned.

(xi) **Practice in participatory evaluation of training:** Participants will be asked to give feedbacks and make evaluation of the training.

The best commandments of the training

1. Share learning with the trainees, rather than imparting knowledge to them.
2. Be creative yourself and also encourage the trainees to be creative.
3. Supplement your talk by suitable illustrations with a view to make your presentations more interesting by using different types of visuals like pictures, drawings, a flannel board, flash cards, models, and samples.
4. Start the talk by inculcating in the trainees an interest in the subject matter being covered and end up by creating a curiosity to learn more about the topic in future.

5. Make maximum use of two-way communication by inviting comments and queries from the trainees and sharing your views with them.
6. Remember, the job of a trainer is not only to build a potential cadre of trainers for preparing functionaries for different development activities, but also to inspire, encourage and enthuse them to be the facilitators of a self-sustaining growth process through participatory approach.
7. Assess the impact of your role as a committed and competent trainer and do it as objectively as you can. This can be done by constant monitoring of the extent to which the trainees have been receptive, responsive and reinforced by the inputs provided to them.
8. Equip yourself with knowledge of recent developments in the materials and methods of training skills. This can be done by keeping yourself in touch with the latest literature and widening your knowledge by frequent interactions with those who have earned a 'status' of a successful professional in the field of training.
9. Inculcate a sense of ideal role performance while facilitating TOT. The success of such efforts can be judged in terms of your trainees following your example while himself/herself practicing the same principle as a trainer.
10. Finally, continue to think and act on developing new tools and techniques which may further enrich the exciting area of training. For this, one need not necessarily be highly educated or enormously resourceful, as some of the most valuable inventions have been made by persons and professionals of a very modest background. By doing this you will not only share the experience of excitement and achievement, but also a feeling of pride and privilege.

Planning a Training Program: For planning, conducting and evaluating a training program we recommend to use the sample formats given in the Appendix I to X.

Training Aids

The trainer will make use of the following aids to facilitate the training. Additional training aids can be used as per necessity of the session.

- Multimedia Projector and Computer
- Laser pointer
- Flip Chart
- White Board
- Writing Pad
- Pen, Pencil, Color Marker
- Meta Cards

Session and Lesson Planning

Each session will contain 2 to 3 lessons. Each lesson will be of 45-60 minutes duration.
Each lesson will contain following components:

Title -	
Learning Objectives -	2 min
Introduction-	5 min
Main Content-	20 min
Group Work-	20 min
Comments/Feedback/Evaluation -	10 min
Summary-	3 min

Chapter I - Trainer's Skills Development

Model I - Communication and Motivation Skills

Model II - Micro-Teaching Techniques

Module I

Communication and Motivation Skills

1.1 Lesson Plan

Title: Communication and Motivation Skills	**Total Time: 60 minutes**
Time (minutes)	**Topics**
02	**Learning Objectives**
	At the end of this session participants will be able to understand: • The art and types of Communication • The involvement of the participants in class room • The incentives for motivation in the training program: learning by doing • The importance of recognizing the composition of the participants
05	**Introduction & Background**
	Definition
20	**Main Content**
	Training and Trainer Communication skills Feedback skills
20	**Discussion**
	Group Work
	Exercise
10	**Feedback**
	Evaluation
03	**Summary**

1.2 What is training and how is it different from education?

Training is skill learning and practicing

Education is Knowledge. Class room teaching is for knowledge learning.

Training is learning and practicing the skill

Example: Knife

To know about the existence of knife and its functions is knowledge.

How to use the knife is skill.

Skill is gained from training and practices.

This is the importance of training program.

1.3 Planning a Training Course

Activities to be implemented when organising a training course:

- Organisation's situational analysis
- Training needs assessment
- Select topic
- Select objective
- Make course planning
  - Get required approval
  - Establish a team to work on
  - Prepare and send invitation letters
  - Transportation arrangements
  - Logistic arrangements and schedule
  - Prepare financial resources
  - Fix time
  - Prepare materials & equipment
  - Implement training
  - Select place
  - Select participants and fix number
  - Select Trainers and Facilitators
  - Prepare visual aids
  - Evaluation form preparation and conduct
  - Certificate delivery

Start of training program

Freezing and Unfreezing practices:

Unfreezing of participants should be the first task for effective training. People from different location, background, knowledge base, age and sex will be participant in training. Hence, the trainer has to create a friendly atmosphere and environment of mutual respect. Creation of a feeling that all participants are equal.

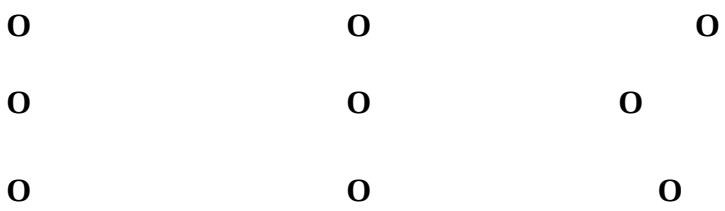
Methods

1. Introduction of participants by rotation system starting from left or right. Have the next person collect information about name, age, working experience, family background etc to introduce to the group. Such Interaction helps bring people closer and know each other better. This further opens up the environment to learn from each other.
2. **Group Work**

   An Exercise to bring participants together.

Puzzle

Nine points puzzle solving individually and later in group



- **Issue**: Connect those 9 points by straight lines. While doing that, you are not allowed to raise your hand or not allowed to repeat the line twice
- Make pair of two member groups and look for solution.
- Explain the rationale of these 9 points and frame of mind for attempting to solve the problem
- Traditional approach: People get involved with the limited boundary hence difficult to solve the problem.
- However advanced approach force to look for alternatives beyond the given boundary. The 9 points can be connected if one goes beyond the boundary.

1.4 Communication

- **One way communication.**

  Example: you give lecture but you do not know whether they received it well or not. When there is no response expected, it is one way communication. Sometimes, it becomes ineffective.

- **Two way communication.**

  The sender gets feedback. For example: If you send SMS by mobile phone, you get feedback saying delivered. You know that the massage is received.

  Such communication is called communication with feedback

  (many other examples can be added)

Components of Communication

1. Sender: who?
2. Message: What? Verbal or signal or other forms
3. Receiver: Intended person
4. Feedback: Reaction from the intended person to sender

Modes of communication

There are different modes of communication.

1. **Verbal communication:** is by voice through understandable language (using words)
2. **Gesture communication:** is use of sign, body language, and expressions like happy, unhappy, dissatisfaction expressions
3. **Written communication**: written in black and white with use of words
4. **Communication and distortions :** One way communication and message passing to different levels (4-5) without feedback cause distortion
5. **Straight and clear communication:** face to face communication. It will have inbuilt feedback mechanism
6. **Communication with feedback mechanism:** Two way communication with feedback from the participants

1.5 Communication skills (Skills in trainer)

These include

1. Presentation skills: with visualisation technique
2. Discussion leading skills: Help the participants open the mind and give opinion on the subject.
3. Facilitation skills: The facilitator does not dictate what to speak. He allows participants put different ideas and help synthesize the discussion.
4. Case writing skills: Is important to present case and have discussion to find out the solution through group discussion. Group discussion has to have small group of 6-8 where everybody must be able to interact and listen to each other. Group coordinator and reporter are to be assigned. Discussion findings are to be reported by the reporter. Coordinator is to guide the discussion.
5. Role play: Skills in making stories for role playing are to be imparted. Discuss low to play roles.
6. Skills in using visual cards and visual aids: Enumerate different types of visual cards and aids.
7. Other participatory training methods like organising study tour depending on the objectives and time availability like visit to hospital, homes, patients etc.

1.6 Role of Trainer

Before the organization of training program, trainer is to analyse the problem.

Accordingly, he/she design the training course to address the problem and will select the appropriate methodology to deliver the course contents.

The trainer should play the role as facilitator more than the resource persons. All in all, participants are helped to develop self-learning skills.

In the words of an old saying…(e.g. Lou Tsu)

- ***"If I hear, I forget, (one way communication)***
- ***If I see, I remember, (audio-visual)***
- ***If I do, I understand" (Exercise, participation)***

1.7 Methods of mediating communication

The trainer has to learn these features which are parts of communication skills

- Presentation method
- Exercises and practices
- How to use words appropriately
- Group discussion method
- Forming sub-groups for given discussion topic
- Presentation from sub-groups
- Summarise and conclusion by lecturer
- Brainstorming method
- Give a specific topic
- Questionnaire
- Give them time for thinking, give ideas
- Eliminate similar ideas
- Output presentation
- Stimulating question

1.8 Feedback skills (Components of feedback in communication)

- Listening carefully when information is shared
- Ask for clarification if something is unclear
- Encourage participants to add ideas in order to encourage participation.
- Acknowledge with thanks for recommendations
- Sandwich approach of giving feedback (start with positive, mention the limitations in a constructive and encouraging manner, end with positive).
- Feedback should always be encouraging and constructive with recommendations. Mention what you would do if you were in his or her place

1.9 Exercise on Communication and Distortion

This exercise is to be conducted in separate session. It will be of one hour. Following steps are to be taken into consideration.

Exercise method

A picture with many details will be used for this exercise

— Make 3 groups. A, B and C. Two rooms are required for this exercise

— Each group will consist of five members.

Group A activities.

A picture with many details will be given to group A for observation

All members of Group A will move to a separate room

One member from group A will be observing details of the objects. Other four will observe how that one member is observing those objects. This is controlled group. Time for this exercise will be about 7-10 minutes. Other members of the group also will observe the object.

- Group A will come back to Group B sitting in another room. Group B will participate in listening from the one from group A who has observed the object. The object will not be shown to the Group B.
- Listing will start from two, and five people will get involved in it.
- The first person relays what he has observed to a person who has not been part of object observation.
- One will listen and relay that to 2nd person, 2nd person to 3rd person and so on until the 5th person.
- The third group C will be observing what has happened during the relay of description of object.
- The four members of group A who have observed along with first person will act as feedback group. This group will relay what were missed and what were added.
- The group C will make comments how the information got changed from one person to another person during relay of information.

1.10 Exercise for Development Comradeship

Untangling the rope

2 pairs of people will be involved in this exercise

- This is a problem solving exercise
- Other members of the training group will help untangle the rope.
- This exercise is for developing comradeship among the participants so that it will create an atmosphere of congeniality to learn and communicate.

1.11 Summary

1. Training programs are important for developing knowlege with skills.
2. Training should begin with unfreezing practices.
3. Good communication and motivation skills in trainer is vital for a sucessful training program.

1.12 Key Points

1. ***Training is learning the skills and practicing.***
2. ***Unfreezing of participants should be the first task for effective training.***
3. ***Two way communication in a training program is important (i.e. communication with feedback)***
4. ***The trainer should play the role as facilitator rather than a resource person.***
5. ***Feedback should always be encouraging and constuctive with recommendations***
6. ***Effectiveness of a training program largely depends upon good training skills of the facilitators.***

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Module II

Micro-Teaching Techniques

2.1 Lesson Plan

Title:	**Micro-Teaching Techniques**	**Total Time: 60 minutes**
Time (minutes)	**Topics**	
02	**Learning Objectives**	
	At the end of this session, the participants will be able to: 1. Define micro-teaching 2. Explain features/characteristics 3. State aim of micro-teaching 4. Explain principles of micro-teaching 5. Explain steps/characteristics of micro-teaching 6. List component of skill in microteaching 7. Use guidelines giving and receiving feedback 8. Explain general reflections 9. Explain micro-teaching cycle 10. Discuss advantages and disadvantages of micro-teaching 11. Use micro lesson observation checklist	
05	**Introduction & Background**	
	Definition	
20	**Main Content**	
	Basic Principles of Micro-teaching Phases of Micro-Teaching Steps/procedures in Micro-teaching Core teaching skills used in Micro-teaching Guidelines giving and receiving feedback	
20	**Discussion**	
	Group Work	
	Exercise	
10	**Feedback**	
	Evaluation	
03	**Summary**	

2.2 Introduction

Micro-teaching is one of the most recent innovative teaching methods used in teacher education program. It is one of the methods for training in teaching skills in a safe and controlled environment under the guidance of a supervisor.

Definition

Micro-teaching is a training method for learning teaching skills. Allen & Rayn (1985) defines micro-teaching as a "Scaled down teaching encountered in class size and class time."

Aim

The aim of micro-teaching is to enable the trainee teacher to remove deficiencies and improve his/her teaching through constructive feedback.

2.3 Characteristics of Micro-Teaching

- It is real teaching but focuses on developing teaching skills.
- It is scaled down teaching.
- It reduces the class to size to 5-10 pulils.
- It reduces the duration to 5-10 minutes.
- It reduces the size of the lesson.
- It reduces the learning time.
- It is a highly individualized training device.
- It provides feedback for trainee's performance.
- It is a training device to prepare effective teachers.
- It increases confidence for practice.
- It produces skilled manpower.
- It provides effective teaching.

2.4 Basic Principles of Micro-teaching

- Principle of Practice and Drill
- Principle of Enforcement
- Principle of Continuity
- Principle of Microscopie Supervision

2.5 Phase of Micro-Teaching

- Knowledge Acquisition
- Skill Acquisition
- Skill Transfer

Knowledge Acquisition Phase

It is preparatory phase. Teachers get trained on the skills and components of teaching through leture. discussion, illustrations, demonstration of skill by the experts.

Skill Acquisition Phase

Teacher plans a micro lesson for practicing the demonstrated skill

- A colleagues peer can act as constructive evaluator which helps modify the units of lessons
- Improves teaching learning exercises
- Re-enforce behavior/skill that are necessary

Skill Transfer Phase

Ultimately, learned skill is integrated and transferred from simulated teaching situation to actual class room teaching.

2.6 Steps/procedures in Micro-Teaching

1. Orientation of microteaching
2. Discussion of teaching skills
3. Preparation of model lesson
4. Preparation of micro lesson plan
5. Micro-teaching Setting
    - Time for teach feedback, re-plan, re-teach and re-feedback
    - Number of students
    - Supervisors
    - Feedback by the supervisor
6. Simulated condition
7. Practice of teaching skills
8. Observation of teaching skills
9. Feedback
10. Teaching time (normally 35 minutes will be taken by a trainee to complete one cycle)

2.7 Core teaching skills used in Micro-Teaching

1. Lesson Planning
2. Probing questions
3. Re-enforcement
4. Explanation
5. Stimulate variations
6. Use of Pause (speaking skill)
7. Content delivered with clarity
8. Communication

2.8 Advantages

1. Simple teaching and non-treatening context.
2. Feedback is provided immediately
3. Interaction of classroom can be studied
4. Concentrate on same specific aspects of teaching and learning.
5. Focuses on defined aspects of behaviour.
6. Opportunity to do immediate evaluation and feedback
7. The microteaching provides sequences
8. The microteaching focuses on individual task
9. The objectives of microteaching are specified in terms of behavioural outcomes.
10. Individual micro lessons are observed by other teachers and improvement can be suggested by them.

2.9 Disadvantages

1. It is only a simulated technique with few person over a short period of time.
2. Microteaching applies only to observable demonstration of quantifiable skills, so it does not apply to other skills such as small group discussion.
3. It is expensive to proceed and to maintain video recording equipment.
4. Time consuming.

2.10 How is Micro-teaching organized?

- Small segment of a lesson presented, usually four to six trainees with supervisor attend.
- Use of teaching observation checklist tool (Appendix XV)
- Video recording could be done
- Feedback given by supervisor/peers and self-feedback.

2.11 Persons giving and receiving feedback

1. **Self** evaluation by presenter if his/her goals were achieved and how s/he feels about the session.
2. **Peer** evaluation by member of the group to comment on how they perceived the criteria to feedback have been met.
3. **Supervisor or teacher** will provide feedback

2.12 Guidelines for giving feedback

- Comment on the strength you observe
- Speak from your own perceptions and feelings " I felt, I noticed".
- Use description not judgement.
- Use "more or less" rather than 'either or' terminology to focus on what you see happening.
- Share ideas and information rather than give advice.

2.13 For receiving feedback, useful rules

- Ask for specific feedback
- Listen to colleagues perceptions and thank those who comment.
- Clarify if necessary, but don't justify.
- It may be useful to ask someone to note comments for you.

2.14 General Reflections

- If you were to re-teach this concept to your group, what are two things you would do differently? Why?
- The one thing I did really well in this micro-teaching was....
- The one thing I'd still like to improve upon in my next micro-teaching is...

2.15 Feedback criteria

Feedback should be specific, right amount, not too much, not too little, not only positive and not only negative. A mixture makes the soup smell well. If the soup is tasty it's easy to swallow.

2.16 Key Points

1. ***Micro-teaching is one of the most recent innovative teaching methods used is teacher education program.***
2. ***It focuses on developing teaching skills***
3. ***Basic principles of Micro-teaching are practice, enforcement, continuity and supervision.***
4. ***Micro-teaching is organized in small group of trainees (usually 4 to 6) with supervisor***
5. ***The core teaching skills are all used in Micro-teaching but in a micro group, Micro time period and micro environment.***

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1. Anshu.D. Singh.R. Narang .P. 2009. Introducing Micro-Teaching Sessions in Medical Schools. New Delhi: Medical Education.
2. L.C Sharma and R.D.Sharma.1987. Micro-Teaching in Theory and Practice: New Delhi: Department of Education. NCERT.
3. Internet browsing for recent publications.

Chapter II - Rheumatic Fever and Rheumatic Heart Disease

Model III	- Introduction & Overview of RF and RHD
Model IV	- Anatomy and Physiology of Throat, Upper Respiratory Tract and Cardiovascular System (CVS)
Model V	- Tonsillitis and Pharyngitis
Model VI	- Acute Rheumatic Fever
Model VII	- Rheumatic Heart Disease
Model VIII	- The Penicillin
Model IX	- Strategies for Preventing RF and RHD
Model X	- RHD Control Program in Nepal

Module III

Introduction and Overview of Rheumatic Fever and Rheumatic Heart Disease

3.1 Lesson Plan

Title: Introduction and Overview of RF/RHD	**Total Time: 60 minutes**
Time (minutes)	**Topics**
02	**Learning Objectives**
	By the end of this session, participants will be able to: 1. Identify the burden and impact of RF/RHD in the world, South East Asia and Nepal. 2. Find out the background information of RF/RHD 3. Explain the global, regional and national scenario of RF/RHD
05	**Introduction & Background**
	Definition
20	**Main Content**
	Global, Regional and Local Scenario Burden & Impact
20	**Discussion**
	Group Work
	Exercise
10	**Feedback**
	Evaluation
03	**Summary**

3.2 Introduction

Acute Rheumatic Fever (ARF) is the result of an untreated bacterial throat infection caused by B-hemolytic group A streptococcus (GAS). ARF develops about 2-3 weeks after the onset of a GAS infection. ARF may involve the heart, joints, central nervous system and/or skin. The illness usually lasts up to 3 months and resolves without treatment. With treatment the symptom resolves within 1-2 weeks. ARF can occur in children who continue to be exposed to high levels of group A Streptococcus (GAS) in their environment. (1)

Rheumatic Heart Disease (RHD) is a condition when one or more heart valves are damaged as the result of repeated attacks of ARF. The valves become stretched and scarred, and do not move normally. The valves may not close or open properly causing disturbance to blood flow resulting in swelling of the heart chambers and increase in pressure inside the heart. (2)

If RHD is not diagnosed and treated early, it may result in heart failure and premature death.

3.3 Global Scenario of ARF and RHD

ARF and RHD affect about 15.6 million people worldwide and causes approximately 233000 deaths every year. More than 80% of the children younger than 15 years of age grow up in regions where RHD is endemic (Africa, South Asia, Middle East). The global incidence of ARF is approximately 282000 new cases per year, with more than half of these cases between the ages of 5 to 15 years. (3)

Recent study shows 47.8% decrease in mortality due to RHD from 1990 to 2015 (4). The health related burden of RHD declined worldwide, but high rates of disease persist in some of the poorest regions in the world.

ARF and RHD remain the common cause of cardiovascular morbidity and mortality in many low income countries over the past 50 years. Improved living conditions and the development of penicillin have been large contributors to the decrease of ARF and RHD across high income countries.

It is estimated that 50% of ARF/RHD patients worldwide are unaware of their disease and more than 70% do not receive penicillin prophylaxis on regular basis.

WHO has stated RHD as a neglected heart disease of the poor.

3.4 RHD in Nepal

RHD is a major Pediatric Heart problem in Nepal. It accounts for around 3000 premature deaths annually. In a school based study, the prevalence of clinical and subclinicals RHD among schoolchildren in eastern Nepal amounted to 10.2 per 1000 children of 5 to 15 years of age (Findings of Echocardiography screening in eastern Nepal)(5). Epidemiological studies in Kathmandu on RHD prevalence done using Clinical auscultation methods show the prevalence of definite RHD ranging from 0.8 to 1.3/1000 schoolchildren of age 5 to 15 years.(6-9). As estimated by Nepal Heart Foundation (NHF), around 100,000 children in Nepal live with RHD. The financial burden to the Government of Nepal caused by RHD is very high. In Nepal every year 7500 new RHD cases are being diagnosed.(10)

Government of Nepal and Nepal Heart Foundation jointly have been working on RHD secondary prevention since 2007 AD. This is focused on providing injection Benzathine penicillin to RHD patients every 3 weeks till the age 40 years. This is integrated with the existing health care system in diagonal programs. Government of

Nepal has been providing financial support and the implementation partner is NHF, which manages the program as well as provides technical assistance. The government funding is very low compared to the volume of work and number of patients to be covered throughout Nepal. Till the end of 2013, around 9000 RHD patients were registered for secondary prophylaxis and the program had reached 25 out of 75 districts of Nepal. There is need of scaling up of this program to all the 75 districts of Nepal. (11)

A pilot project on primary prevention of RHD, which was launched in Lalitpur district of Nepal with support of Rotary Club of Patan during 2014-2017 concluded that awareness programs were highly effective and should be an essential component of primary prevention of RHD.

Table 3:1 Prevalence of RHD in Nepal

Author	Year	Location	Total Children screened	Prevalence of RHD (per thousand)	Study age group
1. Shrestha UK, et al	1991	Rural Kathmandu	4452	1.35	5-16 years
2. Regmi PR, et al	1996	Kathmandu City	4736	1.2	5-16 years
3. KC MB, et al	2002	Kathmandu City	9420	1.2	5-18 years
4. Prajapati D, et al	2013	Kathmandu City	34,876	0.9	5-15 years
5. Shrestha NR, et al	2015	Sunsari	5,178(Echo based)	10.2	5-15 years
6. Regmi PR, et al	2017	Hilly Region of Central Nepal	15,520	2.2	5-15 years
7. Regmi PR, et al	2017	Palpa	5327	1.8	5-15 years

3.5 Group activities

- Divide the participants in two or three groups.
- Appoint one coordinator from each group
- Let the groups discuss with its members about:
  - What they know about RF and RHD?
  - What they know about the problems of RHD patients in the community?
  - Have they seen any patient with RHD in the community, clinic or hospital?
- Each coordinator will present the summary of their group discussion.

3.6 Summary

- ARF/RHD is the result of untreated bacterial throat infection caused by B-hemolytic streptococcus of group A (GAS).
- ARF/RHD is a major pediatric heart problem in children of school going age (5 to 15 Years) in low income countries all around the world.
- ARF/RHD is a significant heart problem of children and young adults in Nepal causing large number of morbidity & mortality.
- GoN and NHF has been working on RHD prevention since 2007.
- WHO has stated RHD as a neglected heart disease of the poor.

3.7 Key points

1. ***ARF/RHD is the result of untreated bacterial throat infection caused by B-hemolytic streptococcus group A***
2. ***It is common in Children of 5 to 15 years age.***
3. ***RF/RHD is endemic in children living in low income countries all around the world.***
4. ***Poverty, malnutrition, overcrowding and limited access to health care are some of the causes of high prevalence of RF/RHD in low income countries.***
5. ***Nepal is among one of the high endemic countries in the world.***
6. ***The prevalence of RHD in Nepal ranges from 0.8 to 1.3 per 1000 school children of 5 to 15 years age.***
7. ***Prevalence of subclinical RHD detected through echo screening in eastern Nepal is 10.2 per 1000 children of age 5 to 15 years.***
8. ***The morbidity, mortality and financial burden caused by RF/RHD in Nepal is very high.***

References

1 Rheumatic Fever and Rheumatic Heart Disease: WHO technical report series 923 Report of a WHO expert consultation Geneva, 29 Oct-1 Nov. 2001.

2 Rheumatic Fever and Rheumatic Heart Disease in Nepal: Proceeding from National Seminar on RF/RHD prevention and control in Nepal. Nepal Heart Foundation, July 2011.

3 Carapetis JR, Steer AC, Mulholland EK, Weber M. The global burden of group A streptococcal diseases. Lancet infects. dis 2005; 5: 685-94.

4 Watkins DA, Johnson CO, Colguhoun SM et al. Global Regional, and National Burden of Rheumatic Heart Diseases, 1990-2015. The New England Journal of Medicine. 23 Aug 2017; 377/8: 713-22

5. Nikesh R Shrestha, Prahlad Karki, Rajan Mahato. Prevalence of Subclinical Rheumatic Heart Disease in Eastern Nepal. A school-based cross-sectional study. JAMA Cardiol.2016;1(1):89-96

6. Shrestha UK, Bhattarai TN, Pandey MR. Prevalence of Fhrumatic fever and Rheumatic heart disease in rural community of the hill region of Nepal. Indian Heart J 1991;43:39-41

7. Regmi PR, Pandey MR. Prevalence of Rheumatic fever and Rheumatic heart disease in school children of Kathmandu city. Indian Heart J 1997;49:518-20

8. Bahadur KC, Sharma D et al. Prevalence of Rheumatic and Congenital heart disease in school children of Kathmandu valley in Nepal. Indian Heart J. 2003;55:615-18

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10. Regmi PR. Comprehensive approach to Rheumatic fever and Rheumatic heart disease prevention and control: The Nepalese model. Nepalese Heart J. 2016;13(2):3-10

11. National RF/RHD prevention and control program. Annual report. 2011

Module IV

Anatomy and Physiology of Throat and Cardiovascular System

4.1 Lesson Plan

Title:	**Anatomy and Physiology of Throat and Cardiovascular System (CVS)**	**Total Time: 60 minutes**
Time (minutes)	**Topics**	
02	**Learning Objectives**	
	By the end of this session, participants will be able to: 1. Describe the anatomy of the throat and CVS 2. Describe the structure of throat, pharynx, and tonsils. 3. Describe structure and function of the heart.	
05	**Introduction & Background**	
	Definition	
20	**Main Content**	
	Structure and function of pharynx, tonsils Structure and function of the heart The circulatory System	
20	**Discussion**	
	Group Work	
	Exercise	
10	**Feedback**	
	Evaluation	
03	**Summary**	

4.2 Introduction

Throat is anterior part of neck. It is a tube that carries food to the esophagus and air to the air pipes. It contains the pharynx, tonsils and larynx.

4.3 Pharynx

The pharynx is a cone shaped fibro-muscular tube of 12 - 14 cm in length. It is extending from the inferior surface of the base of the skull to the level of the sixth cervical vertebrae. It is the shape of an inverted cone being wider at its upper end. It is a common part of both respiratory and digestive system.

For descriptive purpose, pharynx is divided into three parts.

i) Naso-pharynx (Upper part)

ii) Oral pharynx (Middle part)

iii) Laryngo- pharynx or hypopharynx (Lower part)

Structure

The pharynx is composed of 3 layers of tissue

(1) Mucous membrane: This is the inner lining of the pharynx.

(2) Fibrous tissue: This forms the intermediate layer.

(3) Muscle layer: This outer layer consists of several muscles which plays an important part in swallowing.

Functions

(1) Acts as a pathway for both respiratory and digestive system.

(2) It helps to warm and moisten the inhaled air

(3) Helps to maintain atmospheric pressure of the air in the middle ear. This maintenance is essential for satisfactory hearing.

(4) The palatine and pharyngeal tonsil helps to prevent the entry of micro-organisms.

(5) It also helps to taste food

4.4 The Tonsils

The tonsils are a pair of almond shaped, soft tissue masses located on either side of the throat (or pharynx). Each tonsil is composed of tissue similar to lymph nodes, covered by pink mucosa (Figure 4:1).

The tonsils are part of the lymphatic system, which helps to fight infection. Tonsils vary widely in size and swell in response to infection. When tonsils are infected they become red, swollen and may have a white or yellow coating on them. Other symptoms of infection of tonsils include

- Pain or discomfort when swallowing
- Fever
- Enlarged tonsils
- Enlarged Lymph nodes in the neck

Figure 4:1 The Tonsils

Enlarged tonsils without any symptoms are common among children. Left alone, enlarged tonsils may eventually shrink on their own over the course of several years.

4.5 The Heart

The heart is a hollow muscular organ which lies obliquely in the thorax, in the middle chest between the lungs and immediately above the diaphragm. It is situated behind the sternum. In adults, it's average weight is 300 grams in males and 250 grams in female. The adult heart is approximately about size of the owner's fist. (Figure 4:2)

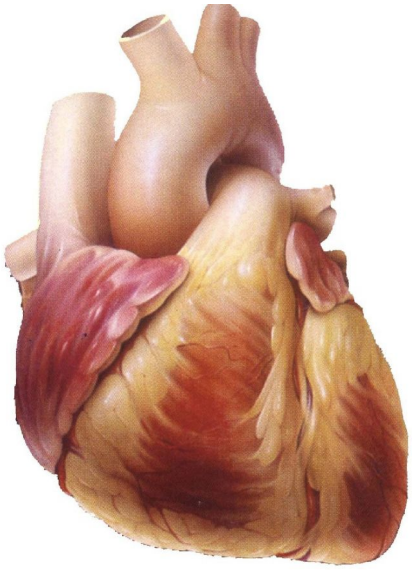

Figure 4:2 The Heart

A) Position of the Heart

The heart is in the thoracic cavity between the lungs, behind the sternum and between the points of attachment of the second rib up to the sixth rib. Approximately 2/3 of the heart lies behind the sternum at the center of the chest. At the posterior side the heart rests on the bodies of the fifth to the eighth thoracic vertebrae. It lies obliquely, with its apex towards the left and down. Clinically, the apex can be palpated in many individuals and is normally within the left mid clavicular line (a line drawn on the chest wall from the mid-point of the left clavicle and running parallel with the midline of the sternum). Displacement of the apex beat leftwards may be due to cardiac enlargement (Cardiomegaly) or to a shift of the heart caused by lung disease. In dextocardia, the apex of the heart is located in the right side of the chest.

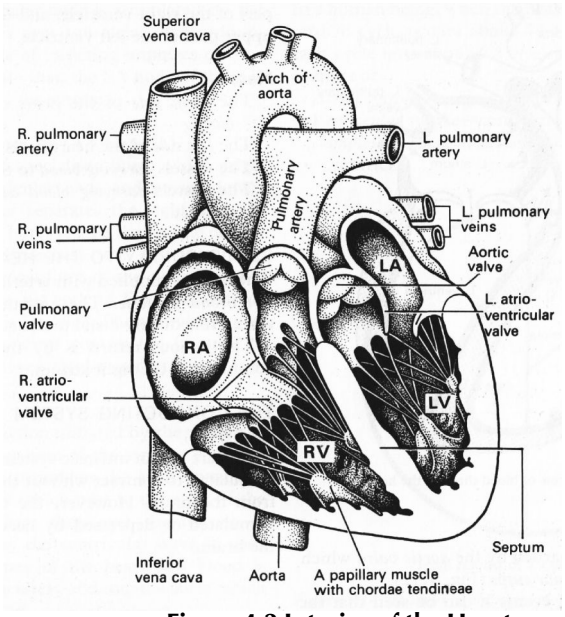

Figure 4:3 Interior of the Heart

B) Structures of the Heart

The heart is composed of three layers of tissue.

* Pericardium (Outer thin layer)
* Myocardium (Middle Muscular layer)
* Endocardium (Inner thin layer)

Internal structure of the heart is divided into a right and left side by the septums. The heart is again divided into four chambers by atrioventricular valves into upper chambers the atrium and lower chambers, the ventricles. (Figure 4:3) The atria serve as receiving chambers and the ventricles serve as pumping chambers. The right side of the heart pumps venous bloods into the pulmonary circulation and the left side pumps arterial blood into the systemic circulation.(Figure 4:4)

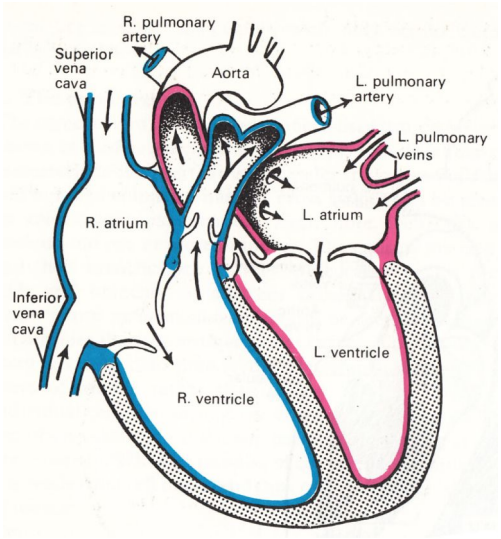

Figure 4:4 Flow of blood though the heart

C) Valves of the Heart

The heart valves open and close permitting blood to flow in one direction only. The valves allow the blood to flow from the atria into the ventricles and from ventricles to artery. These valves prevent a back flow from ventricles to the atria and from artery to the ventricles. There are 4 valves: (Figure 4:5A and 4:5B)

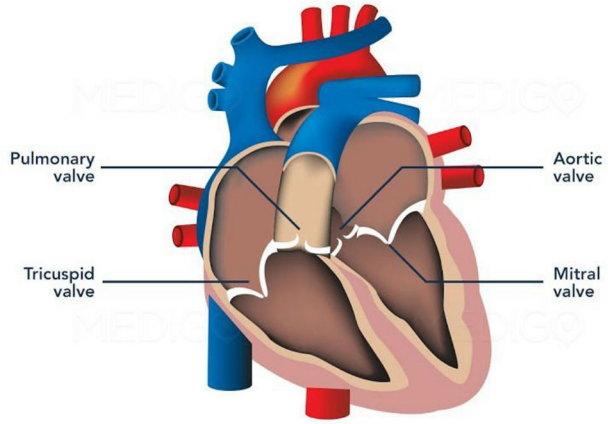

Figure 4:5A

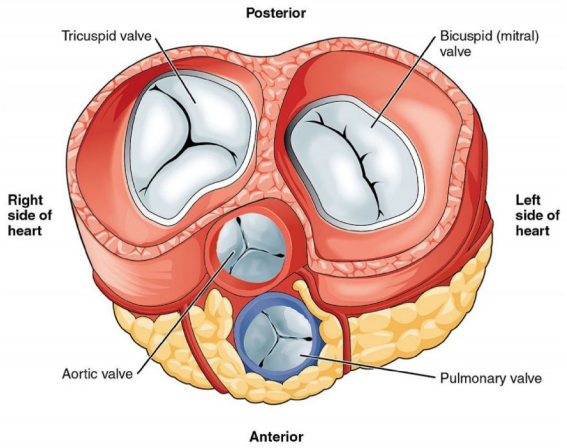

Figure 4:5B

(1) **Mitral valve:** The valve between left atrium and left ventricle is known as Mitral valve. This valve has two leaflets (Anterior and Posterior).

(2) **Tricuspid valve:** The valve between right atrium and right ventricle is known as tricuspid valve. It is called tricuspid because it consists of three flaps (Anterior, Posterior and Septal).

(3) **Aortic valve:** The valve guarding between left ventricle and aorta is called aortic valve. It has 3 cusps (Right Coronary, Left Coronary and Non Coronary).

(4) **Pulmonary valve:** The valve between right ventricle and pulmonary artery is known as pulmonary valve. It also has 3 cusps

4.6 The Circulatory System

The circulatory system is transport system carrying Glucose, oxygen, nutrients, hormones and other substances to the tissue organs and conveying carbon dioxide to the lungs and other waste products to the kidneys.

The cardiovascular system consists of cardiac (Heart) and vascular (Blood vessels).

The blood is the vehicle or carrier and the blood vessels are the channels along which it travels. The motive power is supplied primarily by the heart, which is a muscular pump. However, the venous return of blood to the heart is assisted by gravity, skeletal muscle activity, squeezing the veins, and the aspiratory phase of breathing, which sucks blood towards the thorax. (Figure 4:6)

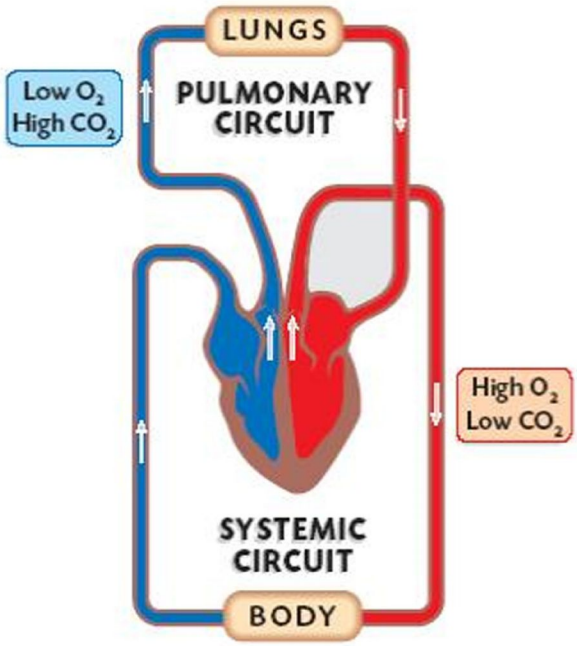

Figure 4:6

4.7 Physiology of circulation

The heart (left ventricle) pumps blood into the aorta, from which it is distributed by artery to all parts of the body. The arteries branch and narrow down to arterioles and these in turn lead to microscopic capillaries which ramify throughout the tissues. The diameter of a capillary is about the same as that of a red blood cell.

The Capillaries drain into venules and these unite to form veins, which carry the deoxygenated blood back to the heart (right atrium) to complete the systemic circulation, sometimes referred to as the greater circulation. The lesser circulation is the pulmonary circulation in which venous blood is pumped from the right side of the heart into the pulmonary artery and it branches.

4.8 Group activities

- Divide the participants in two or three groups.
- Appoint one coordinator from each group

  Let all the groups take plain sheets of paper and draw position of tonsils in the throat and structure of heart with 4 chambers and 4 valves. Ask them to draw the pictures based on their knowledge and imagination.
- Each coordinator will present the best drawing of their group.

4.9 Summary

1. Throat is made of pharynx and tonsils.
2. Tonsils are part of lymphatic system and help to fight infection.
3. Heart is situated in middle part of chest, has 4 chambers and 4 valves.
4. The heart pumps blood into the blood vessels and transports glucose and oxygen to the organs.

4.10 Key points

1. ***Pharynx acts as a pathway for both respiratory and digestive system. It helps to warm and moisten the inhaled air.***
2. ***The tonsils are part of the lymphatic system, which helps to fight infection.***
3. ***Infected tonsils become enlarged, red, swollen and may have a white or yellow coating on them.***
4. ***Enlarged tonsils without any symptoms are common among children. Left alone, enlarged tonsils may eventually shrink on their own over the course of several years.***
5. ***The heart is located at the center of the chest behind the sternum***
6. ***The heart has four chambers and four valves. Mitral and aortic valves are most commonly affected by Rheumatic fever.***
7. ***The circulatory system consists of the heart and the blood vessels. The heart is a pump which pumps blood into the blood vessels. The blood vessels carry blood with glucose and oxygen to the organs.***

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Module V
Tonsillitis and Pharyngitis

5.1 Lesson Plan

Title: **Tonsillitis and Pharyngitis**	**Total Time: 60 minutes**

Time (minutes)	**Topics**
02	**Learning Objectives**
	By the end of this session, participants will be able to: 1. Define tonsillitis and pharyngitis 2. Explain the importance of bacterial throat infection and its relation to acute rheumatic fever and Rheumatic heart disease. 3. Differenciate bacterial and viral throat infection based on clinical signs and symptoms.
05	**Introduction & Background**
	Definition
20	**Main Content**
	Bacterial and Viral infections of throat Signs and Symptoms Diagnosis Treatment, Prevention
20	**Discussion**
	Group Work
	Exercise
10	**Feedback**
	Evaluation
03	**Summary**

5.2 Introduction and background

Throat infection or sore throat (tonsillitis/pharyngitis) is common childhood disease in most countries. Almost two third of the throat infections are caused by viral infections. One third of the sore throats are caused by bacterial infection, most commonly Group A Streptococci (GAS)(1,2). Throat infection can present as tonsillitis or pharyngitis or a combination of the two known as Tonsillopharyngitis. Untreated GAS throat infections may lead to Rheumatic fever. It has been shown that in untreated GAS throat infection 3% of the cases develop acute rheumatic fever.Treatment with oral penicillin can reduce attack rate of RF following GAS by about 70% and up to 80% by injection Penicillin(3). A full course of appropriate antibiotic treatment started within 9 days of sore throat symptoms can prevent almost all cases of RF.(4)

5.3 Tonsillitis

What Is Tonsillitis?

Tonsils are first line of defense against illness and they produce white blood cells to help body fight infection. The tonsils combat bacteria and viruses that enter the body through the mouth, but are vulnerable to infection from these invaders themselves. When the tonsils themselves become infected, the condition is called tonsillitis.

Tonsillitis can occur at any age and is a common childhood ailment. It is most often diagnosed in children from preschool age through their mid teens. Routine throat examination of Children is important. (Figure 5:1)

Figure 5:1

Risk Factors

Most cases of tonsillitis occur in 5-15 years children. In addition, children attend school and while they are at school, they are in close contact with other children. They have frequent exposure to bacterial and viral infections which can result in tonsillitis. Children have low immunity to fight infection especially when they are malnourished and exposed to cold and smoke. The risk factors can be summarized as age5-15 yrs, close contact with child, expose to cold & smoke, malnutrition.

Causes of Tonsillitis

Tonsillitis can be caused by a virus, such as the common cold, or by a bacterial infection, such as streptococcus. There are several other microorganisms that may cause tonsillitis.

Children come into close contact with others at school and play, exposing them to a variety of viruses and bacteria. If left untreated, tonsillitis caused by Group A Streptococcus (GAS) can lead to damage of heart valves.

Signs and Symptoms of Tonsillitis

There are many signs and symptoms of tonsillitis but the most common include:

Signs:

1. Enlarged tonsils
2. Redness
3. Exudates

4. White or yellow spots
5. Swollen lymphnodes of the neck

Symptoms:

1. Fever
2. Pain in throat
3. Difficulty in swallowing
4. Bad breath
5. Cough

Tonsillitis: Bacterial and Viral

It is very important to know how to differenciate bacterial and viral tonsillitis. Following are the differenciating signs and symptoms of bacterial and viral tonsillitis. (Figure 5:2)

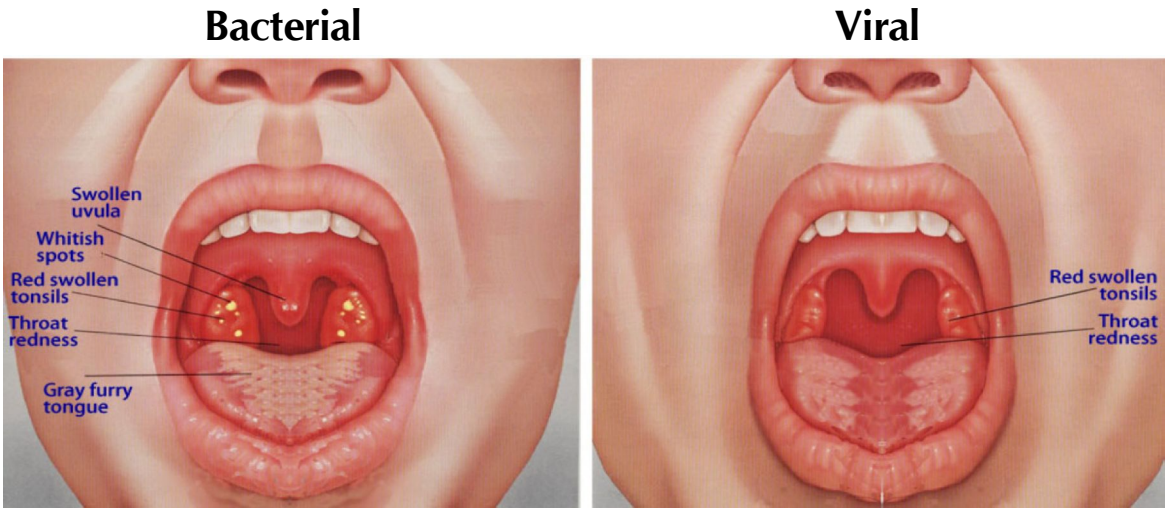

Figure 5:2

Tonsillitis

Signs and Symptoms	Bacterial	Viral
1. Throat pain	Present	Absent
2. Difficulty swallowing	Present	Absent
3. Enlarged and red tonsils	Present	Present
4. Enlarged tonsils with white or yellow spots	Present	Absent
5. Enlarged lymphnodes of neck	Present	Absent
6. Cough	Absent	Present
7. Sneezing	Absent	Present
8. Runny Nose	Absent	Present
9. Fever	Present (>38C)	Present(<38C)

How Tonsillitis Is Diagnosed ?

Diagnosis is based on a physical examination of the throat and may include a throat culture. In low income countries, taking throat culture before initiating treatment is financially not feasible and not recommended.

Complications of Tonsillitis

Peritonsillar abscess
Otitis media
Acute Rheumatic fever

Treatment for Tonsillitis

A mild case of tonsillitis does not necessarily require treatment, particularly if it is caused by a virus, such as a cold.

Treatments for more severe cases of tonsillitis especially caused by GAS infection include:

- **Antibiotics:** Antibiotics should be prescribed to fight a bacterial infection. It is important to complete the full course of antibiotics. The antibiotic of choice is penicillin.
- **Tonsillectomy:** Surgery to remove the tonsils is called a tonsillectomy. This was once a very common procedure. However, tonsillectomies today are only recommended for people who experience repeated tonsillitis, that does not respond to other treatment or tonsillitis that causes complications.

Home Care Tips

- Drink plenty of fluids.
- Bed rest.
- Gargle with warm salt water several times a day.
- Avoid smoke and cold.
- Paracetamol for fever.

Preventing Tonsillitis

Tonsillitis is highly contagious. To decrease the chance of getting tonsillitis, stay away from people who have active infections. Wash your hands often, especially after coming into contact with someone who has a sore throat, is coughing, or is sneezing. If you have tonsillitis, do your best to stay away from others until you are no longer contagious.

5.4 Pharyngitis

What Is Pharyngitis?

Pharyngitis is inflammation of the pharynx. This can cause pain in throat, and difficulty in swallowing.

Pharyngitis is one of the most common health problems in children. More cases of pharyngitis occur during the colder months of the year.

Causes of Pharyngitis

Viruses are the most common cause of throat infection, but some sore throats are caused by bacterial infections. Individuals who are frequently exposed to colds and flues, are most likely to develop pharyngitis. Individuals who have been exposed to second-hand smoke are also more likely to develop pharyngitis.

Viral Infection

Pharyngitis is most commonly caused by viral infections such as common cold, influenza, or mononucleosis. Viral infections do not respond to antibiotics, and treatment is only necessary to help relieve symptoms.

Bacterial Infection

Less commonly, pharyngitis is caused by a bacterial infection. Bacterial infections do require antibiotics. The most common bacterial infection of the throat is streptococcal throat, which is caused by group A streptococcus (GAS)

Signs and Symptoms of Pharyngitis

The signs and symptoms that accompany pharyngitis vary depending on viral or bacterial cause.

Viral pharyngitis

- Sneezing
- Runny nose
- Headache
- Cough
- Fatigue
- Bodyaches
- Fever

Bacterial pharyngitis

- Pain in throat
- Trouble swallowing
- Red throat with white patches
- Swollen lymph nodes of neck
- Fever

Home Care and Medication

If pharyngitis is caused by a bacterial infection, antibiotics should be given. It is important to take full course of antibiotics to eradicate the infection and prevent if from returning or worsening. If pharyngitis is caused by a virus, home care can help relieve symptoms.

Home care includes:

- Drinking plenty of fluids to prevent dehydration
- Gargling with warm saline water
- Bed rest
- Paracetamol for fever

5.5 Protocol for Sore Throat Management in low income countries

Sore Throat Management Protocol

Look for signs and symptoms of GAS infection (Fever, throat pain, enlarged tonsils, enlarged cervical lymphnodes, no cough, no sneezing, no runny nose)

↓

Clinical Diagnosis of GAS infection of throat is made on the basis of signs and symptoms
Throat swab culture is not feasible
There is no role of lab test for ASOT

↓

Treat with Single dose of inj BPG (600000 IU for wt. $<$27kg, 1200000 IU for wt $\geq$27 kg)
Or 10 days course of Pen V 6 hourly (250mg for wt. $<$27kg, 500mg for wt $\geq$27 kg)
Or 10 days course of Erythromycin 6 hourly (250mg for wt. $<$27kg, 500mg for wt $\geq$27 kg)
Or 5 days course of Azithromycin once daily (250mg for wt. $<$27kg, 500mg for wt $\geq$27 kg)

5.6 Nepalese Sore throat guideline (NHF Recommendations)

1. Diagnose sore throat on the basis of clinical signs and symptoms (apply clinical decision rule)
2. If it is Bacterial throat infection- treat with antibiotic. (Penicillin, Amoxicillin, Azithromycin)
3. If you find the diagnosis doubtful or borderline or if you cannot decide clinically whether it is bacterical or viral - treat with antibiotic
4. If it is mixed type - bacterial and viral (cases having signs and symptoms of both bacterial and viral infection) - Treat with antibiotic.
5. If viral - don't treat with antibiotic. Treat with paracetamol, saline gargle.

Pharyngitis Prevention

Maintaining proper hygiene can prevent many cases of pharyngitis.

To prevent pharyngitis:

- avoid sharing food, drinks
- avoid contacts with individuals who are sick
- wash your hands before eating and after coughing or sneezing
- use alcohol-based hand sanitizers when soap and water are not available
- avoid smoking and inhaling second-hand smoke

5.7 Group activities

- Divide the participants in two groups.
- Appoint one coordinator from each group
- Let the groups discuss with its members about:
  - Signs and symptoms of bacterial tonsillitis & pharyngitis
  - Signs and symptoms of viral tonsillitis pharyngitis
- Each coordinator will present how to differentiate bacterial and viral tonsillitis & pharyngitis
- Each group will discuss on the following case study and answer the questions.

Case Study

Ram Bahadur is a middle-aged farmer living in a small village called Ramechhap, which is 60 kms from Kathmandu. He is the family head and has five children. The family's income is from farming and the children look after the goats. All the family members live in a small hut with their cattle, which also serves as a kitchen. Maya, who is 14 years old and the second child of the family, likes playing with her friends. She helps her family by looking after goats. She was very cheerful and vibrant in the family except occasional attack of sore throat, which disappears by itself after few days. Her family have never been worried about it as it was self limiting. They never treated her with medicine, but applied only home care measures. The disease tends to reoccur 3-4 times in a year.

Questions to be answered by the groups

1. What is the problem with Maya?
2. Why is the throat problem recurring several times in a year?
3. What are your suggestions to Ram Bahadur and Maya ?

5.8 Summary

1. Tonsillitis and pharyngitis are common in children.
2. The most important sign and symptoms of bacterial tonsillitis are throat pain, difficulty in swallowing, enlarged tonsils with white or yellow spots , enlarged lymphnodes of neck and fever.
3. Cough, runny nose, sneezing and fever are the symptoms of viral infection.
4. Acute bacterial throat infection (Tonsillitis, Pharyngitis) should be immediately treated with full dose of antibiotics to prevent further complications.

5.9 Key points

1. ***Sore throat or throat infections are common in children of 5 to 15 years age.***
2. ***Two third of all sore throats are viral infections whereas one third are bacterial. The most common bacterial cause is GAS.***
3. ***The most important signs and symptoms of bacterial sore throat are: Enlarged tonsils with exudates, enlarged cervical lymphnodes, throat pain, absence of cough and runny nose.***
4. ***The most important signs and symptoms of viral sore throat are: Cough, runny nose, sneezing, and absence of enlarged cervical lymphnodes.***
5. ***Bacterial sore throat should be treated with full dose of antibiotics (antibiotic of choice is Penicillin) whereas viral sore throat treatment can be done with home care methods.***
6. ***Clinical decision rule should be applied for the diagnosis of sore throat in low income countries because throat culture test is time consuming, expensive and not feasible.***
7. ***There is no role of ASOT test in the diagnosis of acute throat infection because ASOT starts rising only after 7 days of onset of symptoms.***

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Module VI

Acute Rheumatic Fever

6.1 Lesson Plan

Title:	**Acute Rheumatic Fever (ARF)**	**Total Time: 60 minutes**
Time (minutes)	**Topics**	
02	**Learning Objectives**	
	At the end of this session, the participants will be able to: 1. Describe the cause of Acute Rheumatic fever including its risk factors, signs and symptoms. 2. Diagnose a case of ARF by using Jones criteria. 3. Manage cases with acute rheumatic fever 4. Provide primary and secondary prevention of ARF	
05	**Introduction & Background**	
	Definition	
20	**Main Content**	
	Major and minor manifestations Jones criteria for diagnosis of ARF Treatment and Prevention	
20	**Discussion**	
	Group Work	
	Exercise	
10	**Feedback**	
	Evaluation	
03	**Summary**	

6.2 Introduction

Acute rheumatic fever (ARF) is a delayed autoimmune response to an untreated GAS infection. 0.3 to 3% of GAS throat progress to ARF.(1) If left untreated, approximately half of the ARF cases progress to RHD. (Figure 6:1) ARF may involve the heart, joints, central nervous system and/or skin. Signs and symptoms may include any or all of the following: arthritis (of one or more joints), fever, carditis (inflammation of the heart), rash, Sydenham's chorea (uncontrolled movements), and subcutaneous nodules.

ARF develops about 2-3 weeks after the onset of a GAS infection. The illness usually lasts up to 3 months and resolves without treatment. With treatment the symptoms resolve within 1-2 weeks. ARF can occur repeatedly in people who continue to be exposed to group A streptococci in their environment.(2)

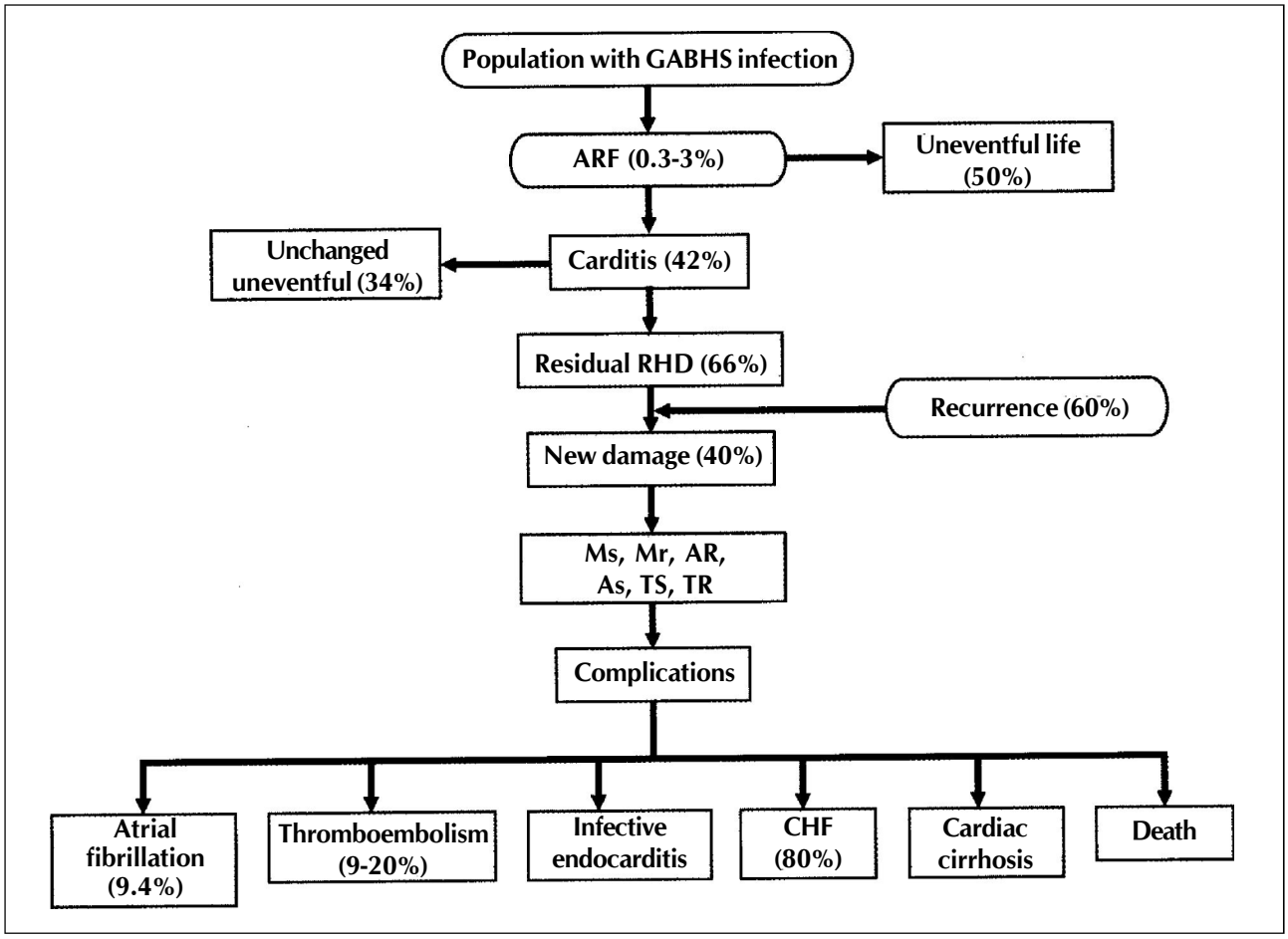

Figure 6:1 algorithm of natural history of RF and RHD

6.3 Risk Factors for ARF

Rheumatic fever and Rheumatic heart disease is a disease found in poorer communities. The following factors increase the risk of developing ARF:

- Overcrowding
- Poor standard of housing
- Reduced access to health care
- Poor nutrition
- Heredity
- Age 5-15 years

6.4 Pathogenesis of ARF

ARF is one kind of hyperimmune reaction due to streptococcal allergy or is an autoimmune process. The streptococcal M-protein and N acetyl glucosamine (multiple epitopes) minic cardiac contractile protein (auto antigens of myosin and tropomyosin) and also with keratin, laminin and vimentin present in cardiac interstitial tissue. It is known as molecular mimicry which is the hallmark of pathogenesis. It was first described by Fujinami and Oldstone in 1983. This molecular mimicry between certain types of streptococcal components and cardiac proteins is most probably the cause for cellular and humoral reactions which are responsible for pathogenesis of ARF and RHD. (Figure 6:2 and 6:3)

The cellular immunity has definite role in formation of classic lesion like Aschoff's nodules due to delayed hypersensitive reaction. Moreover repeated streptococcal infection may be a pre-requisite for induction of the disease. That is why, ARF occurs commonly after four to five years of age, (rarely below 4 years of age). Infiltration of T cells (T-lymphocyte) in valve tissue (mainly mitral valve) in patients of rheumatic fever again indicates that cellular immunity plays an important role. Because of lack of enough proof, the humoral immunity is not thought to be the primary mediator for the pathogenesis of ARF.

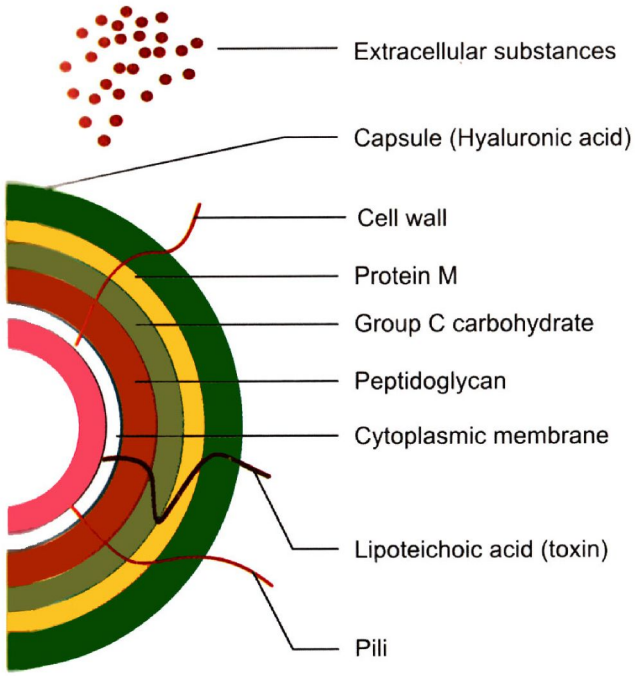

Figure 6:2 Morphology of group A beta hemolytic Streptococcus (colors used to demarcate diffferent layers)

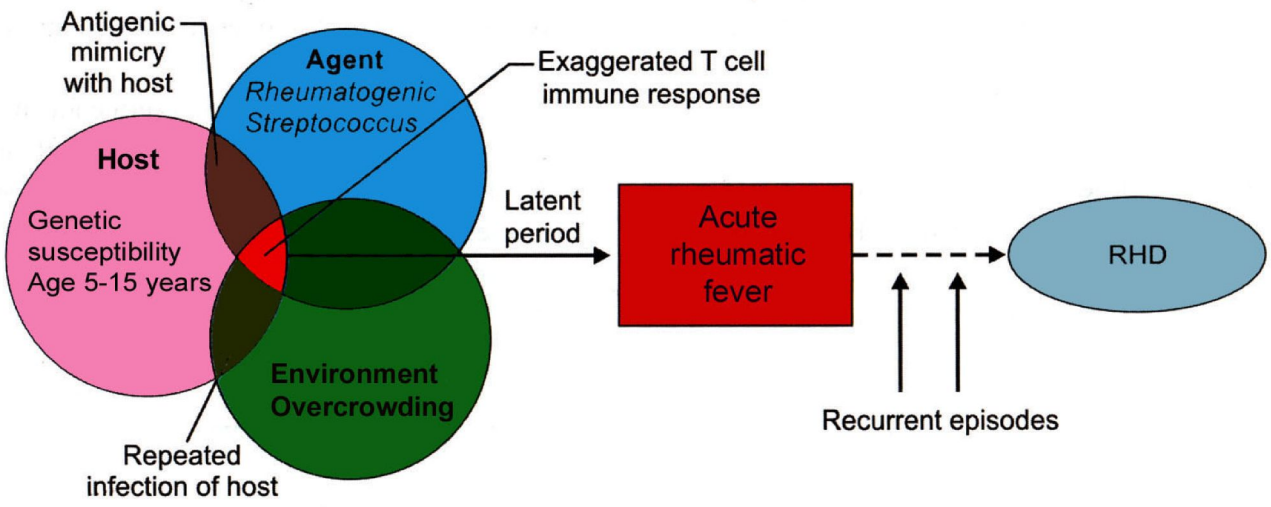

Figure 6:3 Interactions of agent, host and environment in pathogenesis of RF and RHD

6.5 Diagnosis of Acute Rheumatic Fever

ARF diagnosis can be missed or delayed because

- A combination of signs and symptoms are required to confirm the diagnosis
- ARF may be confused with other diseases which have similar sign and symptoms
- People with ARF symptoms do not always present to the health system,
- Health workers may have difficulty recognizing the signs and symptoms of ARF

Diagnosis of ARF is made using the Jones criteria which was introduced in 1944 and has been updated and modified several times by WHO and AHA. The latest modification was made in 2015.(3,4,5)

The Jones Criteria include Major manifestations, Minor manifestations, and evidence of a preceding GAS infection.

- Major manifestations are signs and symptoms more often associated with ARF
- Minor manifestations are signs and symptoms that can help support the diagnosis.

Jones Criteria (2015 Modification made by AHA and endorsed by WHF) (Appendix XII)

Major manifestations

1. Carditis(clinical or **echo diagnosed**)
2. Arthritis (polyarthritis, **Monoarthritis**) or **Polyarthralgia (in high risk areas)**
3. Sydenham's Chorea
4. Erythema marginatum
5. Subcutaneous nodules

Minor manifestations

1. Fever
2. Polyarthralgia or **monoarthralgia (in high risk areas)**
3. Prolonged P-R interval on ECG
4. Raised ESR
5. Raised CRP

Evidence of preceding GAS Infection

1. GAS on throat swab (positive culture)
2. Raised Anti-Streptolysin O titre (ASOT)
3. Raised Anti-deoxyribonuclease B (Anti-DNase B)
4. Positive quick strep test

The diagnosis of acute rheumatic fever can be confirmed in the presence of following situations

1. Presence of 2 major manifestations and any evidence of preceding GAS infection

OR

2. Presence of 1 major manifestation, 2 minor manifestations and any evidence of preceding GAS infection

OR

3. Presence of Rheumatic Chorea (Sydenham's Chorea)

6.6 Major Manifestations

a. Arthritis (the most common symptom, in up to 75% of first episodes)

- Pain, redness and swelling in the joints (commonly the ankles, knees, wrists, elbows, less commonly the small joints of the hands, feet and neck) (Figure 6:2)
- Often the first complaint
- Usually 'migratory'- disappearing in one joint as it begins in another.

Figure 6:2 Arthritis

b. Carditis (inflammation of the heart)

- Commonly presents as a heart murmur
- Chest pain and/or difficulty breathing may be present in more severe cases
- Valves are damaged (Figure 6:3)

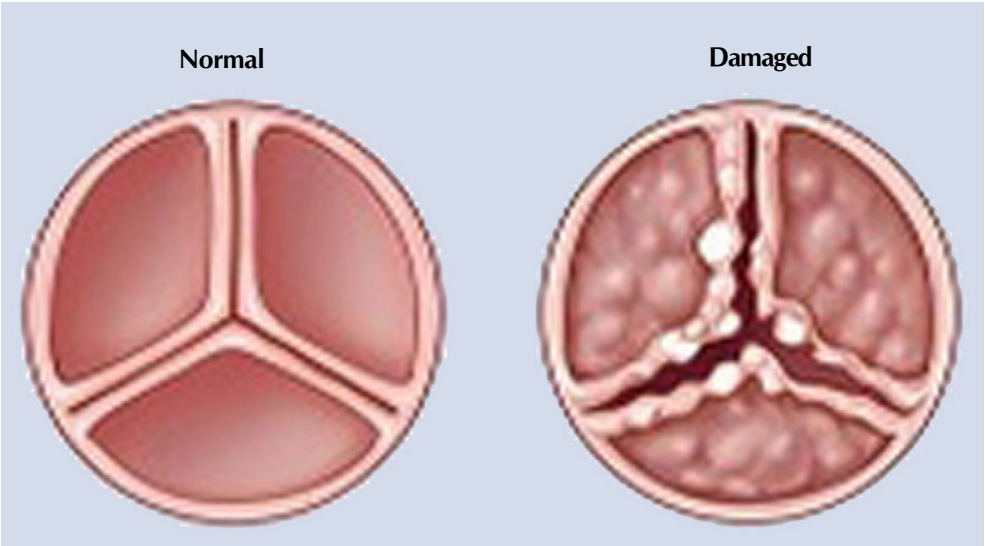

Figure 6:3 Normal and Damaged Aortic Valve

c. Sydenham's Chorea

- Twitchy, jerking movements and muscle weakness (most obvious in the face, hands and feet) (Figure 6:4)
- May occur on both sides or only one side of body
- More common in teenagers and females (rare after age 20)
- May be associated with irritability and or depression
- May begin up to 3-4 months after the streptococcal infection, and often occurs without other Symptoms
- Usually resolves within 6 months
- May recur in females during pregnancy

Figure 6:4 Chorea

d. Subcutaneous nodules (Less common)

- Painless lumps on the outside surfaces of elbows, wrists, knees, ankles in groups of 3-4 (up to12) (Figure 6:5)
- The skin is not red or inflamed
- Last 1-2 weeks (rarely more than 1 month)
- Nodules are more common when Carditis is also present

Figure 6:5 Subcutaneous nodules

e. Erythema Marginatum (Less common)

- Painless, flat pink patches on the skin that spread outward in a circular pattern (Figure 6:6)
- Usually occurs early, may last months, rarely lasts years
- Usually on the back or front of body, almost never on the face
- Hard to see in dark-skinned people

Figure 6:6 Erythema Marginatum

6.7 Evidence of GAS infection

Evidence of a GAS infection is required to confirm the diagnosis of ARF

1. GAS on throat swab (positive culture)
2. Raised Anti-Streptolysin O titre (ASOT)
3. Raised Anti-deoxyribonuclease B (Anti-DNase B)
4. Positive quick strep test

Note:

- Group A beta-haemolytic streptococci may not be found on a throat swab since the infection may be resolved at the time of onset of ARF symptoms.
- Serum ASOT starts rising after 7 days and reaches a peak level around 3-6 weeks after infection and starts to fall at 6-8 weeks.
- Serum ASOT is generally considered to be modestly elevated if it is at least 240 Todd units in adults and 320 Todd units in children(4).
- Serum Anti DNase B - reaches a peak level up to 6-8 weeks after infection and starts to fall at around 3 months after the infection.
- ARF licks the joints but bites the heart (Joints are not damaged whereas heart valves get damaged due to ARF).

6.8 Special Situations

i. **Probable (Atypical) ARF** : Patient may present with non-migrating polyarthritis or monoarthritis and with several (3 or more) other minor manifestations, together with evidence of recent GAS infection. Some of these cases may later turn out to be ARF. It is justified to consider them as case of probable ARF (once other diagnosis are excluded) and advice regular secondary prophylaxis. They require close follow up. This cautious approach is particularly suitable for patients in vulnerable age groups in high endemic countries.(5)

ii. **Chorea:** Often presents without other manifestations and patients should be started on secondary prophylaxis.

iii. **Insidious (indolent) Carditis:** Slowly progressive valve damage without history of ARF is common in endemic countries and these patients are at high risk as the valve damage has already started. Strict secondary prophylaxis is recommended.

6.9 Management of Acute Rheumatic Fever

Persons with symptoms of ARF should be hospitalized to ensure accurate diagnosis, and to receive clinical care and education about preventing further episodes of ARF. The diagnosis should include an initial echocardiogram (if available) used to help identify and measure heart valve damage. Long-term preventive management should be organized before discharge.

6.10 Treatment of the acute illness

All cases of ARF should receive

- A single injection of Benzathine penicillin G, or
- Oral Penicillin for 10 days (Erythromycin or Azithromycin if penicillin allergy)

Relief of symptoms

Arthritis and fever

- **Aspirin** (Aspirin may hide symptoms of polyarthritis and fever. Paracetamol can be used until the diagnosis is confirmed). The usual dose of Aspirin is 75mg/kg/day in 4 divided doses(QID) for 4 weeks then tapering the dose depending on the acute phase reactants(ESR,CRP).
- **Indications for steroids(prednisolone):**

There is little evidence that prednisolone is superior to aspirin (6). Prednisolone is indicated in following situations:

1. Patients who do not tolerate aspirin.
2. Patients who do not improve with aspirin.

Dose of steroid is 2mg/kg/day for 2 weeks then taper by 5mg/day every 2-3 days. While tapering steroid overlap with aspirin (initial dose 60mg/kg/day)

Chorea

- Most mild-moderate cases do not need medication
- Provide calm and supportive environment (prevent accidental self-harm)
- Haloperidol or Carbamazepine or Valproic acid can be given for severe cases.

Carditis

- Bed rest if in cardiac failure
- Anti-failure medication (e.g. Diuretics, ACEI, Digoxin)
- Anti-coagulation medication if atrial fibrillation (irregular heart beat) is present

Treatment of acute carditis (Appendix XIV)

6.11 How to prevent ARF ?

If we treat bacterial throat infection within 9 days of onset of disease with proper antibiotic for sufficient duration the development of ARF can be prevented. This method of treating bacterial throat infection with antibiotic is known as primary prevention of ARF. Recurrent sore throat may cause repeated attacks of ARF which may lead to further damage of the heart valves. To prevent the repeated attack or recurrence of ARF long acting injection penicillin (Inj. BPG) should be given every three weeks for a long period. This method is known as secondary prevention of ARF.

6.12 Group activities

- Divide the participants in two or three groups.
- Appoint one coordinator from each group
- Let all the groups discuss with its members about the following case study.
- Each coordinator will present the answers to the questions.

Case Study

Ramita is a 10 yrs old village girl. She has frequent sore throat with throat pain, enlarged tonsils, pus in tonsils and fever. Last year she had severe sore throat, which was unattended. Three weeks later she developed sudden onset of fever, joints pain with joint swelling along with chest pain. Her father Ram Bahadur brought her some pain killer tablets from nearby medical shop. Ramita was fine after taking pain killer tablets for 7 days and started going to school. She again had fever with big joints pain after 1 month. Her father then consulted a traditional healer who gave him un-identified root and said 'it will vanish after she takes it'. Ramita showed some improvement after a while, but since then, she was never healthy and cheerful as she used to be. She repeatedly complained of difficulty in walking with big joints swelling, pain and fever. However nobody in the family took those problems seriously. She was never taken to the hospital or health post or doctor for checkup. Her family members thought this was just the usual childhood problem and after all "no child has

ever grown without having cold, fever and joints pain". She started to have breathlessness, could not play and run with her friends and could not even carry out her routine activities.

Questions to be answered by the group

1. Which type of throat infection Ramita used to have-bacterial or viral?
2. Can bacterial sore throat be treated with pain killers or herbal drugs (roots)?

   How should bacterial sore throat be treated?
3. What diagnosis can be made if the child has recurrent sore throat which is unattended and fever, joints pain, and joint swelling along with chest pain and breathlessness?
4. What would we suggest the family to do, if above mentioned symptoms occur in their child?
5. What were the mistakes done by Ram Bahadur in the treatment of Ramita's illness? Point out 3 mistakes.

6.13 Summary

1. Acute Rheumatic fever is the result of untreated GAS infection,
2. Overcrowding, poor standard of housing, poor nutrition, age 5-15 years, are the risk factors of ARF
3. ARF is diagnosed by using Jones criteria.
4. All patients with ARF should be treated with Injection BPG (Erythromycin in case of allergy to penicillin)
5. All bacterial throat infections should be treated with antibiotics to prevention ARF (This is known as primary prevention)
6. ARF may reocur if long term penicillin prophylaxis is not given, therefore action should be made to prevent the reccurence of ARF by giving Inj. BPG (This known as secondary prevention of ARF)

6.14 Key points

1. ***Acute rheumatic fever is the leading cause of acquired heart disease in children and young adults in low income countries.***
2. ***The cause of ARF is untreated GAS infection of the throat.***
3. ***ARF is considered as inflammatory disorder of connective tissue which is developed as an autoimmune response to untreated or inadequately treated GAS infection of the throat.***
4. ***ARF licks the joints but bites the heart.***
5. ***Modified Jones criteria 2015 is the latest tool used in the diagnosis of***

ARF. This new modification in jones criteria has included subclinical carditis, polyarthralgia and monoarthritis as major criteria and monoarthralgia as a minor criteria in high risk countries.

6. ***If left untreated, around 50% of ARF cases will further develop RHD.***
7. ***Treatment of GAS throat infection properly (within 9 days of onset of symptoms, full course of antibiotic preferably IM Penicillin single dose or oral penicillin for 10 days) will prevent development of ARF. This is known as primary prevention of ARF.***
8. ***Repeated episodes of GAS throat infections may cause repeated attacks or recurrences of ARF which may lead to progression of heart valve damage. Inj BPG is given for a long period for prevention of recurrence of ARF. This is known as secondary prevention of ARF.***
9. ***Tonsillectomy does not prevent ARF.***

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Module VII

Rheumatic Heart Disease

5.1 Lesson Plan

Title:	**Rheumatic Heart Disease**	**Total Time: 60 minutes**
Time (minutes)	**Topics**	
02	**Learning Objectives**	
	At the end of this session, the participants will be able to: 1. Describe the cause, signs and symptoms of Rheumatic heart disease. 2. Diagnose and manage the patients with RHD 3. Understand the importance of secondary prophylaxis of RHD. 4. Refer RHD patients for surgical treatment whenever necessary	
05	**Introduction & Background**	
	Definition	
20	**Main Content**	
	Physical examination. Signs and Symptoms. Diagnosis. Medical Management. RHD and Pregnancy. PTMC, Surgical Management, Prevention	
20	**Discussion**	
	Group Work	
	Exercise	
10	**Feedback**	
	Evaluation	
03	**Summary**	

7.2 Introduction

Rheumatic heart disease is a condition of heart valve damage. This is a result of repeated episodes of ARF. Early diagnosis of RHD is very important so that secondary prophylaxis can be started as soon as possible to prevent the progression of the valve damage. Echocardiography is an important test to confirm the diagnosis of RHD.

The mitral valve is affected in over 90% of cases of RHD. The next most commonly affected valve is the aortic valve. Usually disease of the aortic valve is associated with disease of the mitral valve. The tricuspid and pulmonary valves are rarely directly affected.

Mitral regurgitation (MR) is the most common heart valve lesion in RHD. Isolated MR is found most commonly in children and young adults. Mitral stenosis represents long standing chronic changes to the mitral valve. It is therefore more commonly seen in adults. A common complication of mitral stenosis is atrial fibrillation. Aortic regurgitation is not uncommon but aortic stenosis is almost never seen as an isolated lesion.(1)

7.3 Types of RHD

RHD can be divided into clinical and subclinical. Clinical RHD are those, which are more or less symptomatic and have murmur on auscultation. Subclinical RHD are diagnosed only with echocardiography. On auscultation they donot present with heart murmur. These are silent cases and are in very large number (10 time more than clinical RHD) in the community. Echocardiography screening is useful in the diagnosis of such cases. Subclinical RHD or carditis are of two subtypes

1. Definite RHD
2. Borderline RHD

They are based on echo findings

WHF has published echo criteria for the diagnosis of definite and borderline RHD. (2) (Appendix XIII)

Definite RHD cases have more echocardiographic Morphological and Doppler features of valve damage whereas borderline RHD cases have less features.

7.4 Symptoms

The symptoms of RHD depend on the valve lesion and its severity. Symptoms of RHD may not show for many years until valve disease becomes severe.

Initial symptoms of RHD are the symptoms of early heart failure: They are

1. Breathlessness on exertion
2. Feeling tired
3. General weakness

As heart failure progresses, other symptoms may develop including:

1. Orthopnea (breathlessness on lying down)
2. Paroxysmal nocturnal dsypnoea (waking at night with shortness of breath)
3. Peripheral oedema
4. Palpitations (feeling of irregular heartbeats).
5. Chest pain (People with aortic valve disease may experience angina)
6. Syncope.

7.5 Physical Examination

Clinical assessment should be conducted carefully because early detection of RHD can result in a better outcome. Careful auscultation should be undertaken and suspicious murmurs referred for assessment by a cardiologist with echocardiography (if available).

Clinical examination should include

- assessment of severity of RHD
- complications of RHD (heart failure, atrial fibrillation etc).

- In mitral regurgitation the characteristic murmur is a pansystolic murmur heard loudest at the apex and radiating laterally to the axilla.
- In mitral stenosis the characteristic murmur is a low-pitched, diastolic rumble heard best at the apex with the bell of the stethoscope and with the person lying in the left lateral position.
- In aortic regurgitation, the characteristic murmur is a diastolic blowing decrescendo murmur best heard at the left sternal border with the person sitting up and leaning forward in full expiration.
- In aortic stenosis the characteristic murmur is a loud, low pitched mid-systolic ejection murmur best heard in the aortic area, radiating to the neck.

7.6 Diagnosis of RHD : ECG, Chest X-Ray and Echocardiography

Assessments of a heart murmur or suspected RHD should include ECG, Chest X-Ray and Echocardiography.

ECG is essential to determine the rhythm and heart rate

Chest X-Ray helps to assess the size of the heart chambers and to detect pulmonary congestion.

Echocardiography

The diagnosis of RHD is confirmed by echocardiography test. All persons with murmurs suggestive of valve disease, or a past history of ARF, should have an echocardiogram. Echocardiography will detect any rheumatic valve damage, help determine its severity and assess left ventricular function. Regular echocardiography helps to detect evidence of progression of valve lesions over time and to assess heart function before surgery.(2) World Heart Federation has published criteria for Echocardiographic Diagnosis of RHD in 2012 (Appendix XIII).

7.7 Management of RHD

The main goal of RHD management is

- to prevent disease progression
- to avoid, or at least delay, valve surgery.

To achieve these goals, the main strategy is to provide Secondary prophylaxis, which will prevent recurrent ARF. This is achieved by giving Injection BPG every 3 weeks for several years depending upon severity of the cases. Regular clinical review is essential and follow-up echocardiography is important to follow the progress of the heart valve lesions. Management of RHD depends on the severity of disease. Basic guidelines for management of mild, moderate and severe RHD are provided below.

The key elements in the effective management of RHD are:

- Initial assessment, education and referral to a heart specialist (If available)
- Management of heart failure (diuretics and ACE inhibitors)
- Management of atrial fibrillation (Digoxin or Betablocker and anti-coagulation)

- Regular secondary prophylaxis (to prevent recurrent ARF done with Inj. BPG 3 weekly)
- Infective endocarditis prophylaxis before dental or surgical procedures
- Family planning referral (for women)
- Appropriate surgical intervention whenever necessary
- Special considerations (e.g. managing RHD during existing pregnancy)
- Influenza and pneumococcal vaccination (where available)

7.8 Surgery for RHD

Surgery may be necessary for severe chronic rheumatic valve disease. The need for surgery is determined by the severity of symptoms, evidence that the heart valves are significantly damaged and LV chamber size and function. Surgery to repair or replace damaged heart valves is important to prevent left ventricular dysfunction and severe pulmonary hypertension.

Indications for surgery

- Severe valve damage (Severe RHD)- Severe MS/MR/AS/AR
- Moderate valve damage with symptoms not responding to medical therapy, high pulmonary artery pressure, LV dysfunction.

Assessment for surgery

Echocardiography before surgery helps to assess the severity of valve disease and left ventricular function. The results of surgical treatment depend on the following:

- severity of valve damage at the time of surgery
- left ventricular function (LV ejection fraction)
- nutritional status of the individual prior to surgery
- long-term post-operative management (particularly anticoagulation management).

Impaired left ventricular function, atrial fibrillation, diabetes and other co-morbidity can all increase surgical risk and decrease long-term survival rates after surgery. People who require emergency surgery or re-operations have an increased morbidity and mortality following surgery

Surgical treatment options

a. Closed mitral commisurotomy

b. Valve repair

c. Valve replacement

Valve repair and valve replacement require open heart surgery with cardiopulmonary bypass.
There are two types of prosthetic valves in use

a. Mechanical Valve (Lasts long, needs anticoagulation)

b. Biological Valve (Lasts short, does not need anticoagulation)

Balloon Mitral Valvotomy(MBV)/Percutaneous Transvenous Mitral Commisurotomy (PTMC)

This procedure is performed in case of severe Mitral Stenosis inside a cathlab using a balloon. The incidence of restenosis is reported to be about 40% after seven years.(3). PTMC can also be performed in second and third trimester of pregnancy in pregnant with symptomatic Severe MS.

7.9 Complications of RHD

RHD if not managed properly may lead to following complications

- Heart failure
- Infective endocarditis
- Stroke
- Death

7.10 RHD and Pregnancy

Pregnancy causes stress to the heart and may make any existing valve problem worse. The cardiovascular changes which occur during pregnancy in women with RHD may threaten the health of the woman and the foetus. Changes that occur during pregnancy are:

- increased heart rate and blood volume
- reduction in systemic and pulmonary resistance
- increased cardiac output.

These changes can complicate existing valvular heart disease and may cause life-threatening complications during pregnancy. Sub-clinical RHD may be identified for the first time during pregnancy because of the above changes. Women with RHD are at high risk of complications immediately after birth.

Ideally, women with known RHD should be fully assessed before pregnancy occurs so that any necessary intervention may safely occur. Women at particular high risk may be counseled to avoid pregnancy (e.g. severe pulmonary hypertension). When pregnancy occurs, management depends on the type and severity of heart valve disease. It is essential that a pregnant woman be assessed by a medical specialist as early as possible so that a coordinated pregnancy management and follow-up can be planned. Management generally includes:

- restricting physical activity and salt intake
- administering appropriate secondary prophylaxis
- avoiding community-acquired infectious disease
- Education about monitoring own signs and symptoms and seeking care if shortness of breath
- close monitoring of cardiovascular state (specifically in woman who have symptoms of RHD).
- Special attention should be given to women with high risk RHD including women with
    - mitral and/or aortic stenosis
    - atrial fibrillation
    - Prosthetic heart valves
    - Those receiving anticoagulant therapy

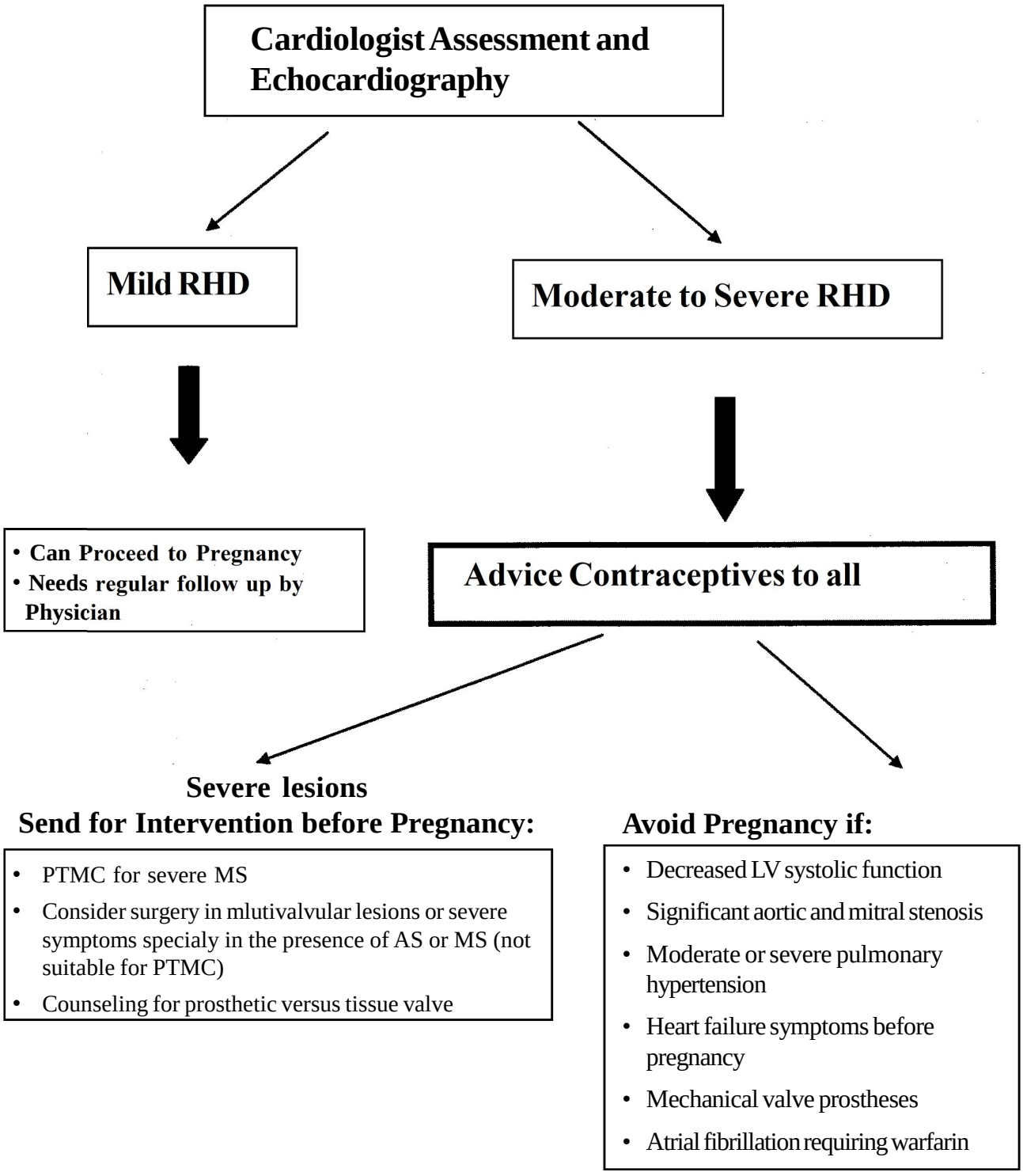
7.11 Special Situations

a. Pre-Conception Planning

b. Pregnancy with RHD

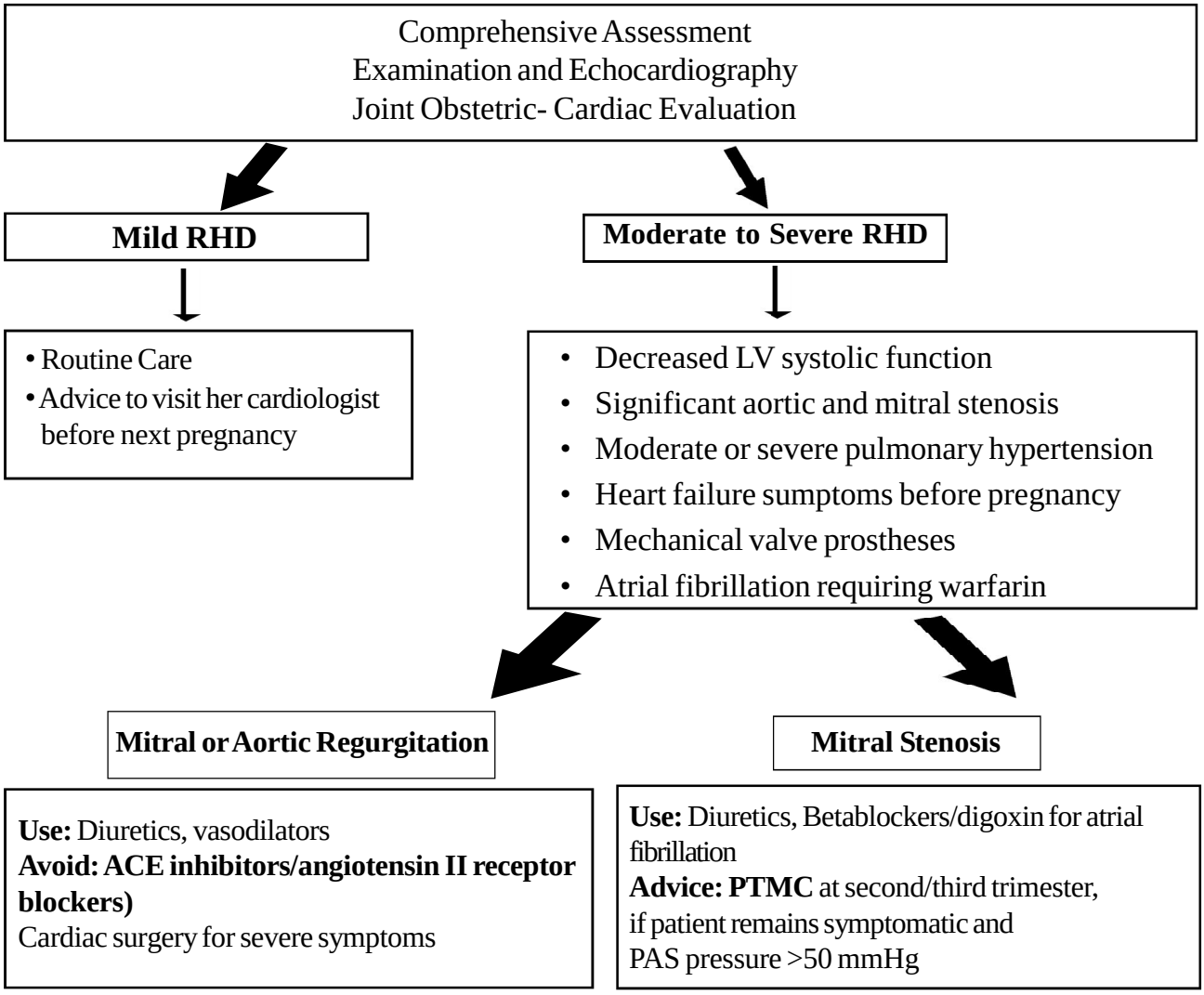
c. Pregnant RHD cases on Anticoagulant

a. Pre-Conception Planning



(Source: Reference 5)

b. Pregnancy with RHD



Consider Termination of Pregnancy if:

Severe LV dysfunction
Severe aortic stenosis
Severe pulmonary hypertension

Note

- Benzathine penicillin prophylaxis for RHD should continue during pregnancy
- IE prophylaxis during delivery

(Source: Reference 5)

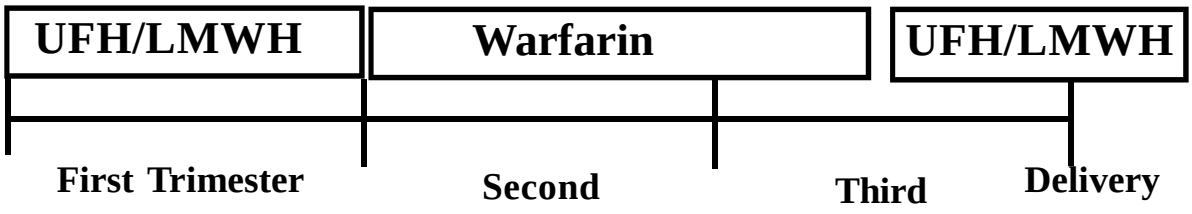
c. Pregnant RHD Cases on Anticoagulant (Prosthetic Valves, Atrial Fibrillation)

If possible, warfarin therapy should be avoided during pregnancy. If warfarin therapy is essential, it should be avoided at least during the first trimester because of teratogenicity and from about 2 to 4 weeks before delivery to reduce the risk of hemorrhagic complications.

Follow One of the Two Regimens

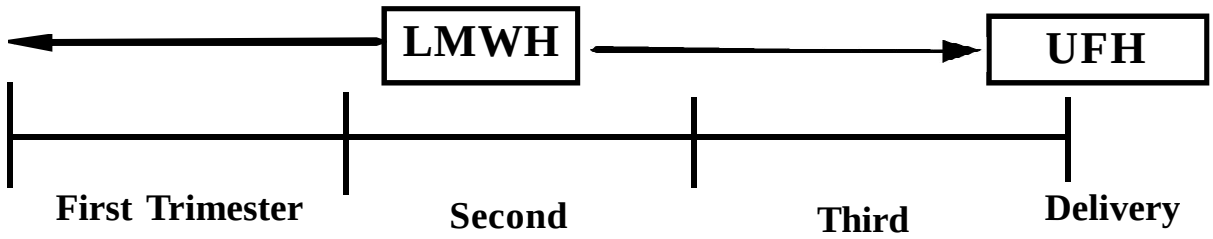
Regimen One (PREFERRED)

- Low Molecular Weight Heparin (LMWH) or Unfractionated Heparin (UFH) during first trimester
- Warfarin during second and third trimester
- Change to LMWH or UFH at 36 weeks till delivery
- Stop heparin 12 hours before delivery. Restart heparin after delivery if no bleeding.



Regimen Two

- Low Molecular Weight Heparin (LMWH) throughout pregnancy
- Unfractionated heparin (UFH) at 36 weeks



7.12 Group activities

- Divide the participants in two or three groups.
- Appoint one coordinator from each group
- Let all the groups discuss with its members about the following case study.
- Each coordinator will present the answers to the questions.

Case Study

Ram Bahadur found his child Maya sick with fever and large joints pain & swelling and took her to 'Baidya' for treatment. Maya could not get any improvement, rather her symptoms got worsened. She developed generalized body swelling, shortness of breath, palpitation and turned bed ridden. Her father then took her to nearby clinic from where she was referred to a hospital in Kathmandu. There she was admitted, investigated and managed accordingly. When she began to show improvement, she was discharged with advice to take injection Penicillin every 3 weeks and take some medicines. The family especially, the father, was told about the necessary precautions including the injection & need to take the medications regularly. They were also told about the nature of the disease and the need to bring the child urgently to health institution if she got sick again with fever & joints pain. In the following years, Maya at times used to experience recurrence of the symptoms she had previously, especially when she stopped taking injection & medications as her father became engaged with his farming duties and failed to take her to the health center for Injection Penicillin.

Questions

1. Is it advisable to parents to visit the 'Baidya' or 'Jhakri' to cure for fever with joints pain in children?
2. Looking at family condition and location, are the medical professional accountable to explain the parents about RF/RHD and it's symptoms and complications?
3. What would be the result of discontinuation of the injection penicillin?
4. How can you confirm if Maya needs surgical treatment or not?
5. What are the lessons learned from this story?

7.13 Summary

1. RHD is the result of recurrent attacks of ARF causing damage to heart valves.
2. If left untreated, there may be progression of the heart valve damage leading to heart failure and death.
3. Secondary prophylaxis of RHD is the method to prevent the recurrence of ARF and stop or delay the progression of heart valve damage. This is achieved by giving Inj. BPG every 3 weeks for several years.
4. If heart valves are severely damaged, surgery of the heart valves is necessary.
5. Treatment of RHD including secondary prophylaxis should not be stopped without doctor's advice.

7.14 Key points

1. ***The valve damage in RHD is the result of repeated attacks of ARF. Chronic RHD is a NCD with lifetime course.***
2. ***The valves most commonly damaged in RHD are Mitral and Aortic.***

3. ***Symptoms of RHD include: Dyspnea, chest pain, palpitation, orthopnoea, paedal edema etc.***
4. ***The diagnosis of RHD can be confirmed by Echocardiography test.***
5. ***The progression of valve damage in RHD can be prevented by giving injection Benzathine penicillin G every 3 weeks. This method is known as secondary prophylaxis.***
6. ***Surgery for RHD is life saving and is indicated in moderate and severe valve damage.***
7. ***PTMC is a catheter based procedure which is indicated in case of severe MS. It can even be performed in pregnant women at second and third trimester.***
8. ***Mechanical and biological are the two types of prosthetic heart valves used in valve replacement surgeries. Biological prosthetic valve is used in young females. It does not need anticoagulants.***
9. ***Females with RHD of child bearing age should be carefully counseled and fully assessed before pregnancy occurs.***
10. ***RHD if not properly managed may lead to heart failure, stroke, infective endocarditis or premature death.***

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Module VIII

The Penicillin

8.1 Lesson Plan

Title: **The Penicillin**	**Total Time: 60 minutes**
Time (minutes)	**Topics**
02	**Learning Objectives**
	At the end of this session, the participants will be able to: 1. Understand the importance of penicillin in the management and prevention of ARF/RHD 2. Perform penicillin allergy test 3. Recognize and manage allergic reactions to penicillin
05	**Introduction & Background**
	Definition
20	**Main Content**
	The history of Penicillin, good and bad about Penicillin, allergic reaction to Penicillin, NHF recommendations on use of Penicillin in RF/RHD
20	**Discussion**
	Group Work
	Exercise
10	**Feedback**
	Evaluation
03	**Summary**

8.2 Introduction

Before the discovery of Penicillin there was no effective treatment for infections like pneumonia, gonorrhea, acute rheumatic fever etc. Alexander Fleming in 1928 discovered Penicillin, which was able to kill bacteria. In 1940 this discovery was recognized as one of the greatest advances in medicine. Penicillin was then named the first wonder drug. It is now available in different forms. (Figure 8:1)

Figure 8:1

- Oral tablets (Penicillin V)
- Short acting IV preparation (Inj. Benzyl Penicillin)
- Long acting crystalline powder (Inj. Benzathine Penicillin G)(BPG)
- Premixed liquid Benzathine Penicillin G

BPG is commonly used in secondary prevention of ARF. BPG was developed in 1950s as relatively insoluble penicillin, which is injected IM. Low solubility of BPG means that penicillin remains in the blood for weeks, preventing GAS infections.(1). After deep intramuscular injection of BPG, peak serum concentration of penicillin is reached within 12-24 hours and effective concentrations are usually detectable for approximately three weeks in most patients and for four weeks in a smaller proportion (2)

8.3 The good about Penicillin

1. Has narrow spectrum of activity able to kill and eradicate gram positive bacteria.
2. GABHS resistant to Penicillin have never been documented.
3. Long-acting preparations are available
4. Inexpensive
5. The number one drug recommended for RF/RHD Prevention and Control.
6. Effectively kills GABHS when started within 9 days after the onset of acute illness.
7. Single dose of BPG is sufficient to kill all GABHS present in the infected throat.
8. Effectively prevents primary as well as recurrent attacks of ARF.
9. It is a time tested antibiotic-the first wonder drug.
10. It is safe in pregnancy.

8.4 The bad about Penicillin

1. Allergic reactions to Penicillin are not uncommon. Although anaphylaxis occurs rare, it may sometimes lead to death. The overall incidences of allergic and anaphylactic reactions to BPG are 2-5% and 0.2% respectively; fatal reactions are rare (3, 4)
2. Injection of BPG is painful.
3. Preparation and delivery of powdered BPG is difficult and needs good technical skills.
4. Needs Penicillin sensitivity testing before injecting BPG.
5. Vasovagal reactions are common with Inj. BPG (5)
6. Not easily available (Frequent shortage specially Inj. BPG)

8.5 Allergic reactions to Penicillin

The overall incidence of allergic reaction to penicillin is 2-5%.(4). Anaphylaxis is rare and occurs in about 1 in 10000 injections. Death has been reported about 1 in 100000 injections. In a Nepalese study allergic reaction to penicillin was detected in 9.1/10000 injections out of which anaphylactic reaction was 0.7/10000 injections. (5)

A. Minor reaction

Signs and Symptoms

- Fever
- Swelling of lips
- Itching
- Rashes
- Urticaria
- Nausea
- Vomiting

B. Major reaction (Anaphylactic Shock)

This is the most serious reaction with Penicillin which occurs immediately within 1 hour after injection of Penicillin. It is Ig E mediated (Type I) reaction.

Signs & Symptoms

- Low BP
- Tachycardia
- Sweating
- Dizziness
- Dyspnea
- Syncope
- Death if not treated

Treat anaphylaxis with Inj. Adrenaline

8.6 Vaso -Vagal Reaction

Vaso-vagal reactions are common with Inj. BPG. This is mostly due to pain and is reported mostly in patients with severe RHD. Because of poor cardiac function, these patients are susceptible to vaso-vagal reactions and are at high risk of life threatening arrhythmias.(3). Most vaso-vagal reactions are mistakenly reported as anaphylaxis.

Sign & Symptoms

- Low BP
- Bradycardia
- Dizziness
- Syncope

Treat Vaso-Vagal Reaction with Inj. Atropine

8.7 Penicillin Sensitivity Testing (PST)

This is an acceptable and usually accurate method to determine whether a person is at risk of having an immediate reaction to penicillin.(4,6,7,). Some researchers state that PST with diluted BPG injected intradermally do not predict allergy to Penicillin. In the absence of international guidelines, in Nepal we follow the NHF recommendations on PST. (See 8.9 below)

Negative predictive value of PST is 97-99%. (1-3% of negative test cases develop allergy upon being challenged with oral Penicillin). False negative test is very low.

Positive predictive value is 50% (50% of positive test cases do not develop allergy upon being challenged with oral Penicillin). False positive test is high.

Acute allergic reactions are rare in patients with negative skin tests and virtually all patients with a negative skin test can receive injection penicillin. However, penicillin skin testing also may have an adverse reaction. Although rare instances of anaphylactic shock have been reported even with skin testing dose of penicillin(8,9).

8.8 Some facts about Penicillin allergy

1. Penicillin allergy is rare. 95% of history positive and 50% of positive skin test cases turn out to be negative in proper allergy testing
2. Oral Penicillin cases give fewer reactions than parenteral Penicillin
3. Anaphylaxis to oral Penicillin is extremely rare
4. Skin testing dose of Penicillin may also cause anaphylactic reaction

8.9 NHF Recommendations on Penicillin Sensitivity Testing

A. Whom to perform PST?

1. Before first injection of Penicillin who do not give a history of major Penicillin allergic reaction.
2. Patients on Inj. BPG taking same brand but change in the batch number.
3. Patient on Inj. BPG changing a new brand of BPG.
4. If patient, care giver or provider is anxious about anaphylaxis.

B. Steps to perform PST.

1. First perform epidermal test (Prick- Puncture test) (Anaphylaxis is rare with this test method)
2. If negative, perform intradermal test
3. If positive, perform oral Penicillin challenge test (Give 500mg of Penicillin or Amoxicillin orally and wait for 1 hour. Watch for sign & symptoms of allergy)

C. Safety Measures for PST

An emergency kit for treating anaphylaxis should be available in any clinical setting where intramuscular penicillin is administered. All health workers injecting penicillin should be trained in performing the penicillin skin test and in treating anaphylaxis. (10,11)

1. Keep adrenaline preloaded and inject immediately if anaphylaxis occurs
2. Always have an anaphylaxis treatment kit present.
3. Always have trained professional administer the skin test.

8.10 Group Work

Field Visit

Visit to RHD secondary prophylaxis centre and observe the techniques of BPG PST and injection delivery.

8.11 Case Study

A staff nurse in a primary health centre in far western Nepal injected 600000 units of BPG IM in left buttock of a child with RHD. Before BPG injection she had performed intradermal PST, which was negative. The child, immediately after IM injection of BPG, developed severe dyspnoea, sweating and syncope. The nurse searched for emergency medicine, but could not find them. The child died.

Questions

1. Is the death due to medical negligence from the side of the staff nurse or due to an usual medical complication?
2. Point out the weakness of the nurse in the process of Penicillin Injection delivery.
3. What safety measures would have been helpful in saving the child?

8.12 Summary

1. Penicillin is the drug of choice in the management, prevention and control of RF/RHD.
2. There are many good effects of Penicillin in comparison to other antibiotics.
3. Although anaphylaxis to Penicillin is rare, the fear of allergic reaction to Penicillin is very high among health professionals and patients.
4. The long term benefit of BPG therapy in preventing RF/RHD far outweighs the risk of a serious allergic reaction.
5. A systemic approach in the use of Penicillin is recommended to reduce the fear of Penicillin Allergy.
6. Giving Inj. BPG without preparation to treat anaphylaxis is a medical negligence.

8.13 Key points

1. ***Penicillin was the first antibiotic which was discovered in 1928 by Alexander Fleming.***
2. ***Penicillin is the drug of choice in the treatment of GAS throat infection and in secondary prevention of rheumatic fever.***
3. ***GAS resistant to penicillin are not yet reported.***
4. ***Penicillin is available as oral tablets and injections (Powder and Liquid)***
5. ***Injection benzathine penicillin G is a long acting penicillin with action duration 3 to 4 weeks. It is used in primary as well as secondary prevention of rheumatic fever.***
6. ***Overall incidence of allergic reactions to penicillin is 2-5%. Anaphylaxis occurs in about 1 in 10000 injections. Death has been reported about 1 in 100000 injections.***

7. ***Many times vaso-vagal reactions are mistakenly reported as anaphylaxis.***
8. ***Penicillin skin testing is an accepted method to determine penicillin sensitivity.***
9. ***The negative predictive value of PST is 97-99% whereas the positive predictive value is only 50%.***
10. ***Skin test dose of penicillin may also cause anaphylaxis. Therefore all emergency care medicines and instruments should be available in the clinical setting where penicillin is administered.***
11. ***Anaphylaxis should be treated with injection adrenaline. Vaso-vagal reaction should be treated with injection atropine.***
12. ***Nepal Heart Foundation has published recommendations for health professionals on safe administration of penicillin***

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Module IX

Strategies for Preventing RF and RHD

9.1 Lesson Plan

Title:	**Strategies for Preventing RF and RHD**	**Total Time: 60 minutes**
Time (minutes)	**Topics**	
02	**Learning Objectives**	
	By the end of the session, Participates will be able to: 1. Understand the comprehensive approach to RHD prevention and control 2. Be familiar with all 4 methods of RHD prevention 3. Organize or support a RHD prevention unit in Nepal	
05	**Introduction & Background**	
	Definition	
20	**Main Content**	
	Primary, Secondary, Tertiary and primordial prevention of RHD. Comprehensive approach to RHD prevention. The World Heart Federation's TIPs	
20	**Discussion**	
	Group Work	
	Exercise	
10	**Feedback**	
	Evaluation	
03	**Summary**	

9.2 Introduction

RHD is preventable. The first episode of ARF can be prevented by treating GAS infection with antibiotic. In patients who already have ARF, recurrent episodes of ARF can be prevented with long-term Penicillin delivered at regular intervals. This can prevent the progression of ARF to RHD.

ARF and RHD can be prevented at population level by sustainable control strategies. For regions with high rates of disease, WHO recommended a dedicated, register based program, which focuses on identifying cases, delivering regular prophylaxis, treatment and education.

There are several strategies for preventing RF/RHD at different stages of the disease. They are named Primary, Secondary, Tertiary & Primordial Prevention.

9.3 Primary Prevention of Acute Rheumatic Fever

The primary prevention of ARF is defined as the adequate antibiotic therapy of GAS throat infection to prevent an initial attack of acute RF (WHO). The therapy is therefore intermittent, in contrast to the therapy used for the secondary prevention of RF, where antibiotics are administered continuously at fixed intervals

Antibiotic therapy of GAS Tonsillopharyngitis (Primary Prevention)

Effective antibiotic therapy eradicates group A streptococcus from the throat and can prevent RF, if therapy is started within nine days after the onset of symptom (1-4). To date, no clinical isolate of GABHS has been shown resistant to Penicillin. For this season and because Penicillin is inexpensive and available, it remains the drug of choice for treating GAS infection. To eradicate GAS infection, oral Penicillin V should be given for full 10 days or a single dose of IM injection BPG can be given.

Antibiotics used for primary prophylaxis of RF is shown in table No.9:1

Table 9:1 Primary Prevention of Rheumatic Fever: (Recommended Treatment of Streptococcal tonsillopharyngitis)

Antibiotic	Administration	Dose	Comments
Benzathine Penicillin G	Single intramuscular injection	Adults $\geq$ 27kg 1200000 IU intramuscularly; 600000 IU for children weighing < 27kg.	Preferable to oral penicillin because of patient adherence problems.
Phenoxymethyl penicillin (Penicillin V)	Orally 3-4 times/day for 10 full days	Children: 250mg Adolescents or adults: 500mg	Penicillin resistance by group A streptococci has never been reported.
Amoxicillin	Orally 3 times/day for 10 full days	Children 250mg Adults 500 mg	Acceptable alternative to oral penicillin because of the taste.
First-generation cephalos-porins (Narrow Spectrom)	Orally 2-3 times/day for 10 full days	Varies with formulation.	Acceptable alternative for oral penicillin.
Erythromycin ethylsuccinate	Orally 4 times/day for 10 full days	Children 250mg Adults 500mg	Alternative drug for patients allergic to penicillin. Should not be used in areas where group A streptococci have high rates of macrolide resistance.
Azithromycin	Orally once daily for 5 days	Children 250mg Adults 500mg	

Note:

- Recurrent sore throat could be due to treatment failure or a new infection.
- Tonsillectomy is not effective in reducing the incidence of RF, and is not recommended for the primary prevention of RF (5-8)
- Researches for the development of streptococcal vaccine are ongoing.

9.4 Secondary Prevention of RF

Secondary prevention of RF is defined as the continuous administration of specific antibiotic to patients with a previous attack of RF, or well documented RHD. The purpose is to prevent colonization or infection of the throat with GABHS and the development of recurrent attack of RF. Secondary prophylaxis is mandatory for all patients who have had an attack of RF, whether or not they have residual RHD.

Antibiotics used for secondary prophylaxis is given below in Table 9:2 and the duration in table 9.3.

Tabel 9:2 Antibiotics used in Prevention of Recurrent attacks of RF (Secondary Prevention of RF)

Antibiotic	Mode of administration	Dose
Benzathine Penicillin G	Intramuscular injection every	For adults and children $\geq$27kg in weight: 1200000 units. For children $<$27kg in weight: 600000 IU. every 3-4 weeks.
Penicillin V.	Oral	250mg twice daily.
Erythromycin.	Oral	250mg twice daily.

- Secondary prophylaxis with Penicillin should be continued during pregnancy.

  There is no evidence of teratogenicity associated with BPG.
- In Nepal ARF is endemic, Penicillin Prophylaxis once in 3 weeks is preferable .

Tabel 9:3 Duration of Secondary Prophylaxis of Rheumatic Fever

Category	Duration after Last Attack
Rheumatic fever without carditis	5 years or until 21 years of age (whichever is longer)
Rheumatic fever with carditis but no residual heart disease (no valvular disease)	10 years or until 21 years of age (whichever is longer)
Rheumatic fever with carditis and residual heart disease (persistent valvular disease)	10 years or until 40 years of age (whichever is longer), sometimes lifelong prophylaxis

9.5 Tertiary Prevention of RHD

Management and treatment modalities directed towards preventing the complications of RHD, like Heart Failure, Stroke, Infective Endocarditis and Death are known as tertiary prevention. The basic guidelines for

management of RHD are provided below.

- Initial assessment, education and referral to a medical or heart specialist.
- Management of heart failure (Diuretic, Digoxin, ACE inhibitor)
- Management of Atrial Fibrillation (Beta Blocker, anticoagulation)
- Regular medical review and follow up
- Infective endocarditis prophylaxis before Dental, Surgical and Gynecological procedures
- Regular dental care
- Family planning referral (for women)
- Appropriate surgery and interventions (PTMC, Valve Replacement) when necessary

If medications are not successful, then interventional procedures and/ or surgery may be necessary. These may include heart valve repair or replacement. A heart valve repair may be done by one of the following procedures:

- **PTMC (Percutaneous Transvenous/Transluminal Mitral Commissurotomy)**

This is a non surgical, Catheter-based procedure done in Cath Lab using a balloon for dilating the stenosed mitral valve.

- **Valvulotomy or valve repair**

A type of open heart surgery in which the surgeon cuts into a valve to repair the valvular damage with stenosis or regurgitation. Open mitral valvulotomy is performed by separating the fused leaflets with a scalpel. To repair regurgitation surgeons use rings or clips.

- **Heart valve replacement**

This is an open heart surgery in which a biological or mechanical valve is used to replace a defective heart valve. Biological heart valves last about 10 years before they start to fail due to tissue disintegration. Mechanical valves, which are made from Metal or other Man-made synthetic materials, are designed to last a lifetime.

Mechanical valves carry a higher rise of blood clots, so patients with mechanical valves must take anticoagulants for lifelong.

9.6 Use of Anticoagulants

The most common anticoagulants used are warfarin, Acitrom and Dabigatran. Monthly PT/INR monitoring and dose adjustment of warfarin or Acitrom is necessary to maintain a safe therapeutic range of INR which is 2-3. Dabigatran does not need PT/INR monitoring but is very expensive and not easily available in Nepal.

Foods rich is Vit K (Fruits, green leafy vegetables) can interfere with the blood thinning action of warfarin & Acitrom reducing their efficacy.

9.7 Primordial Prevention

RHD is rare in economically developed countries. ARF has declined where government and their population

have improved environmental conditions and provided access to resources that improve hygiene. Reducing the risk factors for GAS infection, ARF and RHD is known as primordial prevention. Such risk factors are:

- Poverty
- Poor nutrition
- Overcrowding
- Poor standard of housing
- Shortages of resources for healthcare
- Low level of knowledge of ARF among health care providers
- Low level of awareness of the disease in the community

9.8 Streptococcal Vaccine

Rheumatic fever and chronic RHD are still considered as a public health problem in developing and underdeveloped countries. Rheumatic fever is a disease caused by infection by the group A B-hemolytic streptococcus and is considered an autoimmune disease resulting from the defence immune response triggered against the group A B-hemolytic streptococcus. In some susceptible individuals there is an aggressive response against the organism's own proteins through biological mimicry mechanisms.

The pathogenesis of rheumatic fever needs to be understood as prevention of the disease is possible with production of a vaccine against the causative agent, the GABHS, which is the trigger for the autoimmune disease. Hence, an effective vaccine against GABHS has the potential of reducing disease burden and seems to be a reasonable way to approach the control of ARF and RHD. WHO in its publication state that "In light of the current lack of a clear strategy for primary prevention of GABHS infections, there is definitely a place for a safe, effective, affordable and practical GABHS vaccine".(9)

Though an effective vaccine against GABHS would be ideal there are a number of difficulties, like safety, cost and efficacy that need to be overcome before one is made available. Several potential Group A streptococcus vaccines are in development, but only a few vaccines have reached the stage of clinical trials. In developing and low-income countries, major issues are whether the vaccine will be effective against the streptococcal strains found here and also identifying the population at risk.

9.9 Comprehensive approach to RF/RHD Prevention and control and the World Heart Federation's TIPs

What is a Comprehensive RHD Control Program?

There are many opportunities to intervene on the path way from GAS to RHD. Traditionally these have been divided into primordial, Primary, secondary and tertiary intervention (Figure 9:1)

Register-based programs for RHD control have been recommended by the WHO and WHF for many years (10,11). In reality most programs are more than a register. They include efforts to treat sore throats, educate communities, arrange antibiotic supplies and treat complications of advanced RHD. These programs are called comprehensive because they include all components of RHD prevention.

In 2013 the recommended components of comprehensive RHD control program were structured into a conceptual framework(12). WHF in 2014 published TIPs Handbook (Tools for implementing RHD control program) where each components of the conceptual framework are described. (Figure 9:2) TIPs handbook is very useful to those initiating RHD control program in their countries.

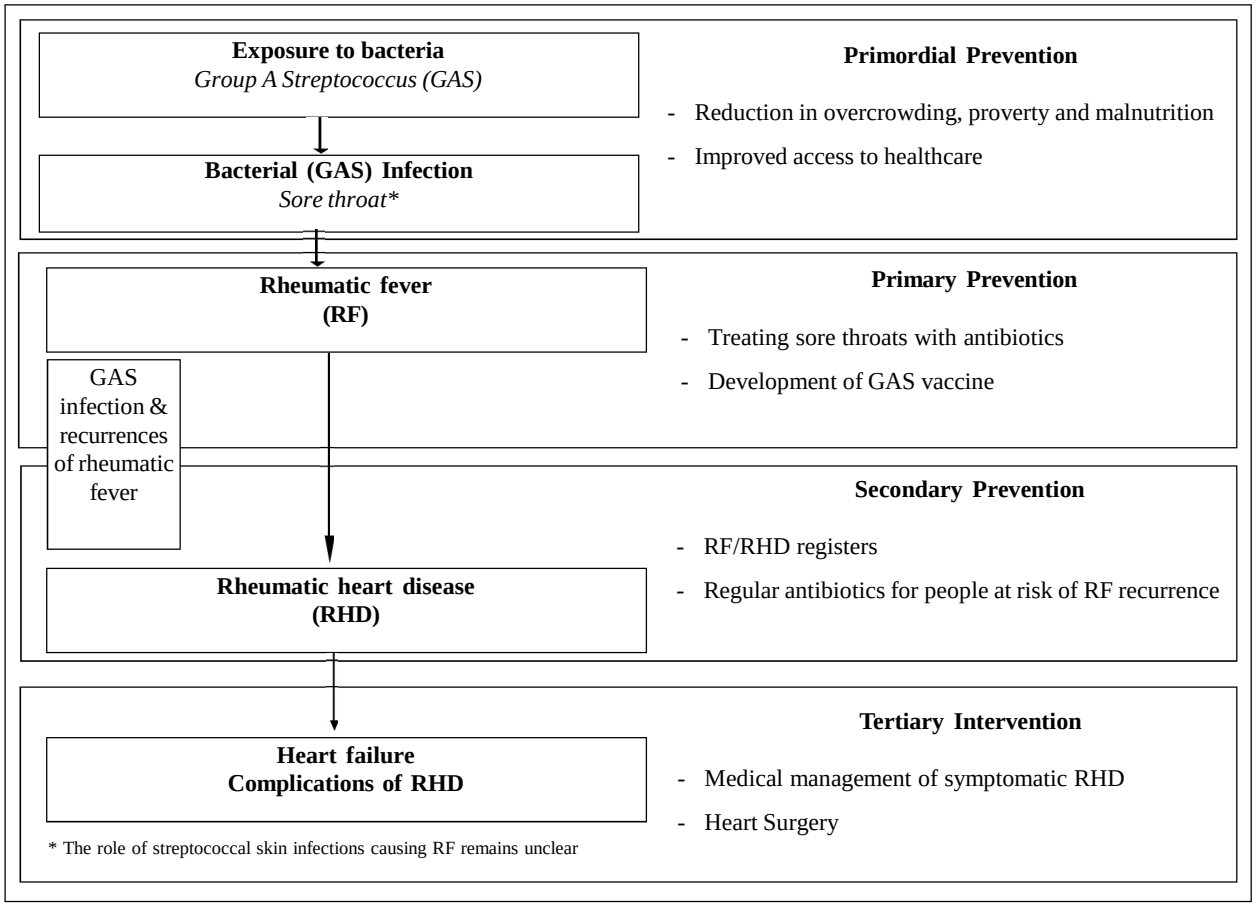

Figure 9:1 : Opportunities for Intervention in RF and RHD

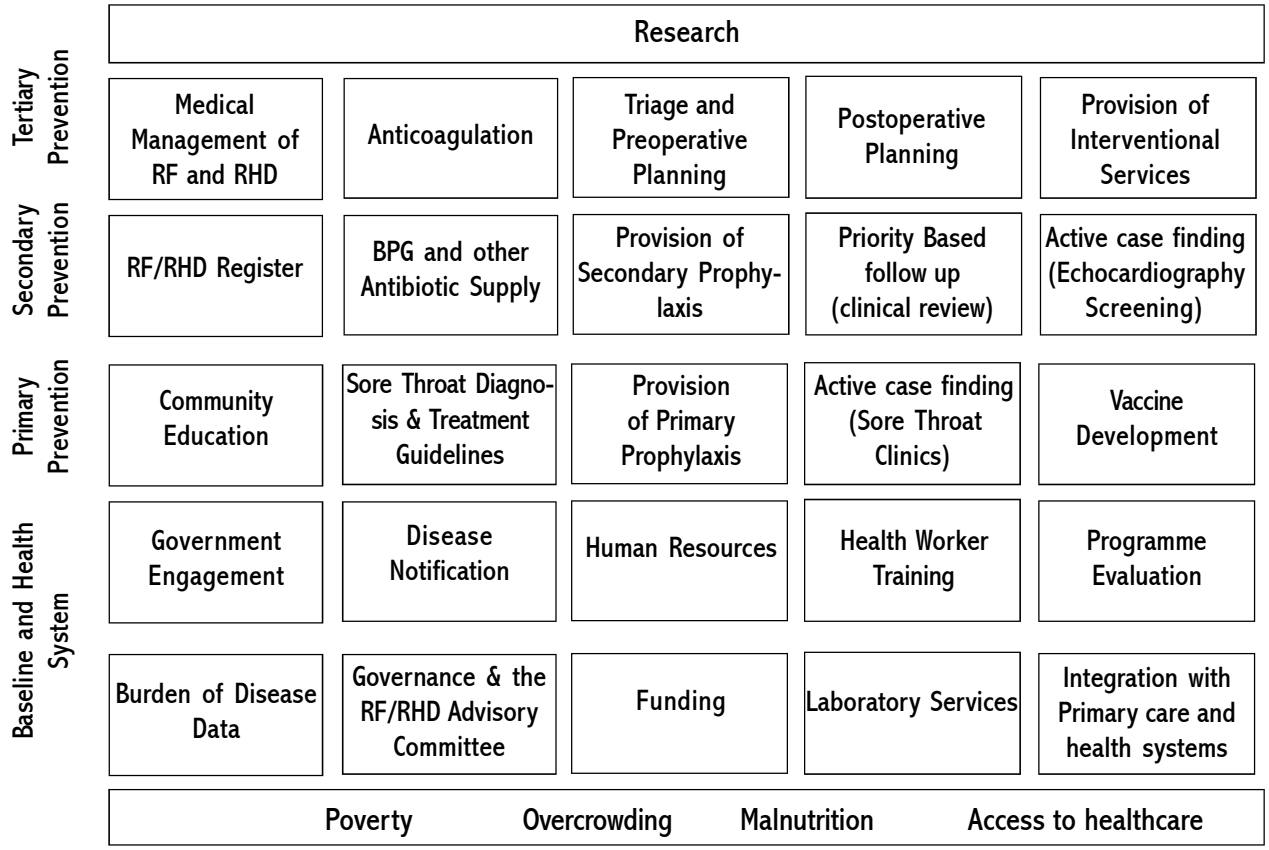

Figure 9:2 Conceptual framework for comprehensive RHD control programmes. Components are arranged in approximate order of priority working from left to right, bottom to top, in each row.

9.10 Case Study (Group Work)

Sunita is 32 old yrs female who is on Inj. BPG for secondary prophylaxis of RHD. On regular follow up at a tertiary care centre, she was found to have new onset of Atrial fibrillation (irregularly irregular heart beat).

Questions to be Answered

1. Which complications of RHD she is likely to suffer?
2. What should be the Management strategy of this case to prevent from possible complications?
3. How long should she continue Inj BPG?

9.11 Summary

1. RHD can be prevented and controlled with the implementation of the primary, secondary, tertiary and primordial preventive strategies
2. A comprehensive approach is needed for an effective RHD control program
3. TIPs handbook published by WHF provides RHD program designers effective tools for implementation of a comprehensive RHD control program.
4. Streptococal vaccine if available would be very effective in the prevention of RF.

9.12 Key points

1. ***RF and RHD can be prevented through certain strategies known as primordial, primary, secondary and tertiary prevention.***
2. ***Primordial prevention is the measure taken to prevent the development of GAS throat infection. These measures include improvement in the socio economic condition, sanitation, standard of living, awareness raising, access to healthcare etc.***
3. ***Primary prevention is the early treatment of GAS throat with adequate antibiotic. This measure can prevent the development of ARF.***
4. ***Secondary prevention is the strategy to prevent the recurrence of GAS infection by administering injection BPG every 3-4 weeks. This measure further prevents the progression of heart valve damage.***
5. ***Tertiary prevention is the strategy to prevent the life threatening complications of RHD like heart failure, stroke, infective endocarditis etc. This is done through medical or surgical interventions.***
6. ***Penicillin is the drug of choice for primary and secondary prevention of ARF.***

7. ***Anticoagulant Warfarin, Acitrom are commonly used for prevention of thrombo-embolic stroke in patients with AF. PT/INR monitoring is necessary in such patients and the INR target should be 1.5 to 2.0. Anticoagulant Dabigatran does not need PT/INR monitoring but it is expensive and not easily available.***
8. ***PTMC can be performed in pregnant ladies having RHD with severe MS at the second and third trimester of pregnancy. This is tertiary prevention strategy.***
9. ***RHD patients with a mechanical prosthetic heart valve need to take anticoagulant drug lifelong. The target INR should be 2.0 to 3.0. This is also tertiary prevention strategy.***
10. ***RHD patients with Biological prosthetic heart valve do not need to take anticoagulant drug. The life of such valve is around 10 years. Females with RHD of child bearing age can be benefited by this type of valve.***
11. ***RHD control program can be named Comprehensive if that includes all the components of primary, secondary and tertiary, prevention strategies.***
12. ***TIPs handbook published by the world heart federation is a guide to designing and implementing a comprehensive RHD control program.***
13. ***Streptococcal vaccine which would be very effection in prevention of RF is in research phase and still needs time for development.***

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Module X
RHD Control Program in Nepal

10.1 Lesson Plan

Title:	**RHD Control Program in Nepal**	**Total Time: 60 minutes**
Time (minutes)	**Topics**	
02	**Learning Objectives**	
	By the end of the session, Participants will be able to: 1. Describe the objectives and components of RHD control Program in Nepal 2. Understand the different activities of Nepal Heart Foundation (NHF) conducted for the prevention & control of RF/RHD in Nepal 3. Describe the success and challenges of RHD control Program in Nepal	
05	**Introduction & Background**	
	Definition	
20	**Main Content**	
	History, Objectives, Components of Nepal RHD control program. The registers. Advocacy, Awareness, Training efforts done by NHF. Pilot project on primary Prevention of RF in Lalitpur.	
20	**Discussion**	
	Group Work	
	Exercise	
10	**Feedback**	
	Evaluation	
03	**Summary**	

10.2 Introduction

RHD is a major pediatric heart problem in Nepal. It accounts for around 3000 premature deaths annually. 1.0 to 1.35 per 1000 school children of age 5-16 years suffer from this diseases(1-4). In a school based cross sectional study in eastern Nepal, the prevalence of RHD (including subclinical) was found to be 10 per 1000 school children(5). This study shows that subclinical RHD exist in large number in the community increasing the burden from RHD by several folds.

World Health Organization (WHO) led a global program of RHD control which was established in 16 countries and later expanded to 22 in the mid-1980s(6). Although underfunded, this global program had some remarkable achievements: the concept of register based control programs was borne, as was the idea of screening school-aged children for RHD. WHO published the first global guideline on RHD; and some pilot programs managed to persist and even later reported dramatic reductions in disease burden(7-8).

In Nepal the burden of RF/RHD had remained unchanged for more than two decades till the establishment of National RF/RHD prevention and control program in 2007. The efforts made after implementation of the program resulted in start of decline in RHD burden(9).

10.3 RHD Control Program in Nepal

The History

Nepal Heart Foundation (NHF) a forerunner non-governmental organization established in 1988 initiated community activities with focus on RHD prevention through one of its five national programs with the name "Save the Children's Heart Program" in 1990. During those days RHD was among the leading causes of admission to cardiology services and Cardio thoracic surgery(10). Due to lack of surgical facilities for RHD, patients were forced to travel to India for heart surgery. Patients who could not afford had no options for treatment. This led to huge number of premature deaths from RHD. As a result of several years of advocacy led by NHF, Shahid Ganga Lal National Heart Centre (SGNHC) was established and became functional in 1998. The government of Nepal (GoN) has started supporting valve surgeries of RHD patients providing a good number of prosthetic heart valves free of cost .

The demand for free valves increased year by year and the waiting list crossed over one year. RHD prevention program was the need of time. By that time NHF developed a project proposal on RHD prevention and control and handed over to the Ministry of Health in 2006. The secretary of Health Ministry was very crucial in making the decision to launch National RF/RHD prevention and control program in 2006 with allocation of budget NRs. 3 million (USD 30000). NHF was then given the task of implementing the program in 2007.

Program Design

The NHF investigated a number of models for delivering disease-specific health care while developing the national program for control of RF and RHD. In particular, decisions were required about the relative contribution of independent disease specific activities (vertical) and integration of RHD care delivery into the broader health system (horizontal)(11). The NHF identified that a purely vertical approach was prohibitively costly and a purely horizontal approach lacked the urgent focus needed for reducing RF/RHD morbidity and mortality. A combination (diagonal approach) was chosen in order to focus on RHD within the framework of the existing health care system. The Nepalese RHD control program is a diagonal partnership between the GoN and the NHF.

The national RF/RHD prevention and control program has 3 objectives and 8 elements, outlined in Table 10:1 and 10:2. The overall goal is to reduce the premature morbidity and mortality from RF/RHD. Efforts were made to design a comprehensive RHD control program that included components of primary, secondary and tertiary prophylaxis (Figure 10:1). The overall responsibility of managing the program was taken by NHF with the program director as a key functioning person (Figure 10:2). Collaborating health facilities were selected that included governmental as well as non-governmental health facilities (Figure 10:3).

Table 10:1 Core program Objectives

1.	Early detection and registration of RF/RHD patients
2.	Establishment of centers for safe administration of Benzathine Penicillin G (BPG) injection for secondary prophylaxis
3.	Establishment of a national strategy for RF/RHD prevention and control with development of RHD control toolkit.

Table 10:2 Elements of the program

1.	Epidemiological Studies
2.	Awareness activities
3.	Training of health workers
4.	Case detection (Heart screening)
5.	Registry of RF/RHD patients
6.	Delivery of medicines for secondary prophylaxis
7.	Surveillance system
8.	Evaluation and monitoring

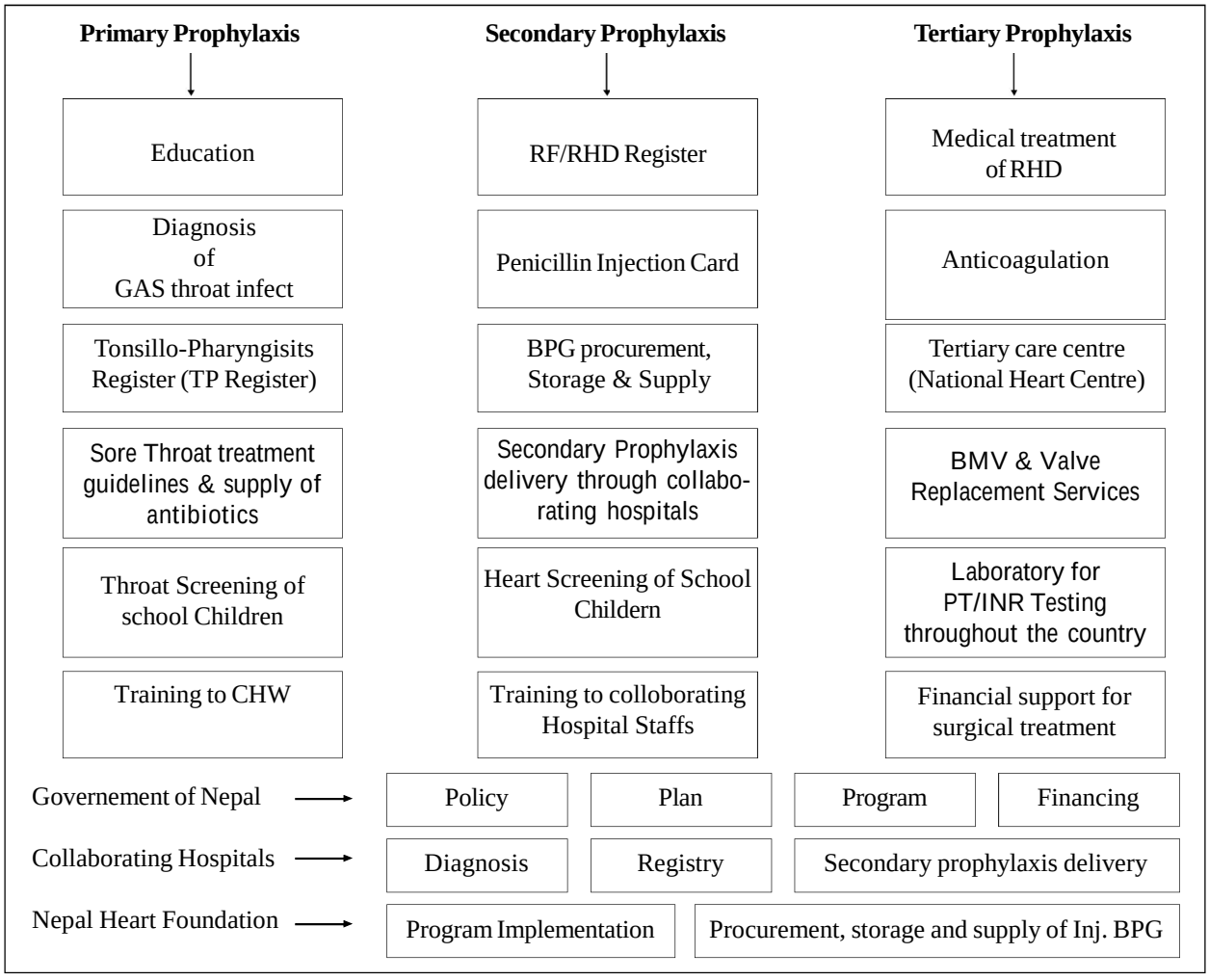

Figure 10:1 Framework of the Nepalese Model of RF/RHD Control Program

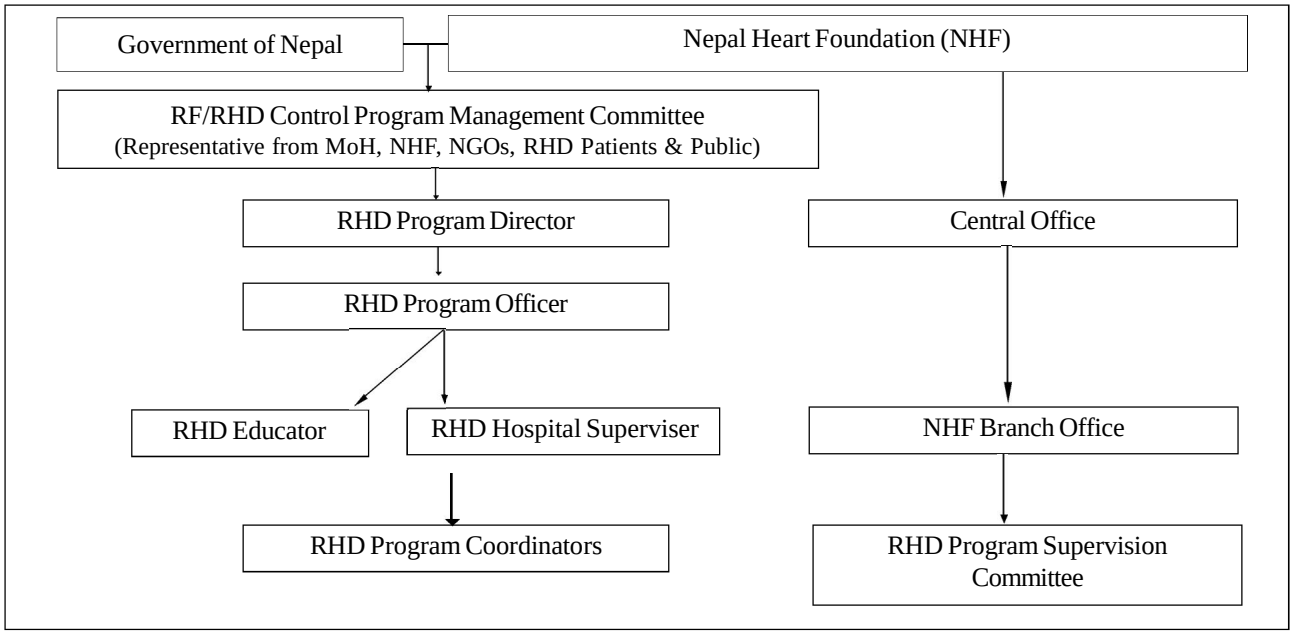

Figure 10:2 Organogram of Nepalese RHD Control Program

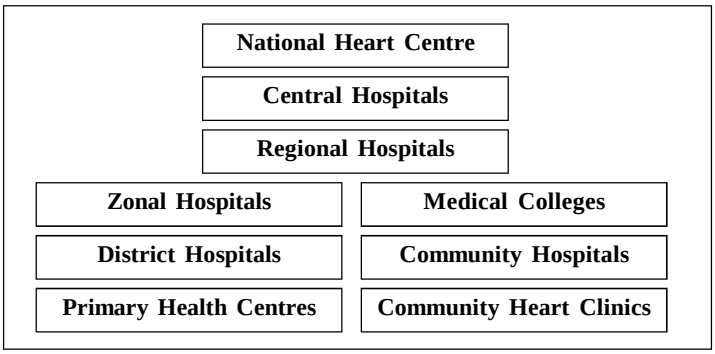

Figure 10:3 Colloborating Health Facilities

10.4 RF/RHD Registers and the Penicillin Injection Card

The RHD control program in Nepal maintains registers as a core component of the disease control efforts(12). Nepal has adopted a three tiered system for maintaining the RF/RHD registry: (Appendix XI)

i. National Register

All patients receiving Injection BPG for secondary prophylaxis nation wide are entered into the national (Central) RF/RHD register which is maintained at the program office of NHF. This is a computer-based register.

ii. Hospital Register (Appendix XI C, XI D)

This paper register is maintained at all the hospitals and health facilities which participate in the RHD control program. Initially 22 government hospitals participated in the program, but by the end of April 2016, 38 health facilities (Central, Regional, Sub-regional, Zonal, few district & community hospitals and medical colleges) are delivering secondary prophylaxis and maintain RF/RHD register with details of RF/RHD patients. These hospitals forward the data to the national register.

iii. Penicillin Injection Card (Appendix XI E)

A penicillin injection card is issued to all the patients receiving secondary prophylaxis. This card contains patient's information, diagnosis, batch number and brand name of the BPG injection that the patient is receiving, dates of injections given, due date and signature of health personnel delivering the injection.

10.5 Advocacy, Awareness and Training

NHF has conducted a range of activities to promote advocacy, awareness and training for RHD control. NHF has been leading the advocacy campaign along with the Nepal Heart Network (a network of 19 heart related organizations) and Nepal NCD alliance to strengthen the engagement of GoN in RHD prevention and control. Attempts are continuing to include RHD into Nepal NCD action plan. As a result RHD has been included into the school curriculum, heart surgery is made free for children below 15 years age, Balloon Mitral Valvuloplasty (BMV) procedure and valve replacement surgery is made free for all RHD patients, secondary prophylaxis is available free throughout the country and medicines for primary prophylaxis is free through all primary health care facilities in the country.

Community awareness activities are essential for a successful RHD control program. Health Literacy at baseline in Nepal has been limited; few school children, parents or teachers were aware that untreated streptococcal throat infection could lead to RHD(13). NHF in collaboration with partners like Rotary Club of Patan, Australian Aid, Medtronic Philantrophy, Edwards Lifesciences Foundation and others has conducted several activities to increase awareness about RHD. The activities include distributing pamphlets, calendars, and posters, putting large hoarding boards throughout the country, telecast of documentary film on RHD on national TV, Video PSA (Public Service Announcement) on RHD in local language on TV channels, radio jingles on FM radios, public interaction programs on RHD and many others.

Training of health workers is another important component of comprehensive RHD control program. NHF has provided training to more than 1500 community health workers on RF and RHD till the end of Nov 2017. Orientation training to paramedics and hospital staffs participating in the secondary prophylaxis program training of trainers (TOT) on RF and RHD for physicians are other regular training programms of NHF.

10.6 RHD Screening of School Children

Heart Screening of school children has been a routine activity of NHF since its establishment. Auscultation followed by echocardiography of suspected cases has been the standard method recommended by NHF. Echocardiography screening has been used for research purpose in eastern Nepal.

NHF has recommended a complete package deal while performing heart screening of school children. Complete package deal means complete management of the diagnosed cases either it is RHD or congenital heart defect (CHD) which include referal to tertiary case center, Medical or surgical intervetion and follow up of high risk cases. Diagnosing a school child with heart defect and leave him/her without proper management is considered unethical. Till November 2017, NHF have completed heart screening of more than 200000 school children.

10.7 Practical Issues in Secondary Prophylaxis Delivery

Secondary prophylaxis of RHD requires regular administration of long acting penicillin injection-Injection BPG, to prevent recurrent GAS infections and RF in patients with a history of RF or RHD. Nepal follows three weekly regimen of secondary prophylaxis as recommended by WHO. An alternative method is the use of oral Phenoxymethyl Penicillin tablet. Although less effective than injection BPG, it is used in those cases when Inj. BPG administration is not possible. NHF has been discouraging the use of oral penicillin citing that even with optimal patient adherence, the risk of recurrences is higher in individuals receiving oral prophylaxis than in those receiving intramuscular BPG(14).

A number of challenges have to be faced on initiating and implementing RHD control program in low resource settings. Few practical issues that were faced and addressed by NHF were:

1. Penicillin Allergy and Penicillin Skin Testing Recommendations.

Allergic reactions to penicillin are rare. The long term benefits of BPG therapy in preventing RF far outweigh the risk of serious allergic reaction(15). Patients and health care providers are very much concerned about the risk of anaphylactic reaction from BPG(16). Paramedics in Nepal expressed their serious concern about community reaction following fatal anaphylactic reaction. They suffered physical assault, claims for financial compensation and even jail sentence in some cases. This resulted in refusal by paramedics to administer Inj. BPG. In India some states even banned Inj. BPG(17). There were concerns about frequency of penicillin skin testing. Due to lack of published recommendations from international authorities, paramedics and hospitals in Nepal were in confusion whether penicillin skin testing was to be done routinely before every penicillin injection. The practice varied from routine penicillin skin testing in one hospital to not testing at all in another hospital. NHF conducted several training to paramedics to overcome these concerns. They were provided training on safety measures in BPG delivery, anaphylaxis management and penicillin skin testing. NHF developed recommendations on penicillin skin testing (Table 10:3) and safe penicillin injection delivery (Table 10:4). The recommendations on penicillin skin testing were based on the audit of adverse reactions of 77300 penicillin injections delivered to 4713 RHD patients(18).

Table 10:3 NHF Recommendations on Penicillin Skin Testing

1.	Perform penicillin allergy skin test in the following situations:
	a. Before first penicillin injection. b. With change in batch number. c. With change in brand name.
2.	Steps for penicillin skin test: (Intradermal Test)
	a. Use 23-G needle. b. Clean the middle of forearm with spirit swab. c. Inject 0.1 ml of diluted BPG intradermal on the forearm. d. Wait for 15 to 20 min. e. Look for local signs and symptoms of allergy (e.g., redness, inflammation, itching, erythema, swelling, blistering). f. If any of the local signs are present and if the swelling is >10 mm, the test is considered positive.

2. BPG: Quality, Stock and Supply

BPG is not manufactured in Nepal. It has to be imported from India. There are two main quality concerns about the imported powdered formulation of BPG. The first concern is difficulty in dissolving the powder, which causes blockage in the needle during delivery, also increases pain and inaccurate dosing. The second concern is the duration of serum penicillin concentration levels. Poor quality formulation is difficult to dissolve, inject and concentration of penicillin falls more quickly than expected(19-20). NHF, while procuring the BPG for the RHD control program, is strongly concerned on the need to import the best quality BPG formulation.

Another important issue has been concerns about uninterrupted supply of BPG. Stock outs and shortages of BPG have occurred in Nepal in 2010 and 2015. The economic blockade at southern Nepalese border resulted is shortage of BPG in 2015. Although NHF keeps stock of BPG for 6 months, the stock went out and alternative method with oral penicillin was temporarily recommended by the NHF.

3. Safe Penicillin Injection Delivery and the Penicillin Injection Room

One of the objectives of the Nepalese RHD control program was to establish centers for safe delivery of inj. BPG. Hospitals with large numbers of patients receiving secondary prophylaxis were advised to have a separate room dedicated only for penicillin injection delivery. Hospitals with smaller number of RHD patients could use the same room for injection and dressings. The RHD control program had to put tremendous efforts to establish injection delivery rooms for safe and smooth injection administration and managing fear and anxiety for paramedics and for patients. NHF developed recommendations to standardize the process, maximize safety and minimize the risks (Table 10:4). Staff were trained to diagnose and treat anaphylaxis. Rooms were equipped with an emergency care kit box distributed to all participating secondary prophylaxis centers by NHF. This box contained instruments and medicines to manage patients with anaphylaxis. Recommendations were made for a model penicillin injection delivery room to include patient trolley, oxygen cylinder, IV stand, suction machine, Intubation set and emergency care kit with necessary medicines.

Tabel 10:4 NHF Recommendations on Safe BPG Delivery

1.	Take consent from the patient or his/her relative before the first penicillin injection.
2.	Record the brand name and batch number of the BPG.
3.	Reconstitute the BPG powder with 3.5 ml of sterile distilled water.
4.	Use 2 separate needles: 1 for pricking the vial and the other for injecting into the patient.
5.	Use 10 ml syringe and 21-G needle for deep intramuscular injection.
6.	Patient should lie down on trolley or bed on abdomen with head resting on pillow in a comfortable and relaxed position. In hospital settings, bed should be portable to rush the patient to the intensive care unit in case of emergency.
7.	Inject BPG deep intramuscularly in the upper outer quadrant of the buttock.
8.	Stay prepared for the treatment of possible anaphylaxis. The following medicines and instruments should be ready for emergency use: a. Adrenaline injection: One ampoule pre-loaded into the syringe. b. Atropine injection. c. Dexamethasone or antihistamine injection. d. Intubation set. e. Suction machine.

4. Pain from Penicillin Injection and Dropouts.

Although there is conflicting evidence about how much pain from injections impacts on patient adherence, it is reasonable to seek to minimize discomfort(21). It has been reported that 1.35% of the RHD patients drop out from secondary prophylaxis in Nepal due to injection Phobia caused by pain (12). NHF continues to provide training to the health providers and has come up with recommendations to minimize pain during Inj. BPG administration: use of 21 gauze needle, warm room temperature, applying finger pressure at injection site, pushing the suspension slowly with constant pressure, patients distraction etc. (Table 10:5) Some programs mix BPG with local anesthetic to reduce the pain. There is reasonable evidence that using local anesthetic reduces pain without compromising serum concentration of BPG(22-23). However, this practice may add the risk of additional allergic reaction from local anesthetic.

10.8 Practical Issues in Primary Prophylaxis Delivery

Primary prophylaxis strategies focus on the early diagnosis and timely treatment of GAS pharyngitis with

Tabel 10:5 NHF Recommendations for Minimizing pain of BPG Injections

1.	Shake the powdered BPG vial after adding 3.5 ml of distilled water until the powder dissolves and an opaque, viscous, suspension is formed with a final volume of -5.0 ml. The penicillin crystal can easily pass through a 21-to23-G needle. If the crystals are attached to each other, they form large particles that get clogged inside the needle. To avoid this situation, reconstitution of the powder with 3.5 ml of distilled waster rather than 3 ml is advised.
2.	Use 21-G taper cut needle for intramuscular injection.
3.	Properly select the injection site and apply finger pressure for 10 s.
4.	Stretch the skin at the injection site with the thumb and index finger.
5.	Inject the liquid medicine at 90^0 angle with taper out needle tip facing downward in vertical plane, which will cause minimum nerve end damage.
6.	Never double prick with the same needle.
7.	Push the syring slowly, applying sufficient pressure in a gradually increasing manner to allow the crystals in the viscous medicine to flow smoothly. It may take up to 1 min to push 5.0 ml of solution.
8.	Distract the attention of the patient away from the injection.
9.	Maintain the Injection delivery room temperature below 30^0C, In hot air and moist skin, the injections are more painful.
10.	Apply ice pack in case of pain immediately after injection.
11.	mix 0.5 to 1.0 ml of 1% lignocaine with the BPG solution for reducing pain if all other techniques fail.

antibiotics to prevent the autoimmune consequences resulting from the infection susceptible individuals. It is thought that antibiotic therapy initiated within 9 days of onset of pharyngitis is effective in preventing ARF(24). Significant barrier to the adequate diagnosis and treatment of GAS pharygitis and thus primary prevention remain namely: 1) the diagnosis of GAS pharyngitis 2) treatment options 3) patient and physician awareness and 4) the positioning of primary prevention within a control program.

RHD control program is Nepal has initiated primary prophylaxis intervention as a pilot project in Lalitpur District since 2014. NHF is collaborating with District Public Health Office, Lalitpur and Rotary Club of Patan, Rotary International district 3292 to launch this pilot project. Lalitpur district has a population of 400000 of which 40% are children of 5-15 years of age. There are 42 primary health care facilities participating in this program. Some of the practical issues needed to be addressed on implementing the primary prevention program were as follows:

1. Tonsillo-Pharyngitis Register (TP Register)

Register for secondary prophylaxis of RHD has been recommended by WHO and WHF. There is no mention about registers for primary prophylaxis. RHD control program in Nepal has established registers for primary prophylaxis also. All primary health care facilities participating in the primary prophylaxis program maintains TP Register. Details of children with streptococcal sore throat receiving treatment with antibiotic are entered into the paper register. They are followed up for evaluating results of treatment and recurrence of throat infection. Data from all the primary health care facilities are sent to the district public health office and program office at NHF. The advantage of maintaining TP Registers will be evaluated at the end of the project.

2. Diagnosis of Streptococcal Tonsillitis and Pharyngitis

Developing a protocol for diagnosis of GAS tonsillitis and pharyngitis has been challenging. The gold standard

confirmatory test for GAS pharyngitis is largely accepted to be a throat swab culture that is positive result for GAS(25). But this method is financially not viable in Nepal. NHF recommends to make diagnosis based on clinical signs and symptoms (throat pain, high fever, enlarged tonsils with exudates and pus spots, enlarged anterior cervical lymphnodes, absence of cough and running nose) aiming for a financially viable "treat all" approach(26). Program recommends to treat not only clinically clear cut, but also doubtful GAS pharyngitis cases.

3. Oral Antibiotic Versus Intramuscular Injection BPG

Treatment of streptococcal throat infection in children with injection BPG was never practiced in Nepal. This was due to the fear of adverse reaction to penicillin. Good alternatives to Inj. BPG are oral Penicillin, Amoxicillin and Azithromycin. The later two of these oral antibiotics are included in the essential drugs list by the GoN and are supplied free of cost to the rural people though primary health care facilities. RHD control program in Nepal has been evaluating the efficacy of oral Azithromycin in once daily for 5 days dosing. It is believed that the compliance to treatment with Azithromycin is better than with Amoxicillin or oral penicillin V due to convenient once daily dosing and comparatively short duration of treatment. But resistant GABHS to these antibiotics have always been an issue.

10.9 Mid Term Outcomes and the Impact

The secondary prevention program has completed 9 years of implementation. The evaluation of the impact on RHD control was done recently by NHF. 10 years trend of three indicators were evaluated. First indicator was the prevalence of RHD in School children which came down from 1.2 to 0.8 per 1000 in 10 years (similar clinical epidemiological survey methods were used). Second indicator was the fall in the number of admissions for RHD in SGNHC where majority of the RHD patients are being referred. The third indicator was the decrease in BMV procedures for RHD. It was concluded that the secondary prevention program has been effective in reducing the burden as well as the severity of RHD cases in Nepal.

10.10 Group Work

Divide the participant in two groups. Let the groups prepare a sample RHD control program for a metropoliton city and a remote village in Western Nepal. Each group will then present the sample program.

10.11 Summary

1. Tremendous efforts have been made in Nepal for the prevention and control of RF and RHD.
2. The Nepalese model of RHD control program is an example of comprehensive and diagonal approach to RHD control in low resource countries.
3. The government of Nepal has been supportive in the implementation of the program.
4. The extensive involvement of NHF in coordinating, implementing and monitoring has been critical for success.
5. The long term impact of the program needs to be evaluated but hopefully will end with good results.

10.12 Key Points

1. RHD control program in Nepal was launched in 2007
2. This program is technically managed and implemented by NHF with financial support from MOH, Government of Nepal.

3. The Nepalese model of RHD control program is register-based with three tired register system: penicillin injection card, hospital register and central register.
4. NHF has addressed the challenges in the implementation of the program through training to health workers, establishment of penicillin injection rooms for safe penicillin injection delivery, maintaining stocks of injection BPG, publication of recommendations on diagnosis and management of RF and RHD.
5. Advocacy, awareness and training activities are the important elements of the program.
6. Nepalese model differ from RHD control programs from other countries with its comprehensiveness and components like RHD educator and TP register.
7. The mid- term outcomes of the program has been very positive: There has been decline in the prevalence of RHD in Kathmandu city, and decline in hospital admissions for RHD.

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Chapter III - Related Cardiovascular Diseases and Heart Healthy Lifestyle

Model XI - Basics of Common Cardiovascular Diseases

Model XII - Heart Healthy Lifestyle

Module XI

Basics of Common Cardiovascular Diseases (CVD)

11.1 Lesson Plan

Title: Basics of Common Cardiovascular Diseases	**Total Time: 60 minutes**

Time (minutes)	**Topics**
02	**Learning Objectives**
	By the end of the session, participants will be able to: 1. Define common congenital heart diseases, hypertension and heart attack 2. Recognize the diagnosis, signs and symptoms and treatment of congenital heart diseases, hypertension and heart attack 3. Provide first aid service during medical emergencies caused by hypertension, and heart attack
05	**Introduction & Background**
	Definition
20	**Main Content**
	Definition, Types, Signs and Symptoms. Diagnosis and Management of Common Cardiovascular Diseases
20	**Discussion**
	Group Work
	Exercise
10	**Feedback**
	Evaluation
03	**Summary**

The Common Cardiovascular Diseases described here are

1. Congenital heart diseases
2. Hypertension
3. Heart Attack

11.2 Congenital Heart Diseases (CHD)

A congenital heart disease is a defect in the structure of the heart that is present at birth. They occur in 1% of live births (2-3% including bicuspid aortic valve). Causes of CHD are often unknown but certain factors may result in CHD. They are

- Infection during pregnancy (Such as rubella)
- Use of certain Medicines
- Use of Tobacco and alcohol during pregnancy
- Closely related parents
- Malnutrition of Mother
- Exposure to X-Ray
- Genetic factors

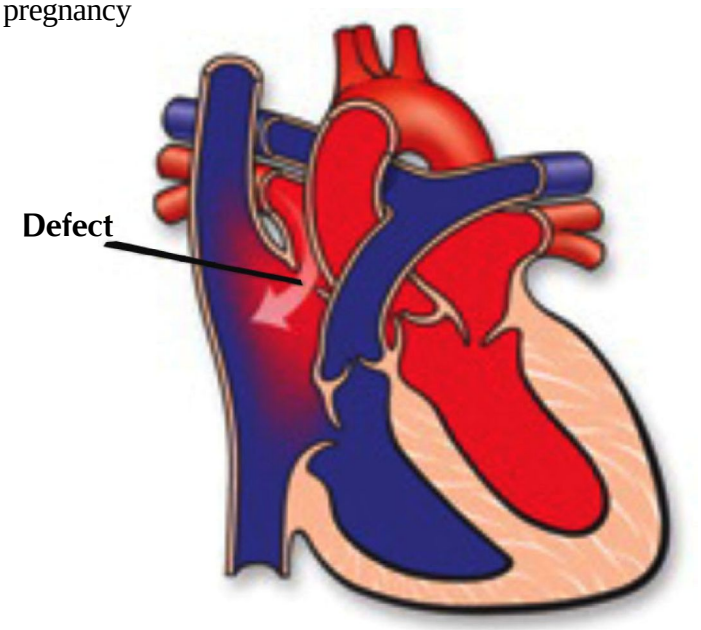

Figure 11:1 Atrial Septal Defect

Two Common Types of CHD

I. Non-cyanotic (Pink baby)
   - Atrial Septal Defect (ASD)
   - Ventricular Septal Defect (VSD)
   - Patent Ductus Arterisosus (PDA)

II. Cyanotic (Blue baby)
   - Tetralogy of Fallot (TOF)

11.3 Atrial Septal Defect (ASD)

Defect is present in the wall (Septum) between left and right atrium (LA and RA). (Figure 11:1). ASD make up 30-40% of all CHDs. Patient may remain asymptomatic throughout lifetime if the defect is smaller than 1.0cm.

Diagnosis is confirmed by Echocardiography test.

ASD can be closed by open heart surgery method or by closure device using catheter based technique.

11.4 Ventricular Septal Defect (VSD)

Defect is present in the wall (Septum) between left and right ventricle (LV and RV). (Figure 11:2). This condition is worse than ASD. It occurs in 30% of all CHDs. With large defects patients are symptomatic early in life

Signs & Symptoms

1. Dyspnoea
2. Heart Murmur
3. Chest Pain
4. Thrill

Diagnosis of VSD is confirmed by Echocardiography test. VSD is closed mostly by open heart surgery method.

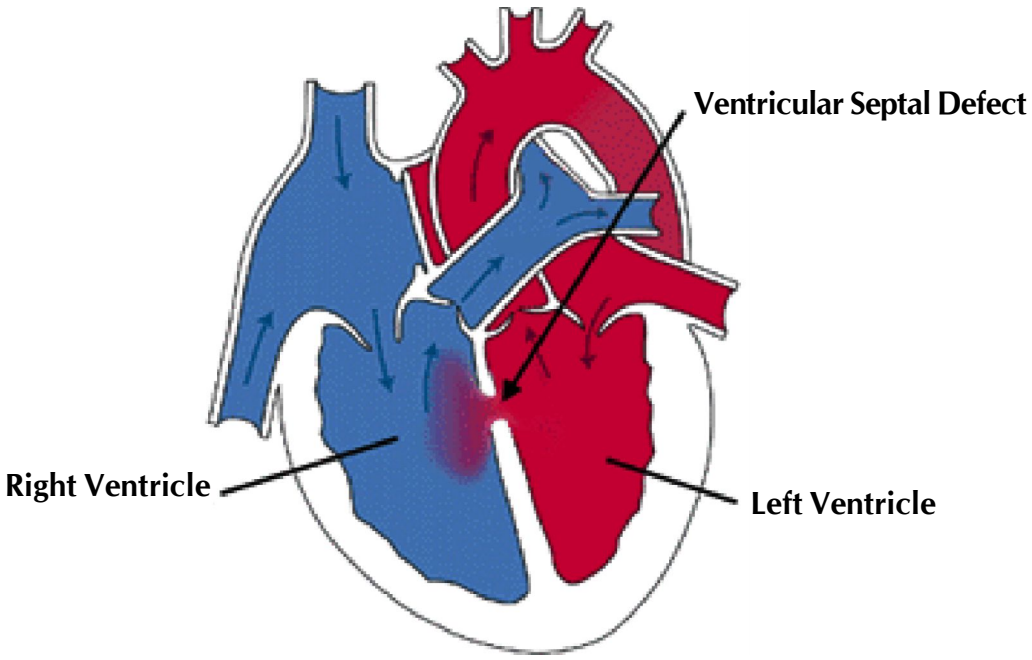

Figure 11:2 Ventricular Septal Defect

11.5 Patent Dutus arteriosus (PDA)

Ductus Arteriosus(DA) is the connection between Aorta and Pulmonary artery which regulates the fetal blood circulation supplying blood throughout the fetal body in the absence of functional lungs. This connection (DA) is closed spontaneously immediately after birth. If it remains open (patent) the condition is known as PDA. (Figure 11:3). Large PDA makes child symptomatic with dyspnoea

Signs & Symptoms

- Dyspnoea
- Heart Murmur

Diagnosis is confirmed by Echocardiography test. PDA can be closed by close heart surgery method or by device using catheter-based technique.

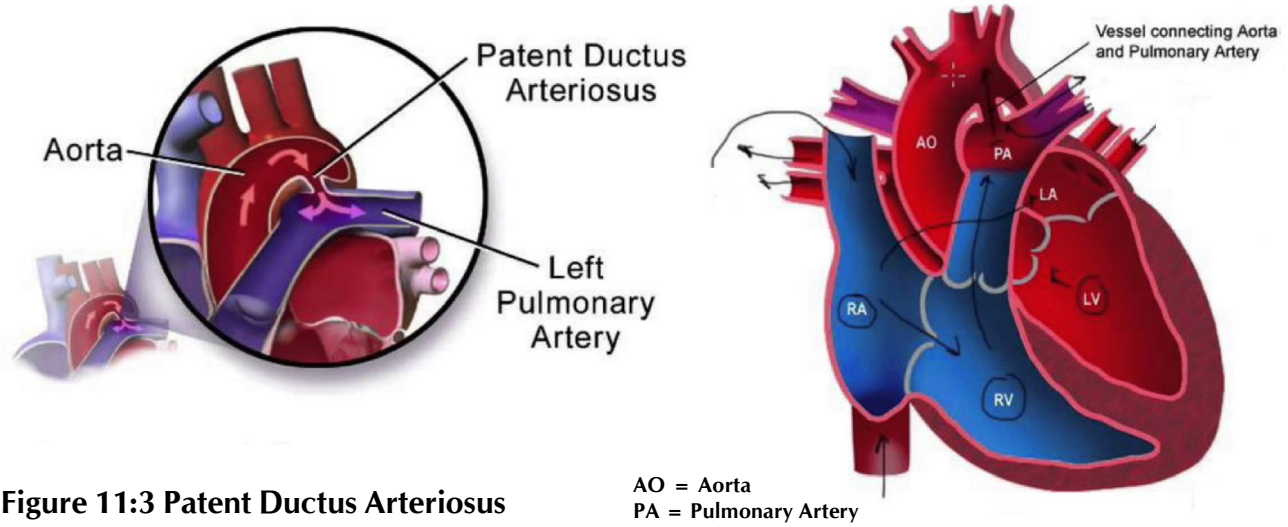

Figure 11:3 Patent Ductus Arteriosus

AO = Aorta
PA = Pulmonary Artery
LA = Left Atrium
RA = Right Atrium
LV = Left Ventricle
RV = Right Ventricle

11.6 Tetralogy of Fallot (TOF)

TOF is a CHD that causes cyanosis (bluish color to the skin) due to mixing up of oxygenated and deoxygenated blood. This condition has 4 defects. (Figure 11.4).

- Ventricular septal Defect (VSD)
- Pulmonary Stenosis (PS)
- Right Ventricular hypertrophy (RVH)
- Overriding aorta which allows blood from both ventricles to enter the aorta.

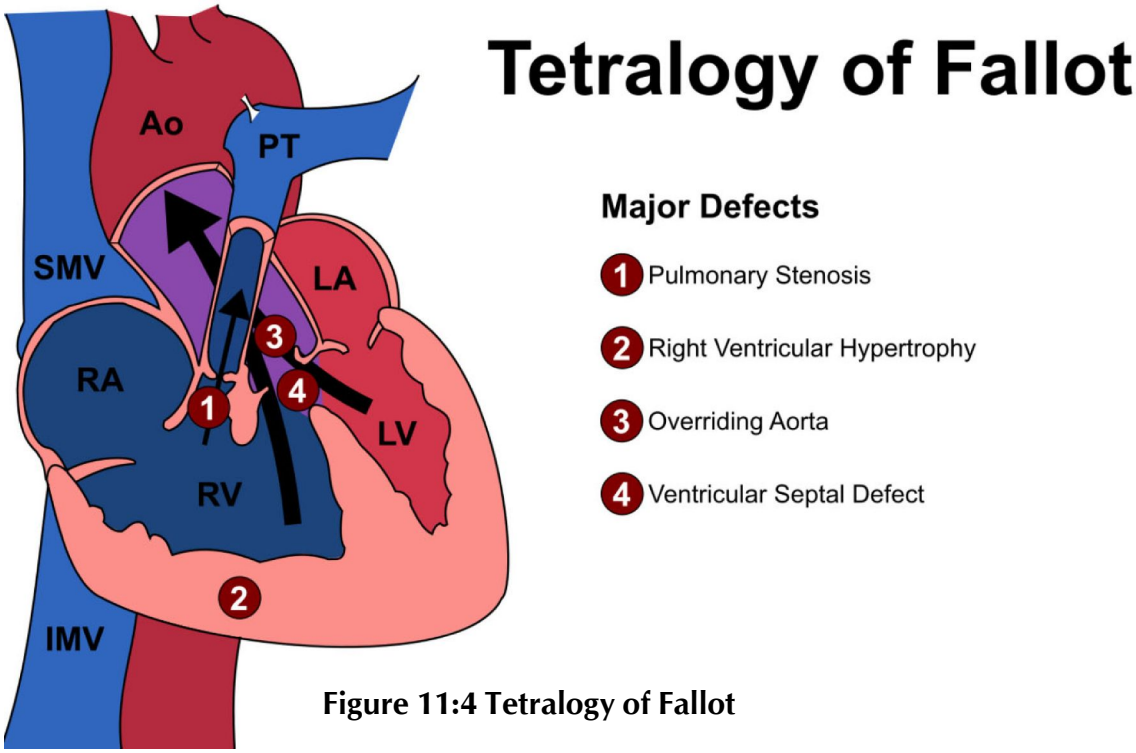

Figure 11:4 Tetralogy of Fallot

Signs and Symptoms

- Cyanosis
- Clubbing
- Heart Murmur
- Syncope
- Dyspnoea

TOF is diagnosed by Echocardiography. TOF is typically treated by open heart surgery in the first year of life. Timing of surgery depends on the baby's symptoms and size.

11.7 High blood Pressure (Hypertension) (HTN)

Hypertension is a major health problem in Nepal. One in three adults in Nepal suffer from this condition. Hypertension is a condition in which a person's BP is elevated. (Table 11:1). Blood pressure is the measure of the force of the blood pushing against the walls of the arteries when the heart pumps.

Types of HTN

A. Primary (Essential): Cause in unknown. Mostly related to lifestyle & heredity.

B. Secondary: Elevated BP due to causes like kidney diseases, renal artery stensis, pheochromocytoma coarctation of aorta and others.

Table 11:1 Classification of HTN

	Systolic (mmHg)	Diastolic (mmHg)
Normal	< 120	< 80
Elevated	120-129	< 80
Stage 1	130-139	80-89
Stage 2	≥ 140	≥ 90

New ACC/AHA Hypertension guidelines Nov. 2017

Signs and Symptoms

There are no symptoms in 90% of patients with hypertension. Few patients show following signs and Symptoms

- Headache
- Dizziness
- Blurring of Vision
- Tinnitus
- Palpitation
- Chest Pain
- Shortness of breath
- Nasal bleeding

Complications of Hypertension

- Heart Attack
- Heart Failure
- Blindness
- Stroke
- Kidney failure

Treatment options

- Lifestyle intervention
- Medicine (Drugs): Diuretics, CCB, BB, ACEI, ARB, alpha Blockers
- Surgical treatment of secondary causes like pheochromocytoma, Coarctation of aorta, Renal Artery stenosis etc.

Emergency Care (First Aid)

- Nifedipine 10mg or Amlodipine 5 mg to be chewed and swallowed.
- Sit or lie down in a comfortable position. Close the eyes
- No disturbances from outside
- Deep and slow breathing

11.8 Heart Attack

A heart attack is an event that results in permanent heart muscle damage or death. It is also known as myocardial infarction, because part of the heart muscle (myocardium) may literally die (infarct). A heart attack

occurs when one of the coronary arteries becomes severely or totally blocked, usually by a blood clot. When the heart muscle does not receive the oxygen rich blood that it needs, it will begin to die. (Figure 11:5). The severity of heart attack usually depends on how much of the heart muscle is injured or dies during the heart attack.

Heart attack can lead to death.

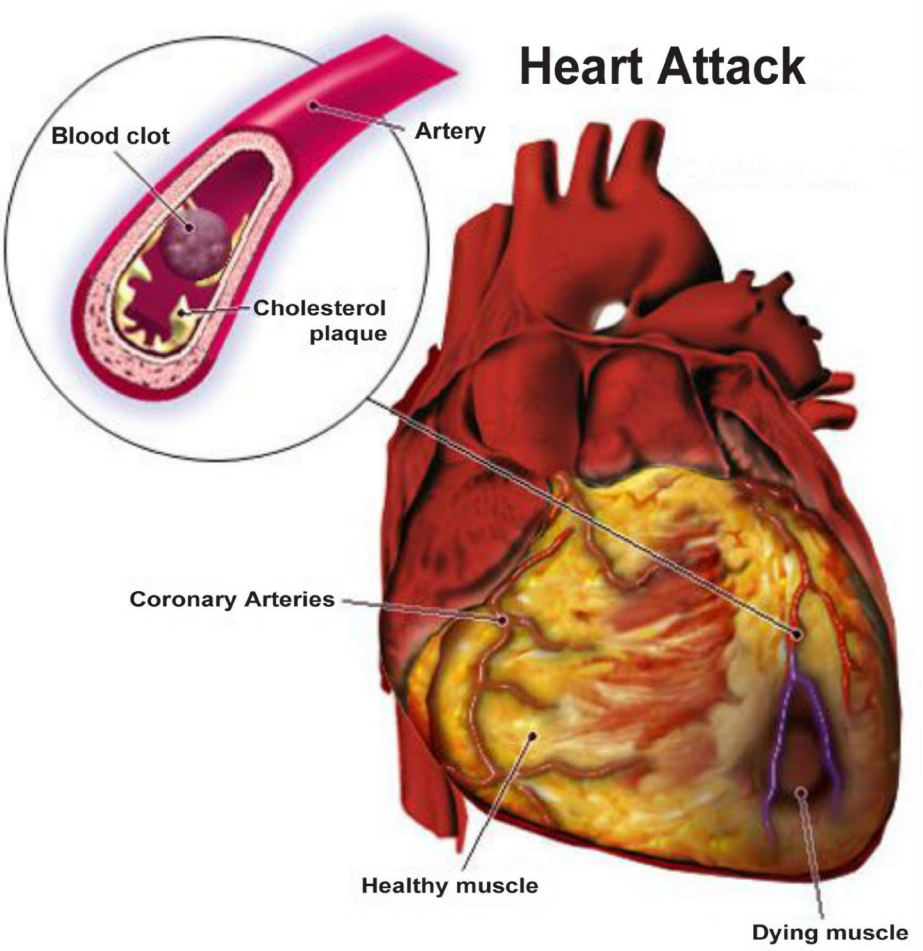

Fig 11:5 Heart Attack

Risk factors (RF) and Causes of Heart attack

	Major RF	Minor RF
1.	Heredity	1. Obesity
2.	Smoking	2. Physical inactivity
3.	Hypertension	3. Mental stress
4.	Diabetes	4. Low consumption of fruits & Vegetables
5.	High blood cholesterol	

Signs and Symptoms

- Severe retrosternal chest pain radiating to left part of the body
- Shortness of breath
- Sweating (Heavy and cold)
- Nausea, Vomiting

- Fatigue
- Dizziness and Syncope

Diagnosis

Diagnosis is confirmed by ECG test and cardiac enzymes test in blood.

Treatment options

1. Up to One hour after the onset of chest pain is the golden hour for treatment. Time is muscle. The more time passes the more heart muscles die. Therefore patient should be immediately transferred to a hospital with heart care facilities.
2. Medical management with aspirin, beta blockers, statin and others.
3. Thrombolysis with fibrinolytic agents.
4. Primary PCI (Angioplasty)
5. Lifestyle Management (Diet, Exercise, Tobacco Quitting etc)

Emergency care (First aid) before transferring to hospital

Give the patient Aspirin 300mg and tell him to chew it. It is thought that taking Aspirin while having a heart attack can decrease the risk of death by about 25%

11.9 Group Work

Divide the participants in 2-3 groups. Discuss the case study given below and present the management strategies.

Case study

45 years old male, smoker comes to you with central chest pain lasting for more than 30 min. You found that his BP is 180/100mmHg. What will you do with this patient? Describe the immediate and long term management strategy.

11.10 Summary

1. Congenital heart diseases, Hypertension, Heart attack are some of the important heart diseases needing attention and proper care
2. Most of the congenital heart defects should be surgically corrected early in life.
3. Hypertension is a silent killer leading to serious complications if left untreated.
4. Central chest pain radiating to left part of the body could be due to heart attack, therefore should not be ignored. It should be tested and treated as early as possible to avoid sudden death.

11.11 Key points

1. ***Congenital heart defect occur in 1% of life births.***
2. ***Common Non-cyanotic CHD are PDA, ASD and VSD.***
3. ***Common cyanotic CHD is TOF.***
4. ***Patients with small ASD remain asymptomatic throughout lifetime. ASD can be closed by devise using catheter based technique.***
5. ***TOF needs early correction by open heart surgery.***
6. ***Hypertension is very common and is defined as BP $\geq$ 130/80 mmHg***
7. ***Main symptom of heart attack is severe central chest pain. The diagnosis should be made by ECG and cardiac enzymes tests.***
8. ***The first hour after beginning of heart attack is the golden hour. The treatment is most effective during this period. Treatment should not be delayed at any cost.***
9. ***Smoking is the main cause of heart attack in Nepalese population.***
10. ***Aspirin 300 mg should be taken immediately when heart attack is suspected. Patient should be transferred to the hospital as soon as possible.***

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Module XII
Heart Healthy Lifestyle

12.1 Lesson Plan

Title: **Heart Healthy Lifestyle**	**Total Time: 60 minutes**

Time (minutes)	**Topics**
02	**Learning Objectives**
	By the end of the session, participants will be able to: 1. Define what is heart healthy lifestyle 2. Describe the importance of heart healthy lifestyle measures 3. Implement each component of heart healthy lifestyle in the community for prevention & control of heart diseases.
05	**Introduction & Background**
	Definition
20	**Main Content**
	Heart healthy lifestyle intervention Tobacco quitting Heart friendly diet Physical activity, mental stress management
20	**Discussion**
	Group Work
	Exercise
10	**Feedback**
	Evaluation
03	**Summary**

12.2 Introduction

Cardiovascular disease (CVD) remains the biggest cause of death worldwide. More than 17 million people died from CVD in 2008, and 10% of the global diseases burden is attributed to CVD (1). The percentage of premature deaths from CVD ranges from 4% in high-income countries to 42% in low-income countries. Over recent decades, CVD deaths have been declining in high-income countries but have been increasing rapidly in low and middle-income countries.

In Nepal 20% of the population are suffering from CVD and 25% of total death is attributed to CVD.

Is it well established that the major lifestyle or behavioral factors influence the incidence of CVD, as well as the progress of existing CVD. These factors are smoking, diet, exercise & mental stress. They all are linked to the development of established biologic risk factors such as Hypertension, Dyslipidemia, Diabetes, Metabolic syndrome and others. These biological risk factors are responsible for development and progression of CVD which may result in death.

The cost of treating heart diseases is very high due to increased use of expensive treatments such as drug eluting stents (DES), implantable cardioverter-defibrillator (ICD) and others. Change in behavior accepting healthy lifestyle measures such as quitting smoking, increasing physical activities, eating healthy diet, managing mental stress can save not only money but also improve the quality of life and prevent premature deaths.

12.3 Mortality Reduction Potential of Lifestyle Change (2)

Recommendations	Mortality Risk Reduction Estimated from studies	
	in CAD Patients	in General Population
1. Smoking Cessation	35%	50%
2. Physical activity	25%	23-30%
3. Moderate alcohol	20%	15%
4. Combined with dietary change	45%	15%-40%

CAD: Coronary Artery Disease

12.4 Mortality Reduction Potential of Preventive Drugs Interventions after Heart Attack(2)

Intervention	Mortality Risk Reduction
1. Low dose Aspirin	18%
2. Statins	21%
3. B-Blockers	23%
4. ACE inhibitors	26%

12.5 Heart healthy lifestyle interventions

I. Smoking Cessation (Quitting)

Smoking has been recognized as one of the "big three" risk factors for CVD (the others two being hypertension and hyperlipidemia) and is responsible for approximately 30% of CVD death. Smoking doubles the incidence of CVD.

Fortunately the CVD risks associated with smoking are almost completely reversible after a patient quits. By quitting smoking, a patient reduces his or her risk of a CVD-related event by half virtually immediately. Smoking cessation has been shown to be one of the most cost-effective interventions in the whole field of medicine.

The occasion of a hospital admission related to a cardiovascular event is the appropriate moment to consider quitting smoking. But 50% of these patients if not treated (with drugs, counseling or both) for quitting support will restart smoking within a year of the cardiac event (3)

There is evidence that smoking cessation intervention that began during a hospital admission are more effective than those that occur after discharge, and intervention with a month or more of supportive contact after hospitalization are particularly effective (4).

Smoking Cessation Actions

I. Smokers Indentification and Counseling Support

- Identify the smokers and advise them to quit.
- Assess smoker's willingness to quit and provide informational support appropriate to his or her readiness to quit.
- For patient who is willing to quit, develop plan for initiating treatment and follow-up.
- For patients unwilling to attempt to quit, provide counseling to promote patient's readiness to quit.

II. Emphasize the "Five R's"

- Relevance to the patient's medical and social situation.
- Risks associated with smoking (acute and long-term risks, and risks to others in their environment)
- Rewards of quitting.
- Roadblocks that might interfere with successfully quitting or increase risk of relapse.
- Repetition of a stop smoking message.

III. The "Five A's" for a smoking cessation strategy for routine practice

A - ASK	Systematically inquire about smoking status at every opportunity.
A - ADVISE	Unequivocally urge all smokers to quit.
A - ASSESS	Determine the person's degree of addiction and readiness to quit.
A - ASSIST	Agree on a smoking cessation strategy, including setting a quit date. behavioural counseling, and pharmacological support.
A - ARRANGE	Arrange a schedule for follow-up.

Drugs to Assist with Smoking Cessation

- Nicotine Replacement
- Bupropion (Zyban or Wellbutrin)

Strong evidence exists, regardless of methods, that use of nicotine replacement roughly doubles the success rate for smoking cessation. Some evidence exists for combining patch with additional PRN doses when one method alone fails. Nicotine replacement should be used with caution in patients within 2 weeks of myocardial infarction, patients with unstable angina, and those with serious arrhythmias.

- **Patches:** Approved for use since 1995, used for 16 hrs/day, either in a fixed or tapering dose over 6-10 weeks.
- **Nicotine lozenges and gum:** Both are available in 2- and 4-mg doses.
- **Nicotine spray or inhaler:** Designed to deliver nicotine more quickly than gum and patches.

Bupropion (Zyban or Wellbutrin)

A drug, originally developed as antidepressant that appears to help reduce urges to smoke. Recommended dose is 300 mg/d, started 1 week before quit date and continued for 7-12 weeks. Approximately doubles successful quit rate, regardless of depression status of patients.

Ten steps to Quitting Smoking

1. Make a date and stick to it. Draw up a plan of action, thinking about what methods are available to you and having them ready before your quit date.
2. Keep busy to help take your mind off cigarettes. Throw away all your ashtrays, lighters, and tobacco.
3. Drink plenty of fluids. Keep a glass of water or sugar-free drink by you and sip it steadily. Try different flavors.
4. Get more active. Walk instead of using the bus or car. Try the stairs instead of the lift. Exercise helps you relax and can boost your morale.
5. Think positively. Withdrawal can be unpleasant but it is a sign that your body is recovering from the effects of tobacco. Irritability, urges to smoke and poor concentration are common. Don't worry-they usually disappear after a few weeks and are reduced by using nicotine replacement products or bupropion.
6. Change your routine. Try to avoid the shop you usually buy cigarettes from. Perhaps you should avoid the bar , restaurant or the break-room at work if there are lots of smokers around you. Try doing something totally different. Surprise yourself!
7. No excuses. Don't use a crisis or even good news to be an excuse for 'just one'. There is no such thing. You will soon want the next and the next.
8. Treat yourself. This is important. If you can, use the money you are saving by not smoking to buy something special-big or small that you would not usually have.
9. Be careful what you eat. Try not to snack on fatty foods. If you do need to snack, try fruit or raw vegetables.
10. Each day without a cigarette is good news for your health, your family, and your pocket.

12.6 Heart Friendly Diet

Eating a well-balanced diet can help improve general health. In patients with heart disease, it brings important extra benefits too. Eating a well-balanced diet can:

- help maintain or reach a healthy weight (and so reduce the strain on heart)
- help lower blood cholesterol level
- help keep blood pressure down
- help prevent atheroma (Fatty material) from building up in the inside walls of the arteries
- help prevent blood clots from forming
- increase the chances of survival in patients with heart attack.

12.7 Eating more Fruit and Vegetables

There is good evidence that eating a diet that is rich in vegetables and fruits lowers the risk of coronary heart disease. Fruits and vegetables contains plenty of antioxidants , vitamins, potassium and fibres, which help to control blood pressure , prevent irregular heart rhythms, reduce blood cholesterol level and reduce the risk of coronary heart disease.

Aim to eat four to five portions or servings of fruit and vegetables a day. On average, people eat fewer amounts of fruits and vegetables than recommended. Try to eat a wide variety of fresh fruits and vegetables. Try to eat more from the bottom of the food pyramid (Figure 12:1), and food portions with different nutriation as shown in Healthy Food Plate (Figure 12.2).

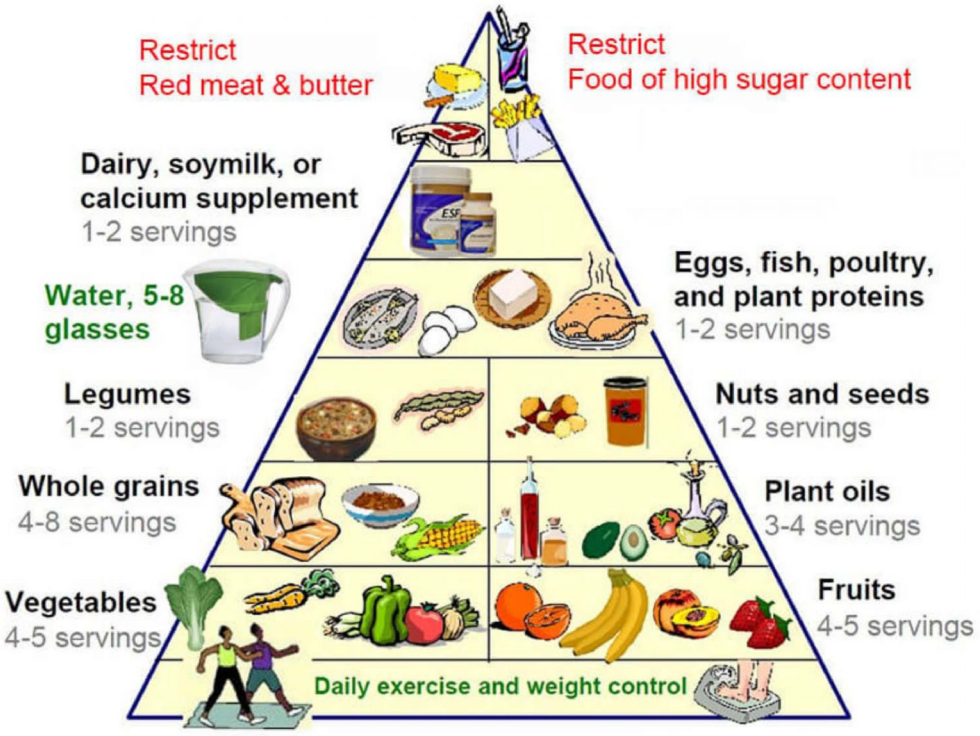

Figure 12:1 Food Pyramid: Eat more from the bottom

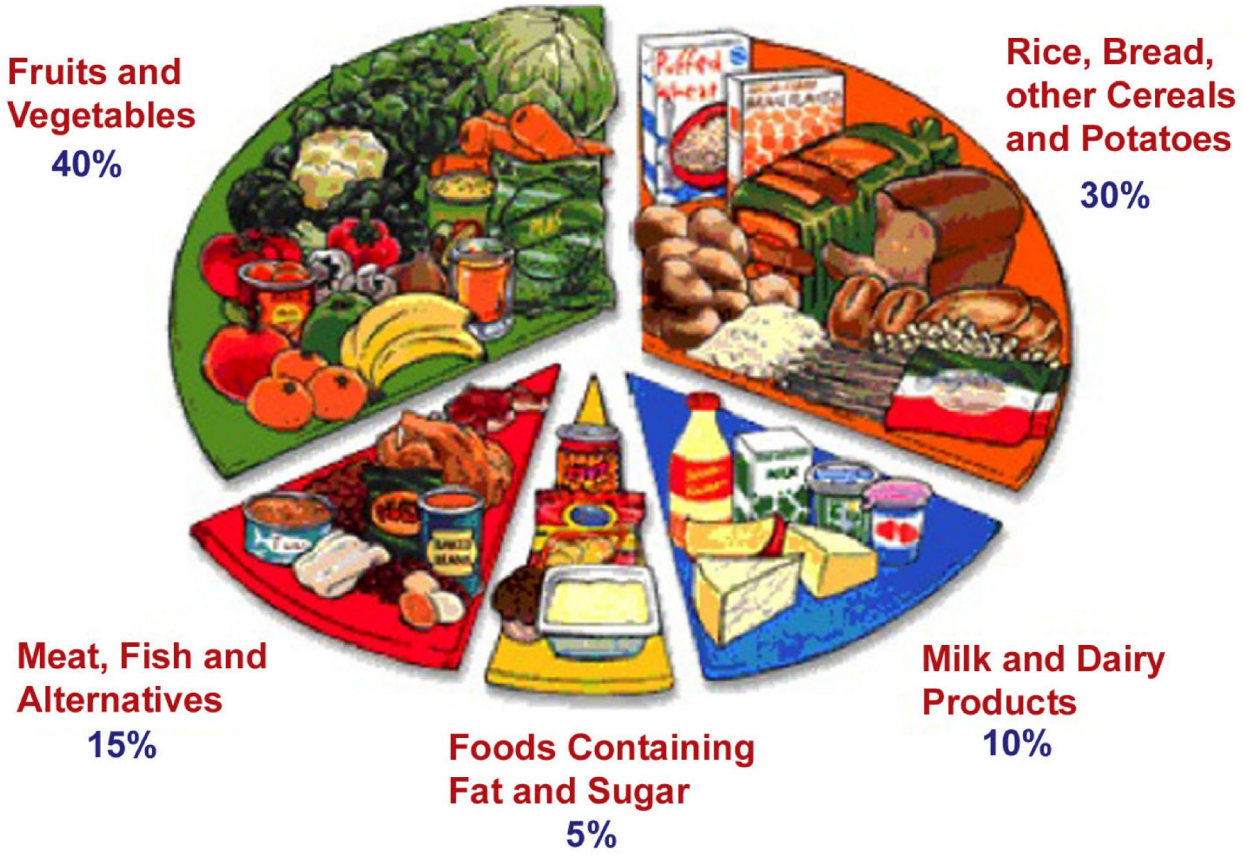

Figure 12:2 Healthy Food Plate

What Counts as a 'Portion' or 'Serving' ?

Item	one serving
Apple, orange or banana (medium size)	1 fruit
Very large fruit (for example, melon or pineapple)	1 large slice
Small fruits (for example, plums, kiwis)	2 fruits
Raspberries, strawberries, grapes)	1 cupful
Fresh fruit salad or canned fruit	2 to 3 tablespoonfuls
Dried fruit	½ to 1 tablespoonful
Fruit juice	1 glass (150mls)
Vegetables	
Raw or cooked vegetables	2 tablespoonfuls
Green Salad	1 dessert bowlful

12.8 Fibres in Food

Fibre is an important component in a heart healthy diet. This basically comes from plant based foods like cellulose, hemicellulose and pectins which are components of the skins of fruits. Coverings of seeds and structural parts of plants are also referred to as fibres. There are two types of dietary fibres - soluble and insoluble.

Soluble fibres can lower total blood cholesterol and LDLcholesterol. The mechanism is as yet unconfirmed, but it is believed that people who eat more soluble fibres may eat less food which are high in saturated fats. Soluble fibres also slow down the movement of food through the small intestines.

Insoluble fibres themselves do not lower total blood cholesterol but they do fill up and contribute to proper bowel function. They also speed up the movement of food through the intestines and promote regularity. Cellulose, hemicellulose and pectins are insoluble fibres.

Dietary fibre has also been considered important for preventing constipation and cancer of the colon and rectum.

The exact amount of fibres required by the human body cannot be accurately stated. This amount varies from 100mg to 50 gm per day. But an average mixed diet consisting of raw or cooked vegetables, fresh fruits and green salads will usually provide sufficient fibre.

Fibre Sources

Soluble	Insoluble
Oat bran, rolled oats, broccoli, brussel, etc	Whole wheat bread, cereals, cabbage, carrots, turnips, sprouts, grapefruit, apples, cauliflower, asparagus, peas, kidney beans, wheat bran, etc

12.9 Eating Less Fats

Cholesterol is a fatty substance which is mainly made in the body. The liver makes it from the saturated fats in food.The cholesterol enters the blood and is carried around by proteins. These combinations of cholesterol and proteins are called 'lipoproteins'. There are two main types of lipoproteins - low density lipoprotein (LDL) the bad cholesterol and high density lipoprotein (HDL) the good cholesterol. There is also a group of fatty substances in the blood called 'triglycerides'.

Atheroma develops when LDL cholesterol undergoes a chemical process called 'oxidation' and is taken up by cells in the coronary artery walls where the narrowing process begins. On the other hand, HDL cholesterol removes cholesterol from the circulation, and appears to protect against coronary heart disease. The goal is to have a low level of LDL and a high level of HDL.

Eating healthily can help reduce total cholesterol level by between 51% and 10%. However, it is easier for some people to reduce their cholesterol level by eating healthily than it is for others. On average, reducing cholesterol by 1% can lower the risk of coronary heart disease by 2%.

The cholesterol found in foods - for example in eggs, liver, kidneys, and in seafood such as prawns does not usually make a great contribution to blood cholesterol levels. There should be no problem in having one whole egg daily as long as the overall diet is healthy and well balanced. The total amount of fat in a healthy diet should not increase 30% of the total daily calories requirement (5). Commercially processed fat known as transfat which is found in large quantity in junk foods are very harmful. They should be limited to less than 1% of the total daily calorie.

12.10 Eating Less High-Carbohydrates Diet

A high-Carb diet can produce quick energy for physical exertion. The energy can be short-lived, however, requiring another meal or snack to keep going. The digestive system breaks down carbohydrates into glucose which then flow through the blood to organs. A high-Carb diet boost blood sugar levels, promoting the pancreas to produce more insuline to handle the excess glucose. Over extended period, a diet high in carbohydrates can cease cells to become resistant to insulin. Insuline resitance is the main mechanism of the development of type 2 diabetes and heart diseases. Processed carbohydrates like white breads, pasta, chowchow, buiscuits, chocolates, sweets taken in large quantity is harmful for health.

Processed junk foods high in sugar, bottled energy drinks and refined grains are unhealthy and cause weight gain and insulin resistance. Refined carbohydrate should be replaced by high fibre carbohydrates for making diet heart healthy.

12.11 Fish and Fish Oils

Eating oily fish regularly can help to reduce the risk of coronary heart disease and to improve survival after a heart attack.

The particular oil in fish that has these good effects is known as "omega-3". It is found mainly in oily fish such as sardines, salmon, trout and fresh tuna. Vegetarians can get omega-3 fats from flaxseed oil and rapeseed oil.

Aim to eat two portions of fish each week. One of these portions should be oily fish. There is some evidence to suggest that people with coronary heart disease can benefit from eating two to three portions of oily fish a week.

12.12 Cutting Down on Salt

People who have a lot of salt in their diet seem to be more likely to have high blood pressure. It is not yet known exactly why this happens.

It is the sodium in the salt that contributes to high blood pressure. Most people eat many times the amount of salt we need. The recommended maximum is 6 grams a day, but the body only really needs 1 gram. (One gram of salt is about one-fifth of a teaspoonful.)

12.13 Daily Guidelines

The daily guidelines are a very rough guide to the recommended daily amounts of calories and nutrients for an average man or woman. You can use this information to help you make sense of food lables. For example, if a ready-made meal contains 50g of fat, you know that it has over half the recommended amount of fat for the day.

Daily Requirements/Guidelines

Nutrient	Men	Women
Energy	2,500kcal	2,000kcal
Sugars	70g	50g
Fat	85g	70g
of which saturates	30g	20g
Fibre	40g	40g
Sodium	2.5g	2g
(or salt)	<5gm	<5gm

12.14 Drinking Alcohol in Moderation

Moderate drinking-between 1 and 2 units of alcohol a day-has a protective effect on the heart in men aged over 40 and in women who have gone through the menopause. One unit of alcohol equals 220ml of ordinary beer or a small glass (100ml) of wine or a pub measure (30ml) of spirits like Whisky, Vodka, Brandy.

However, heavier drinking can contribute to disorders of the heart muscle, high blood pressure and stroke.

Alcohol is high in calories too. One unit of alcohol has at least 100 kcal.

Alcohol in Sensible Limits.

Men should drink no more than 2 units a day, and a total of no more than 14 units of alcohol a week.

Women should drink no more than 1 unit a day, and a total of no more than 7 units of alcohol a week.

Don't binge drink. And have at least two alcohol-free days in a week.

Best idea is to completely avoid alcoholic drinks

12.15 Healthy Diet Characteristics

Healthy diet characteristics
• Saturated fatty acids to account for < 10% of total energy intake, through replacement by polyunsaturated fatty acids.
• Trans unsaturated fatty acides: as little as possible, preferably no intake from processed food, and < 1% of total intake from natural origin.
• < 5g of salt per day.
• 30-45 g of fibre per day, preferably from wholegrain products.
• ≥ 200g of fruit per day (2-3 servings).
• ≥ 200g of vegetable per day (2-3 servings).
• Fish 1-2 times per week. one of which to be oily fish.
• 30 grams unsalted nuts per day.
• Consumption of alcoholic beverages should be limited to 2 glasses per day (20g/d of alcohol) for men and 1 glass per day (10 g/d of alcohol) for women.
• Sugar-sweetened soft drinks and alcoholic beverages consumption must be discouraged.

12.16 Physical Activity (Exercise)

What are the Health Benefits of Exercise?

Research consistently shows that regular exercise can reduce the risk for several diseases and conditions and improve overall quality of life. Regular exercise can help prevent:

- **Heart disease and stroke.** Daily physical activity can help prevent heart disease and stroke by strengthening the heart muscle, lowering blood pressure, raising HDL ("good" cholesterol) and lowering LDL cholesterol ("bad" cholesterol), improving blood flow, preventing blood clotting and increasing heart's working capacity.
- **High blood pressure.** Regular exercise reduces blood pressure in people with high blood pressure.
- **Diabetes.** By reducing body fat, physical activity can help to prevent and control type 2 diabetes.
- **Obesity**: By increasing calories loss.
- **Depression and anxiety.** Physical activity may help to relieve stress
- **Back pain.** By increasing muscle strength and endurance and improving flexibility and posture, regular exercise can prevent back pain.
- **Osteoporosis.** Regular weight-bearing exercise promotes bone formation and may prevent many forms of bone loss associated with aging.

What Sort of Physical Activities are Best?

Different types of physical activity contribute differently to health.

The type of exercise that benefits the heart is called 'aerobic'.

Aerobic activity is any repetitive, rhythmic exercise involving large muscle groups. Examples of aerobic activity include walking, cycling, swimming and dancing. Aerobic activity increases the body's demand for oxygen and adds to the workload of the heart and lungs, making the heart and circulation more efficient and helping to develop endurance.

The other type of exercise is called 'isometric'.

Isometric exercises are those in which muscle tension is produced without moving a joint - for example, when pushing against a wall. These exercises produce good, local strength gain and prevent osteoporosis. However, they do little for heart and circulation. In fact, people with heart disease or high blood pressure should avoid doing isometric exercises because they increase blood pressure, and put heart under stress.

How Much Exercise Should we do?

Studies show that even the most inactive people can gain significant health benefits if they accumulate just 30 minutes or more of physical activity per day. For the greatest overall health benefits, experts suggest 30 minutes of moderate-intensity aerobic exercise 5 or more days per week plus some form of anaerobic exercise such as muscle strengthening activity and stretching twice a week.

12.17 Intensity of Exercise

Exercise till you sweat and breathe deeply without discomfort or until you reach 70-85% of your Maximum Heart Rate (MHR). This is your target Heart Rate (THR).

To estimate your MHR substract your age from 220, e.g if you are 40 years, your MHR is 220-40=180bpm. Your THR will be 70-85% of 180 ie 126-153 beats per minute.

How to Check the Heart Rate or the Pulse Rate?

1) Right after you stop exercising, take your pulse: Place the tips of your first two fingers lightly over one of the blood vessels on your neck, just to the left or right of your Adam's apple. Or try the pulse spot inside your wrist just below the base of your thumb.
2) Count your pulse for 15 seconds and multiply the number by 4.

Precautions

- Build up the activity level gradually.
- Stop exercising if you get any pain, feel dizzy, sick, unwell, or very tired. Consult your doctor if needed.
- When you are doing any exercise or sport, begin slowly for the first few minutes and build up gradually. At the end, spend a couple of minutes slowing down gradually.(Warm up and cool down)
- Dress warmly, with a cap, scarf, gloves, jacket during cold or windy weather.

12.18 Walking

When you first start walking, begin slowly and build up gradually to the main pace. This is important for safety. (It is a bit like building up speed in a car by going through the gears one at a time. You don't go straight into fourth gear.) Also, when you come to the last two or three minutes of your walk, gradually walk more and more slowly until you come to a halt. Don't speed up at the end of your walk and then stop.

How do I Know if I am Walking Briskly Enough?

One way of checking if you are walking briskly enough is by doing the 'talk test'. You should be walking briskly enough that, if you tried to talk to someone it would be quite difficult but you could still do it. If the walk is so hard that you can't talk, you should slow down.

- If you are not walking briskly enough ... you can talk very easily.
- If you are walking at about the right pace ... you can talk but you are a little breathless.
- If you are walking too briskly ... you can't talk, so you should slow down.

12.19 Mental Stress Management

Effects of Stress

Stress can affect both immediately (acute stress) and over time (chronic stress). Tension is often the first signal of acute stress. Tense muscles are tight and feel "hard" to the touch. A tense mind makes you feel irritable, and unable to concentrate. This could be your signal to do something about stress, both for your immediate comfort and to prevent the long-term effects of stress.

Stress is a normal part of life. But, if left unmanaged, stress can lead to emotional, psychological and even physical problems, including coronary artery disease, high blood pressure, chest pains or irregular heartbeats.

Symptoms of Stress

Common symptoms of stress include:

- Restlessness
- Palpitation (Rapid heartbeat)
- Feeling exhausted all the time
- Insomnia

- Headache.
- Stiff neck and/or tight shoulders.
- Backache.
- Rapid breathing.
- Sweating and sweaty palms.
- Upset stomach, nausea, or diarrhea.

Acute Stress Problems

Acute (short-term) stress is the body's immediate reaction to any situation that seems demanding or dangerous. Your stress level depends on how intense the stress is, how long it lasts, and how you cope with the situation. The body usually recovers quickly from acute stress, but it can cause problems if it happens too often or your body doesn't have a chance to return to normal. In people who have heart problems, acute stress can trigger an abnormal heartbeat (arrhythmia) and even a heart attack.

Chronic Stress Problems

In people who have chronic stress, they have persistently elevated levels of stress hormones like adrenaline and cortisol which can lead to high blood pressure, abnormal heartbeat (arrhythmia), problems with blood clotting, and hardening of the arteries (atherosclerosis). They are also linked to increased risk of heart attack, and heart failure.

12.20 Four Ways to Deal with Stress

Here are four simple techniques for managing stress:

1. Positive Self-Talk

Self-talk is one way to deal with stress. We all talk to ourselves; sometimes we talk out loud but usually we keep self-talk in our heads. Self-talk can be positive ("I can do this" or "Things will work out") or negative ("I'll never get well" or "I'm so stupid").

Negative self-talk increases stress. Positive self-talk helps to calm down and control stress. With practice, one can learn to turn negative thoughts into positive ones.

2. Emergency Stress Stoppers

There are many stressful situations - at work, at home, on the road and in public places. We may feel stress because of poor communication, too much work and everyday hassles. Emergency stress stoppers help you deal with stress on the spot.

Try these emergency stress stoppers. You may need different stress stoppers for different situations and sometimes it helps to combine them.

- o Take three to five deep breaths.
- o Walk away from the stressful situation, and say you'll handle it later.
- o Don't be afraid to say "I'm sorry" if you make a mistake.
- o Set your watch five to 10 minutes ahead to avoid the stress of being late.
- o Break down big problems into smaller parts. Deal with problems one by one, instead of dealing with everything at once.
- o Practice of Pranayama (Vastrika, Nadishuddhi, Bhramari, etc)
- o Meditation – Quick Relaxation Technique (QRT)

3. Finding Pleasure

When stress makes you feel bad, do something that makes you feel good. Doing things you enjoy is a natural way to fight off stress.

Try to do at least one thing every day that you enjoy, even if you only do it for 15 minutes.

Such as

1. Read a favorite book, short story, magazine or newspaper.
2. Have tea with friends.
3. Play games
4. Listen to music
5. Take a nature walk - listen to the birds, identify trees and flowers.
6. Make a list of everything you still want to do in life.
7. Watch an old movie.

4. Daily Relaxation

Relaxation is more than sitting in your favorite chair watching TV. To relieve stress, relaxation should calm the tension in your mind and body. Some good forms of relaxation are practice of yoga. Daily practice of yoga is a powerful method of relaxation.

12.21 Group Work

Divide the participants in 2-3 groups, discuss the below case and answer the questions.

Case Study

Sita Devi is 58 years old. Her height is 167 cm and weight 85 kg. She smokes half packet cigarette daily since last 20 years. She runs a business and her daily routine is sitting in her office and taking care of the business. She has no time for exercise. Her diet consists of two major meals with rice at home and noodles in her office in the day time. She loves eating sweets and deep fried snacks. She has high blood pressure for which she is taking three drugs.

Questions

1. What are the health risks with Sita Devi ?
2. Make a lifestyle modification plan to prevent her from developing heart attack.

12.22 Summary

1. The main cause of increasing burden of cardiovascular diseases is unhealthy lifestyle
2. The main components of healthy lifestyle measures are quitting smoking, healthy diet, increased physical activities and mental stress management.
3. Lifestyle change towards healthier side is a very powerful tool in the management of cardiovascular diseases.

12.23 Key points

1. ***Major lifestyle factors that influence the cardiovascular system are smoking, alcohol, diet, physical activity, mental stress and behavior.***
2. ***Smoking doubles the incidence of CVD.***
3. ***Tobacco kills its every second user.***
4. ***Smoking quitting intervention begun during hospital admission are more effective than those begun after discharge.***
5. ***For heart health high carbohydrate diet is more harmful than high fat diet.***
6. ***Consumption of four to five portions of green vegetables and fruits per day will reduce the risk of coronary artery disease and heart attack. Vegetables and fruits are good source of fibers, vitamins and antioxidants.***
7. ***Excessive consumption of alcohol (more than 2 units per day) is harmful for heart health.***
8. ***Salt intake should be limited to less than 5 gms (or 2.5 gms of sodium) per day.***
9. ***Fats in diet should constitute 30% of the total daily calories requirement. Fats saturated or unsaturated in above mentioned quantity is not harmful . Transfat in diet should limit to less than 1%.***
10. ***For overall health benefit 30 minutes of moderate intensity aerobic exercise 5 days a week combined with anaerobic exercise such as muscle strengthening and stretching 2 days a week is recommended.***
11. ***Physical activities help reduce mental stress level.***
12. ***Practice of Yoga(Asanas, Pranayama and meditation) is a very strong tool for stress management***

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APPENDICES

Appendix I

Training Activity Time Line

Activity/Months	1	2	3	4	5	6	7	8	9	10	11	12
Prepare Training Proposal												
Decide Date of Training												
Book Class Room and Accommodation												
Invite Facilitators												
Adapt & Translate Materials												
Invite Nominations for Trainees												
Send Invitation to Trainees												
Conduct Training												
Report												
Follow up												

Appendix II
Arrangements

1. Venue: (Name and street address)

2. Dates:

3. Course Coordinator: (name and address)

4. Objectives of the course are to:

   - Know the current burden and impact of RF/RHD.
   - Make Diagnosis and treat Sore Throats, RF and RHD.
   - Recognize evidence based, cost effective and sustainable interventions for prevention and control of RHD.
   - Promote advocacy to initiate the process of incorporating RHD prevention and control interventions into existing policies and program.
   - Be familier with major public health strategies and tools that are required for formulating, implementing, monitoring, and evaluating RHD prevention and control policies and program.

5. **Participants:** Physicians, Senior Medical Professionals, Medical Officers, Senior Nurses, Health Assistants, Public Health Officers.

6. **Course outline:** The course is full time residential for 5 days (40 hours). There are about 2 class room sessions every day, each is followed by group or individual activity, group discussion. A field visit to the RHD control project and the group work involves preparation of a draft outline of RHD prevention and control program.

7. **Travel, Boarding and lodging:** Accommodation and meals will be available. Travel costs will be refunded.

8. **Registration:** Nomination should be sent to following address by ..... (date)

9. Address and name of the contact person: (Name and Address)

Appendix III
Budget

S.No.	Item	Rate	Total
1.	Participant's travel	@..... per person x..... persons	
2.	Facilitator's travel	@..... per person x..... persons	
3.	Coordinator's travel	@..... per person	
4.	Participant's per diem	@..... per person per day x..... days	
5.	Facilitator's per diem	@..... per person per day x..... days	
6.	Coordinator's per diem	@..... per person per day x..... days	
7.	Payments/honorarium for clerical/administrative support staff	@..... per person x persons x..... days	
8.	Transport for field work	@ ..... per km x .... km	
9.	Rental for the venue/class room and its furniture etc.	@..... per day x..... days	
10.	Stationary,	@	
	AV equipments	@	
	Computer etc.	@	
11.	Refreshments during training (two time tea/coffee and working lunch) @..... per person x .... persons x..... days		
12.	Accommodation (if not covered by per diem)	@..... per person x ..... persons x..... days	
13.	Meals-Breakfast and Dinner (if not covered by per diem) @..... per person x .... persons x..... days		

Grand Total:_____

Appendix IV
Registration Form

1. **Name:** (Capital Letters)

2. **Mailing Address:**

3. **Email:**

4. **Phone :** Residence:

   Mobile:

5. Name and address of office where you work currently:

6. Specify your current work position or job title/designation:

7. Name of the Non-Governmental organization in which you are involved:

8. Any training you have received on RHD in the past? If yes which and when?

Signature

Appendix V

Sample Program Schedule

Day 1

Time	*Program activities*	*Facilitator/Resource Person*	*Remarks*
09:00 - 09:30	Registration		
	Session I (Opening Ceremomy)		
9:30-10:30	Welcome Introduction of TOT Inauguration by chief guest Few words Inaugural Speech Vote of thanks		
10:30-11:00	**Photo Session / Tea Break**		
	Session II		
11:00-11:30	TOT Objectives, Contents and ground rules		
11:30-12:00	**Pre-test**		
12:00-13:00	Introduction and overview of RF/RHD		
13:00-14:00	**Lunch Break**		
	Session III		
14:00-14:45	Video presentation in RHD in Nepal		
14:45-15:30	Anatomy and Physiology of Throat and Cardiovascular System		
15:30-15:45	**Tea Break**		
15:45-16:45	Pratical Work (Examination of Throat and Cardiovascular System)		
16:45-17:00	Sum Up		

Officer of the day:
Reviewer:
Ice Breaker:
Sum up:

Day 2

Time	**Activities**	**Facilitator/Resource Person**	**Remarks**
09:00-09:30	Attendance/ Breakfast		
	Session I		
09:30-09:45	Review of the previous day		
09:45-10:30	Communication and Motivation Skills		
10:30-11:15	Communication and Motivation Skills (Pratical/group work)		
11:15-11:30	**Tea Break**		
	Session II		
11:30-12:15	Tonsillitis and Pharyngitis		
12:15-13:00	Acute Rheumatic Fever (ARF)		
13:00-14:00	**Lunch Break**		
	Session III		
14:00-14:45	Group Work on ARF		
14:45-15:30	RHD		
15:30-15:45	**Tea Break**		
15:45-16:45	Pratical Work on Echocardigraphy of RHD Patients		
16:45-17:00	Sum up		

Day 3

Time	**Activities**	**Facilitator/Resource Person**	**Remarks**
09:00-09:30	Attendance/ Breakfast		

09:30-09:45	Review of the previous day
	Session I
09:45-10:30	Micro-Teaching
10:30-11:15	Group Work (Micro-Teaching)
11:15-11:30	**Tea Break**
	Session II
11:30-12:15	Preventive Strategies of RF/RHD
12:15-13:00	Group Work
13:00-14:00	**Lunch Break**
	Session III
14:00-14:45	The Penicillin
14:45-15:30	NHF Recommendations on Safe use of Penicillin
15:30-15:45	**Tea Break**
15:45-16:45	Congenital Heart Diseases
16:45-17:00	Sum up

Day 4

Time	Activities	Facilitator/Resource Person	Remarks
09:00-09:30	Attendance/Breakfast		
09:30-09:45	Review of the Previous day		
	Session I		
09:450-10:30	Hypertension and Heart Attack		
	Session II		
10:30-11:30	Travel To Sahid Gangalal National Heart Center		
11:30-12:15	Hospital Visit (Ward round-RHD cases)		
12:15-13:00	Penicillin Injection Room Visit		
13:00-14:00	**Lunch Break**		
	Session III		
14:00-14:45	PTMC in RHD		
14:45-15:30	Valve Replacement Surgery in RHD		
15:30-16:30	Mid Test/Q&A		
16:30-17:00	**Sum up /Adjourn**		

Day 5

Time	Activities	Facilitator/Resource Person	Remarks
09:00-09:30	Attendance/Breakfast		
	Session I		
09:30-09:45	Review of the previous day		
09:45-10:15	RHD in Pregnancy		
10:15-11:00	Heart Healthy Lifstyle (Diet, Exercise, Stress Management)		
11:00-11:15	**Tea Break**		
	Session II		
11:15-13:00	Micro Teaching by participants		
13:00-14:00	**Lunch Break**		
	Session III		
14:00-15:30	Micro Teaching by participants		
15:30-16:00	Training Evaluation		
16:00-16:15	**Tea Break**		
16:15-17:00	Closing Remarks		
	Few words from participants		
	Certificate distribution		
	Photo Session		

Appendix VI

Sample Pretest / Midtest Questions

Put tick mark (✓) in the correct answer.

1. One of the following organisms causes tonsillo-pharyngitis, which may later complicate by acute rheumatic fever.

a) Staphylococcus aureus
b) Group A, B-hemolytic streptococcus
c) Group B streptococcus
d) Enterococcus

2. The commonest age group affected by acute rheumatic fever is

a) 2-4 years
b) 3-5 years
c) 5-15 years
d) Greater than 15 years of age

3. Which of the following is the risk factor for ARF?

a) Overcrowding at home and school environment
b) Poor sanitation
c) Reduced access to health care
d) Low socio economic status (poverty)
e) All

4. International Organizations working on prevention & control of RHD are

a) United Nations
b) World Health Organization
c) World Heart Federation
d) International Labour Organization

5. National Organizations working in prevention & control of RHD are

a) Nepal Heart Network
b) Cardiac Society of Nepal
c) Rotary Club of Patan
d) Nepal Heart Foundation

6. All listed below are the complications of RHD except:

a) Heart Failure
b) Infective Endocarditis
c) Death
d) Arthritis

7. What is the message that a community Health worker should disseminate for the prevention of Rheumatic fever

a) All children with throat infection should be referred to district hospital for treatment
b) All children of age 5-15 yrs having bacterial throat infection should be treated with proper antibiotic as early as possible
c) All children with throat infection should have throat swab culture done
d) All children with throat infection should under go blood test for ASOT

8. What is the reported prevalence of RHD in school children in Nepal

a) 1-2/1000
b) 5-10/1000
c) 10-15/1000
d) 15-20/1000

9. What is primary prevention of ARF?

a) Avoidance of contact with a person having colds and URTI
b) Prevention of throat infection through facemask
c) Early recognition and prompt treatment of streptococcal Tonsillo-Pharyngitis
d) Improved standard of living and housing conditions
e) Three weekly Injection Benzathine Penicillin G (BPG)

10. Which of the following is true about secondary prophylaxis of ARF?

a) Should be given to patients with documented ARF or those with established RHD
b) It helps progression of valve damage in RHD patients
c) Should be administered for life long for those with established RHD
d) It is the most practical and feasible method of prevention of RHD in resource poor countries
e) All of above

11. The most characteristic clinic features of Bacterial throat infection are

a) Sore throat, fever, lymphadenitis, white/yellow exudates on tonsils, no cough
b) Sore throat fever, red pharynx & tonsils with cough and running nose
c) Sore throat, fever, pain abd, Loose motion
d) Sore throat, fever, joints pain, palpitation

12. All patients with RHD should be informed by the treating medical professional about

a) Importance of giving Inj. BPG every 3 wks for preventing the progression of valve damage
b) How long to take Inj. BPG
c) What happens if Inj. BPG is stopped before time
d) All of above

13. School Teachers should known about RHD, because

a) They are in close contact with the school children and can identify who has throat problem and inform their parents.
b) They can give antibiotic for treatment of throat infection

c) They can recognize viral & bacterial throat infection
d) They take exams

14. One of the following is true about acute rheumatic fever

a) Direct tissue damage by the bacteria is responsible for the development of acute rheumatic fever
b) Genetic predisposition is required for the development of acute rheumatic fever
c) It is common in females
d) Immune mediated damage is the most widely accepted theory for the pathogenesis of acute rheumatic fever

15. Two of the following are the clinical features of acute rheumatic fever

a) Migratory arthritis
b) Haemoptysis
c) Sydenham's chorea
d) Nasal bleeding

16. Primordial Prevention of RHD includes

a) Promotion of healthy lifestyle in children
b) Treatment of throat infection in children
c) Three weekly injection BPG to RHD patients
d) Surgery of damaged heart valves

17. What percentage of throat infection caused by B heamotytic streptococcus Gr. A further develops to ARF

a) 3%
b) 5%
c) 10%
d) 15%

18. Which one of the following laboratory investigation is supportive to diagnose acute rheumatic fever?

a) CT Scan
b) Chest X-Ray
c) ASO titer
d) Throat culture
e) There is no specific diagnostic laboratory test

19. Major organs affected by rheumatic fever with long-term sequel is

a) Heart
b) Joint
c) Skin
d) Central Nervous System
e) All

20. The commonest valve involved in ARF and/or rheumatic heart disease is

a) Mitral valve
b) Aortic valve
c) Tricuspid valve
d) Pulmonary valve

21. Tertiary prevention of RHD refers to

a) Treatment of RHD patients to prevent the possible complications
b) Long term treatment with Inj. BPG
c) Referring RHD patient to hospital for Echocardiography test
d) Educating RHD patient about healthy lifestyle

22. Have you heard about RHD prevention & control program in Nepal?

a) Yes
b) No

23. Who is conducting the RHD prevention & control program in Nepal?

a) Nepal Heart Foundation and Government of Nepal
b) Nepal Heart Foundation and Nepal Heart Network
c) World Heart Federation and Nepal Heart Foundation
d) WHO and Nepal Heart Foundation

24. What is the role of RHD prevention & control program

a) Reduce the burden of RHD in the community
b) Save lifes of children dying from RF/RHD
c) Mobilize the entire community to promote healthy lifestyle in children for preventing sore throats
d) All of above

25. A 14 years old male patient from Gotikhel, Lalitpur presented with fever, fatigue, joints pain and palpitation of one week duration. Physical exam showed tachycardia and soft, grade 2/6 ejection systolic murmur at the base of the heart. Which one of the following is correct?

a) The patient has carditis
b) He has jones major criteria
c) If ESR is 100mm in the 1st hour, ARF could be diagnosed
d) Blood film to exclude malaria is not indicated
e) All of above

26. A 12 years old female from Chitwan developed painful right knee joint swelling which after 4 days started to resolve and spread to involve the left ankle joint. She also had fever, fatigue and dyspnea. Physical exam showed, BP 100/80mmHg, PR 112pm, T 38.3C axillary and RR of 26/min. has bibasilar crepitation, grade 3/6 holosystolic murmur at the apex. Which one of the following is required for the diagnosis of ARF?

a) ECG
b) Chest X-Ray

c) ASO titer of above 300
d) History of arthralgia
e) ESR

27. The management of this patient includes all of the following except

a) Admit with bed rest
b) Anti-inflammatory drugs
c) Antibiotic prophylaxis
d) Diuretics and digoxin
e) Antimalarial Drug

28. The patient became well after 3 weeks of treatment and on discharge she did not have symptoms of congestive heart failure. Physical exam was remarkable for grade 1 systolic murmur. Which one of the following is incorrect?

a) Three weekly benzathine penicillin is not needed
b) The Lasix and digoxin should be discontinued on follow up
c) Follow up visit is needed
d) If penicillin prophylaxis is not given damage of the heart valve may progress

29. A year later she developed painful swelling around tooth, which needed extraction. Her course was good without significant symptom. What will be your advice?

a) She can go ahead with tooth extraction
b) She needs preoperative antibiotic prophylaxis
c) She needs postoperative antibiotic prophylaxis
d) She needs both pre and post tooth extraction antibiotic prophylaxis
e) For those who were on regular monthly penicillin injection, there is no need for prophylactic antibiotic.

Appendix VII

Feedback Questions

Instructions:

Please circle or tick your response to the items

Rate aspects of the course on a 1 to 5 scale (1 means 20% and 5 means 100%)

Questions:

1. To what extent the objectives of the course were accomplished?

   1 2 3 4 5

2. Whether the agenda of the course was relevant to achieve the objectives?

   1 2 3 4 5

3. Were the outcomes of the course relevant to the needs of your city?

   1 2 3 4 5

4. Were background materials presented substantive to the needs of the course?

   1 2 3 4 5

5. Was the technical support adequate in achieving your expectation?

   1 2 3 4 5

6. Were the resource person's/facilitator's technical support adequate in achieving the objectives?

   1 2 3 4 5

7. Did you find an opportunity to exchange information with other participants?

   1 2 3 4 5

8. Are you in a position to integrate the outcome of this course to the national or local work plan?

   1 2 3 4 5

Appendix VIII

Training Evaluation Questionnaire

Rate on the five point scale, the contents of the modules and presentations, facilitation of learning, and the level of interactive participation achieved during each of the following session

Model I - Communication and Motivation Skills

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model II - Micro Teaching Techniques

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model III - Introduction & Overview of RF and RHD

Excellent	Very good	Good	Fair	Poor
Content				
Facilitation				
Participation				

Model IV - Anatomy and Physiology of Throat, Upper Respiratory Tract and Cardiovascular System

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model V- Tonsillitis and Pharyngitis

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model VI - Acute Rheumatic Fever

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model VII - Rheumatic Heart Disease

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model VIII - The Penicillin

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model IX - Strategies for Preventing RF and RHD

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model X - RHD Control Program in Nepal

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model XI - Basics of Common Cardiovascular Diseases

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Model XII - Heart Healthy Lifestyle

	Excellent	Very good	Good	Fair	Poor
Content					
Facilitation					
Participation					

Appendix IX

Sample Certificate of Completion

Appendix X

Follow up Questionnaire

Dear .....

You had participated in a training course on RHD prevention and control from.....to..... at..... We would like to have your honest opinion about to what extent you could use the training in your practice and the conditions which helped or distrubed you from contributing to RHD prevention and control.

1. To what extent you could transfer the knowledge and skills gained to others in your organization and community?

2. What problems you faced in developing and managing RHD prevention and control program in your village or city?

3. Which conditions influenced your performance for the development and implementation of RHD prevention and control?

4. Any suggestions you would like to give us to make the training program more relevant to your work?

Thank You.

Please send the filled questionnaire to following address by post or email.

Nepal Heart Foundation
Central Office
Pulchowk, Lalitpur, Nepal
Email: nepalheartfoundation@yahoo.com

Appendix XI A

Tonsillo- Pharyngitis Register (TPR)

Tonsillitis and Pharyngitis Detail Register For age Group 5-15 Years

Month: Year:

1 Date	2 S.N.	3 OPD Regd No	4 Name	5 Surname	6 Name of Guardian	7 Cast Code	8 Age	9 Sex	10 Address Contact no	11 Diagnosis (Tick in one)
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐
DD/MM/YY										Tonsillitis ☐
DD/MM/YY										Pharyngitis ☐
DD/MM/YY										Tonsillopharyngitis ☐

12	13	14	15	16	17	18	19
Type (Tick in one)	Treatment given (Tick in one)	Follow up date/s	Status on follow up	Means of follow up (Tick in one)	If recurrence, date of recurrence	Treatment given on Recurrence	Remarks
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	
Bacterial ☐	Azithromycin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Azithromycin ☐	
Viral ☐	Amoxicillin ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Amoxicillin ☐	
Doubtful ☐	Others ☐	DD/MM/YY	I ☐ S☐ W☐	Visit ☐ Tel call ☐	DD/MM/YY	Others ☐	

*I=Improved, S=Same, W=Worse

Appendix XI B

Primary Prophylaxis Reporting Form

Please attach this sheet on HMIS Monthly Report

Year_____ Month _____

Tonsillitis, Pharyngitis and Tonsilo-Pharyngitis cases (5-15 Years)

Types of Infection and Treatment Given	Total Number of Cases			
	5-10 Years		11-15 Years	
	New	Recurrent	New	Recurrent
Bacterial				
Viral				
Doubtful				
Treatment with Azithromycin				
Treatment with Amoxycillin				

Cast/Ethnicity wise distribution of TP Cases in age 5-15 years. Total (Tonsillitis, Pharyngitis and Tonsilo-Pharyngitis) cases registered in this month _____			Status on Follow Up	Total Numbers
	Code 1		I (Improved)	
	Code 2			
	Code 3		S (Same)	
	Code 4			
	Code 5		W (Worse)	
	Code 6			

Appendix XI C

Secondary Prophylaxis Register I

बिरामीको विवरण

Regd. No (दर्ता नं.)	Date of Regd. (दर्ता मिति)	Name of Patient	Age/Sex	Address (District) & Telephone

बिरामीको विवरण (√ चिन्ह लगाउने)

Present Manifestation of ARF	Past H/O Acute RF	Echo. Report	Medicine Advised	H/O Heart Surgery	H/O Allergy to penicillin	Complica-tion	Miscella-neous
☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ No ☐ Yes ☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ Normal ☐ Valve Thicke-ning ☐ Mild RHd ☐ Mod. RHD ☐ Sev. RHD	☐ Inj. BPG ☐ Pen V. ☐ Erythro-mycin	☐ No ☐ Yes ☐ CMV ☐ PTMC ☐ Valve Replacement ☐ Valve Repair	☐ No ☐ Minor ☐ Major	☐ No ☐ CVA ☐ CCF ☐ Infective Endocarditis ☐ Death Date: …………	☐ Will take inj. BPG in this Hospital ☐ Will take inj. BPG in other Hospital Where? …………
☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ No ☐ Yes ☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ Normal ☐ Valve Thicke-ning ☐ Mild RHd ☐ Mod. RHD ☐ Sev. RHD	☐ Inj. BPG ☐ Pen V. ☐ Erythro-mycin	☐ No ☐ Yes ☐ CMV ☐ PTMC ☐ Valve Replacement ☐ Valve Repair	☐ No ☐ Minor ☐ Major	☐ No ☐ CVA ☐ CCF ☐ Infective Endocarditis ☐ Death Date: …………	☐ Will take inj. BPG in this Hospital ☐ Will take inj. BPG in other Hospital Where? …………
☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ No ☐ Yes ☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ Normal ☐ Valve Thicke-ning ☐ Mild RHd ☐ Mod. RHD ☐ Sev. RHD	☐ Inj. BPG ☐ Pen V. ☐ Erythro-mycin	☐ No ☐ Yes ☐ CMV ☐ PTMC ☐ Valve Replacement ☐ Valve Repair	☐ No ☐ Minor ☐ Major	☐ No ☐ CVA ☐ CCF ☐ Infective Endocarditis ☐ Death Date: …………	☐ Will take inj. BPG in this Hospital ☐ Will take inj. BPG in other Hospital Where? …………
☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ No ☐ Yes ☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ Normal ☐ Valve Thicke-ning ☐ Mild RHd ☐ Mod. RHD ☐ Sev. RHD	☐ Inj. BPG ☐ Pen V. ☐ Erythro-mycin	☐ No ☐ Yes ☐ CMV ☐ PTMC ☐ Valve Replacement ☐ Valve Repair	☐ No ☐ Minor ☐ Major	☐ No ☐ CVA ☐ CCF ☐ Infective Endocarditis ☐ Death Date: …………	☐ Will take inj. BPG in this Hospital ☐ Will take inj. BPG in other Hospital Where? …………
☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ No ☐ Yes ☐ Arthritis ☐ Mono ☐ Poly ☐ Carditis ☐ Chorea ☐ Erythema Marginatum ☐ Subcut. Nudules	☐ Normal ☐ Valve Thicke-ning ☐ Mild RHd ☐ Mod. RHD ☐ Sev. RHD	☐ Inj. BPG ☐ Pen V. ☐ Erythro-mycin	☐ No ☐ Yes ☐ CMV ☐ PTMC ☐ Valve Replacement ☐ Valve Repair	☐ No ☐ Minor ☐ Major	☐ No ☐ CVA ☐ CCF ☐ Infective Endocarditis ☐ Death Date:	☐ Will take inj. BPG in this Hospital ☐ Will take inj. BPG in other Hospital Where?

Appendix XI D

Secondary Prophylaxis Register II

Patient Registration Number - .....
(From Register -1)

Name of Patient:- ..... Age/Sex:- .....

Inj. Brand Name सुईको ब्राण्ड नाम	Inj. Batch No सुई ब्याच नम्बर	Date of Inj. Delivery सुई लगाउने मिति	Reaction if any रियाक्सन भए नभएको	Next Inj. Due Date अर्को पल्ट सुई लगाउने मिति	Name of Health Person सुई लगाइदिने स्वास्थ्यकर्मीको नाम	Signature हस्ताक्षर

Appendix XI E

Penicillin Injection Card

बाथ-ज्वरो /बाथ मुटु रोग बारे जानकारी

१. बाल बालिकाहरुलाई घाँटी दुख्ने र ज्वरो आउने भएको अवस्थामा ठिक उपचार भएन भने पछि गएर हात खुट्टाका जोर्नीहरु दुख्ने र सुन्निने अनि साथमा ज्वरो आउने रोग लाग्न सक्दछ जसलाई बाथ ज्वरो भनिन्छ।

२. बाथ ज्वरो लागेपछि यो रोग मुटुमा पुग्दछ र मुटुका भल्भहरु बिग्रिन्छन् जसका कारण कलिलै उमेरमा हार्ट फेल हुन्छ। मुटुलाई छोए पछि यो रोगलाई बाथ मुटुको रोग भनिन्छ।

३. घाँटी दुख्ने बाट सुरु भई जोर्नीमा पुग्ने अनि मुटुलाई टोक्ने र हार्ट फेल गराउने यो रोगले स्कूल जाने उमेरका बाल बालिकाहरुलाई धेरै जसो आक्रमण गर्दछ। यस कारण यो उमेरका बालबालिकाहरुले घाँटी दुख्ने भएको बेलामा हेलचेक्राई नगरी एण्टीबायोटिक औषधी खाएर उपचार गराउनु पर्छ। नत्र भोली गएर मुटु बिग्रिन सक्छ।

४. बाथ ज्वरो वा बाथ मुटुको रोग लागेपछि धेरै लामो समय सम्म ३ हप्ते पेनिसिलिन सूई लगाई राख्नु पर्दछ। सूई लगाएमा रोग बढ्न पाउँदैन। डाक्टरको सल्लाह विना सूई लगाउन बन्द गर्नु हुँदैन।

५. मुटुलाई धेरै असर परेको भएमा अप्रेशनद्वारा उपचार गर्नुपर्छ। यो कुरा मुटुको भिडियो परीक्षणबाट पत्ता लाग्छ। अप्रेशन नेपालमै हुन्छ।

६. ३ हप्ते पेनिसिलिनको सूई हाललाई केन्द्रीय, अञ्चल तथा केही सामुदायिक अस्पतालहरुमा निशुल्क उपलब्ध छ।

राष्ट्रिय बाथ-ज्वरो/बाथ मुटुरोग रोकथाम तथा नियन्त्रण कार्यक्रम

नेपाल हृदय रोग निवारण प्रतिष्ठान

केन्द्रीय कार्यालय, पुल्चोक, ललितपुर, फोन ५००९२६३

राष्ट्रिय बाथ-ज्वरो/बाथ मुटुरोग रोकथाम तथा नियन्त्रण कार्यक्रम

National RF/RHD Prevention & Control Program

PENICILLIN INJECTION CARD

पेनिसिलिन इन्जेक्शन कार्ड

अस्पताल कोड_____ नागरिकता नं._____

१. दर्ता नं. _____ २. मिति_____

३. सूई लगाउने अस्पताल_____

४. बिरामीको नाम_____

५. उमेर _____बर्ष ६. लिङ्ग ☐ पुरुष ☐ महिला

७. तौल _____ किलो

८. ठेगाना _____

९. Diagnosis : ☐ Acute RF ☐ RHD

★ सूई लगाउन आउँदा यो कार्ड लिइ आउनुहोला।

★ प्रत्येक ३-३ हप्तामा सूई लगाउनु पर्छ।

★ पेनिसिलिन एलर्जी भएकालाई सूई लगाउँदा रियाक्सन भई मृत्यु समेत हुन सक्छ। यसो भएमा सूई लगाई दिने स्वास्थ्यकर्मीको कुनै दोष हुँदैन।

☐ Inj. Benzathine Penicillin ☐ 12 lac ☐ 6 lac ☐ Pen. V 250 mg ☐ Tab Erythromycin 250 mg

	1	2	3	4	5	6	7
सूई लगाउनु पर्ने मिति							
सूई लगाएको मिति							
हस्ताक्षर							
	8	**9**	**10**	**11**	**12**	**13**	**14**
सूई लगाउनु पर्ने मिति							
सूई लगाएको मिति							
हस्ताक्षर							
	15	**16**	**17**	**18**	**19**	**20**	**21**
सूई लगाउनु पर्ने मिति							
सूई लगाएको मिति							
हस्ताक्षर							

सुईको Batch No. _____ Date _____
Batch No. _____ Date _____

सुईको Batch No. _____ Date _____
Batch No. _____ Date _____

Appendix XI F

Reporting of RHD Patients on Secondary Prevention

National RF/RHD Prevention & Control Program

राष्ट्रिय बाथ-ज्वरो/बाथ मुटुरोग रोकथाम तथा नियन्त्रण कार्यक्रम

रिपोर्टीङ्ग फारम

अस्पतालको नाम :

रिपोर्टीङ्गको अवधि: मिति ..... देखी ..... सम्म ।

(नोट :- आ.व. ..... सम्मको रिपोर्ट उल्लेख गर्ने)

सि.नं.	विवरण	संख्या	कैफियत
१.	सूई लगाएको विरामीहरूको जम्मा संख्या (नोट :-दोहोऱ्याएर सुई लगाउनेलाई १ पटक मात्र गन्ने)		
क)	पुरूषहरूको संख्या लगाउनेको संख्या		
ख)	महिलाहरूको संख्या लगाउनेको संख्या		
ग)	उमेर १८ वर्ष वा सो भन्दा माथीको संख्या		
घ)	उमेर १८ वर्ष भन्दा मुनीको संख्या		
ङ)	Inj. Penidure 12 Lac		
च)	Inj. Penidure 6 Lac		
२.	क) Diagnosis: Acute Rheumatic Fever		
	ख) Diagnosis: Rheumatic Heart Disease		
३.	खर्च भएको औषधिको विवरण		
	क) Inj. Penidure 12 Lac		
	ख) Inj. Penidure 6 Lac		
४.	पेनिसिलिन सूईमा एलर्जी भएकाहरूको संख्या		
	क) Minor (Rashes)		
	ख) Major (Anaphylactic Shock)		
५.	पेनिसिलिन सूईको रियाक्सनबाट मृत्यु भएकाहरूको संख्या		

.....

रिर्पोटीङ्ग फारम भर्नेको हस्ताक्षर :

नाम :

पद :

मिति :

.....

कार्यालय प्रमुखको हस्ताक्षर :

नाम :

पद :

मिति :

Appendix XII A

Jones Criteria for the Diagnosis of Acute Rheumatic Fever (2015 Modification)

A. For all patient populations with evidence of preceding GAS infection

Diagnosis: initial ARF	2 Major manifestations or 1 major plus 2 minor manifestations
Diagnosis: recurrent ARF	2 Major or 1 major and 2 minor or 3 minor

B. Major criteria

Low-risk populations*	**Moderate- and high-risk populations**
Carditis†	**Carditis**
• Clinical and/or subclinical	• Clinical and/or subclinical
Arthritis	**Arthritis**
• Polyarthritis only	• Monoarthritis or polyarthritis
	• Polyarthralgia‡
• Chorea	• Chorea
• Erythema marginatum	• Erythema marginatum
• Subcutaneous nodules	• Subcutaneous nodules

C. Minor criteria

Low-risk populations*	**Moderate- and high-risk populations**
Polyarthralgia	Monoarthralgia
Fever (≥38.5°C)	Fever (≥38°C)
ESR ≥60 mm in the first hour and/or CRP ≥3.0 mg/dL	§ ESR ≥30 mm/h and/or CRP ≥3.0 mg/dL§
Prolonged PR interval, after accounting for age variablity (unless carditis is a major criterion)	Prolonged PR interval, after accounting for age variability (unless carditis is a major criterion)

ARF indicates acute rheumatic fever; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; and GAS, group A streptococcal infection.

*Low-risk populations are those with ARF incidence ≤2 per 100 000 school-aged children or all-age rheumatic heart disease prevalence of <1 per 1000 population per year.

†Subclinical carditis indicates echocardiographic valvulitis

‡Polyarthralgia should only be considered as a major manifestation in moderate- to high-risk populations after exclusion of other causes. As in past versions of the criteria, erythema marginatum and subcutaneous nodules are rarely "stand-alone" major criteria. Additionally, joint manifestations can only be considered in either the major or minor categories but not both in the same patient.

§CRP value must be greater than upper limit of normal for laboratory. Also, because ESR may evolve during the course of ARF, peak ESR values should be used.

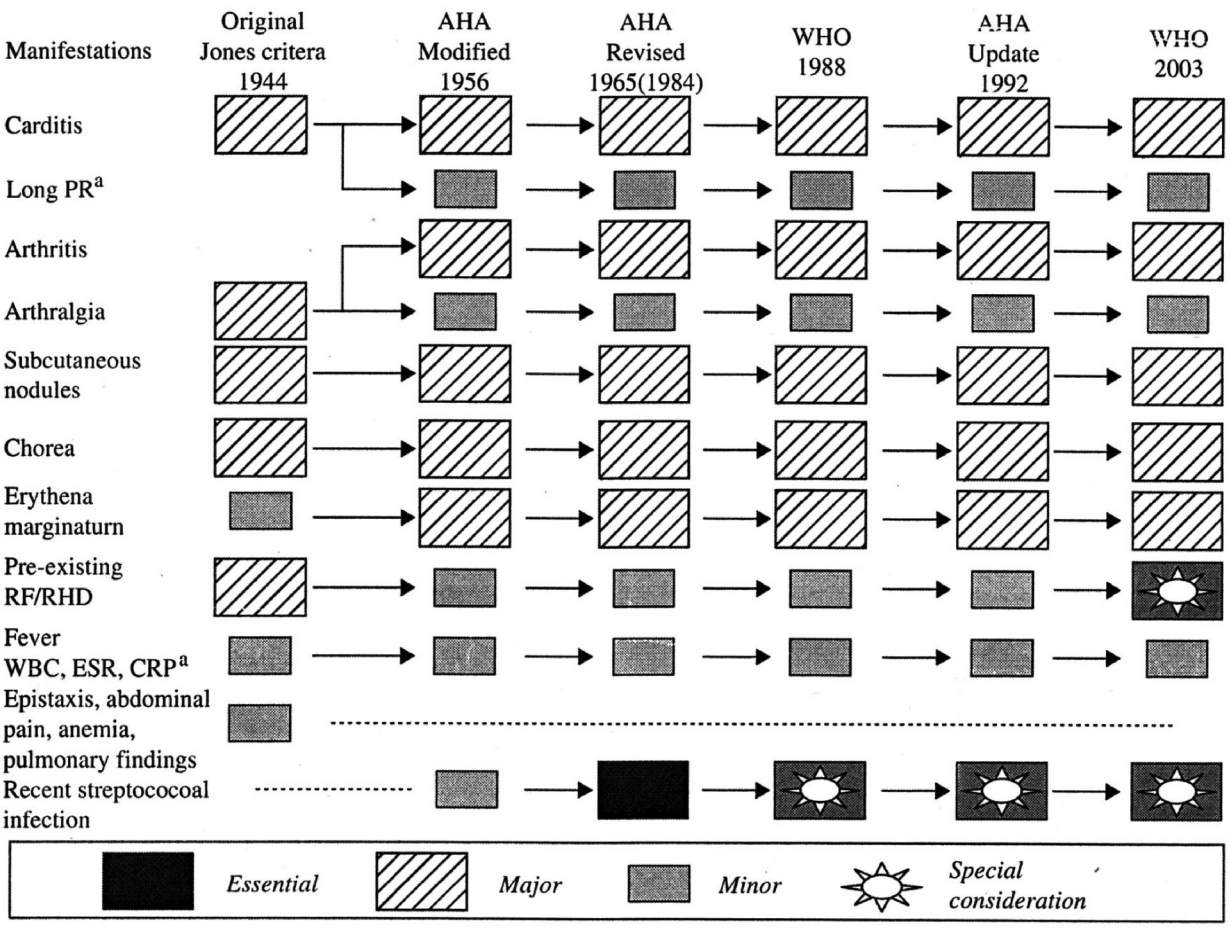
Appendix XII B

Jones Criteria for the Diagnosis of Rheumatic Fever (1944)

Major manifestations	**Carditis** **Arthralgia** **Chorea** **Subcutaneous nodules** **Prior bout with Rheumatic Fever**
Minor manifestations	**Fever** **Arthritis** **Abdominal pain** **Chest pain** **Rashes (erythema marginatum, among others)** **Nosebleeds** **Lung disease** **Abnormal laboratory tests, such as elevated erythrocyte sedimentation rate, high white blood count**

Appendix XII C

Changes in the Jones criteria following reviews from AHA and WHO



[a] PR = PR interval in the electrocardiogram; WBC = leukcoytosis; ESR = erythrocyteseyimontation rate; CRP = C-reactive protein.
Modified in part from reference (45)

Appendix XIII

WHF Criteria for Echocardiographic Diagnosis of RHD (2012)

Applied for indivisuals aged ≤20 yrs

2 groups: I. Definite RHD
II. Boderline RHD

Morphological Features of RHD

MV
1. AML Thickening ≥ 3mm
2. Chordal thickening
3. Restricted Leaflet Motion
4. Excessive Leaflet tip Motion during Systole

AV
1. Irregular or focal thickening
2. Coaptation Defect
3. Restricted Leaflet Motion
4. Prolapse

NB: For RHD at least 2 morphological features should be present.

Criteria for Pathological Requrgitation

MR
1. Seen in 2 views
2. Jet length ≥ 2cm in atleast 1 view
3. Velocity ≥ 3 m/s for 1 complete envelope
4. Pandiastolic jet in at least 1 envelope

AR
1. Seen in 2 views
2. Jet length ≥ 1 cm in atleast 1 view
3. Velocity ≥ 3m/s in early diastole
4. Pandiastolic jet in atleast 1 envelope

Definite RHD (Any 1 of 4 present)

1. Pathological MR with atleast 2 morphological features of RHD
2. Pathological AR with at least 2 morphological features of RHD
3. MS mean gradient ≥ 4 mm Hg
4. Borderline disease of both MV and AV

Borderline RHD (Any 1 of 3 present)

1. Pathological MR without morphological features of MV
2. Pathological AR without morphological features of AV
3. 2 or more morphological features of RHD of MV without pathological MR or MS

Appendix XIV
Treatment of Acute Carditis

- **General Management**
  - Restricted activity: bed/chair rest for 4 to 6 weeks
  - Primary prophylaxis
  - Initiate secondary prophylaxis
  - Endocarditis prophylaxis

- **Mild-Moderate Carditis**
  - Anti-inflammatory agent Aspirin
    - 100 to 125 mg/kg/day in 4 divided doses for children
    - 6 to 8 gm/day in adolescents and adults
    - Target salicylate levels 20 to 30 mg/dL.

- **Severe Carditis**
  - Initial steroids (prednisone 1-2 mg/kg/day) for approximately 2 weeks, then taper.
  - Begin aspirin approximately 1 week prior to stopping steroids to prevent rebound.
  - Follow acute phase reactants (ESR, CRP).

- **Carditis Treatment** depends on severity of involvement and symptoms
  - Moderate to severe: Consider salt and fluid restriction, diuretics, after load reduction as temporizing measures
  - Intractable heart failure: Surgery

Appendix XV

Micro-Teaching Observation Checklist

Name of the Teacher: Observer:

Topic: Date:

Filed of the Skill	Skills tested	Yes	To some extent	No
Preparation	• Adequate			
Introduction	• Introduced the topic			
	• Provide motivation and aroused interest			
	• Review of pre-requisite knowledge			
	• Provided learning objectives			
Lesson Planning	• Contents organized sequentially			
	• Used relevant educational material			
	• Good examples given			
Use of AV Aids	• Used relevant AV aids			
	• Materials prepared according to the given criteia			
	• Used them effectively			
Presentation	• Voice clear and audible			
	• Words pronunciation			
	• Used fillers			
	• Eye contact			
	• Changed the pace of speech by changing the emphasis			
	• Body language			
Audience Participation	• Opportunities provided for students to question			
	• Asked questions			
	• Learners guided to reach answers themselves			
	• Rewarded students effort			
Conclusion	• Summary			
	• Concluded in time			

Feedback Positive
Yes / No

Points needed to be improved

Agreed to the feedback
Yes / No

Appendix XVI

Rheumatic Fever/Rheumatic Heart Disease Community Survey Form

Name: **Address:** **Contact Number:** **Respondent number:**	**Location (town/city/village)** **Urban** **Rural**

1. Have you ever had swollen and painful knees, ankles, elbows, wrists with high fever?

- ☐ Yes
- ☐ No

2. When you play, have you ever felt tired or had shortness of breath and needed to stop earlier as compared to your friends?

- ☐ Yes
- ☐ No

3. Are you undergoing repeated "painful" injection or have you ever had in the past?

- ☐ Yes
- ☐ No

4. Have you ever been diagnosed with rheumatic fever or heart disease or heart murmur before?

- ☐ Yes
- ☐ No

5. Have you ever had sudden and not controllable movements of your arms, legs, hands and facial muscles?

- ☐ Yes
- ☐ No

6. Cardiac Auscultation?

☐ No Murmur ☐ Systolic Murmur ☐ Diastolic Murmur

7. Provisional Diagnosis

☐ Normal ☐ ARF ☐ RHD ☐ CHD

8. Echocardiography Report

☐ Normal ☐ CHD Specify .....

☐ RHD ◯ Borderline ◯ Mild ◯ Moderate ◯ Severe

9. Advise Given

☐ Observation ☐ Penicillin V ☐ Inj. BPG

☐ PTMC ☐ Device closure ☐ Surgery

टन्सिलको उपचार नगरे बाथ मुटुरोग लाग्न सक्छ ।

बालबालिकाको मुटु बचाऊँ ।

बालबालिकाहरुको घाँटी दुख्दा, टन्सिल बढ्दा, पाक्दा, हात खुट्टाका जोर्नीहरु दुख्दा, औषधि नगरे बाथ मुटुरोग लाग्न सक्छ । सावधान !

Nepal Rheumatic Heart Disease Prevention Program

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