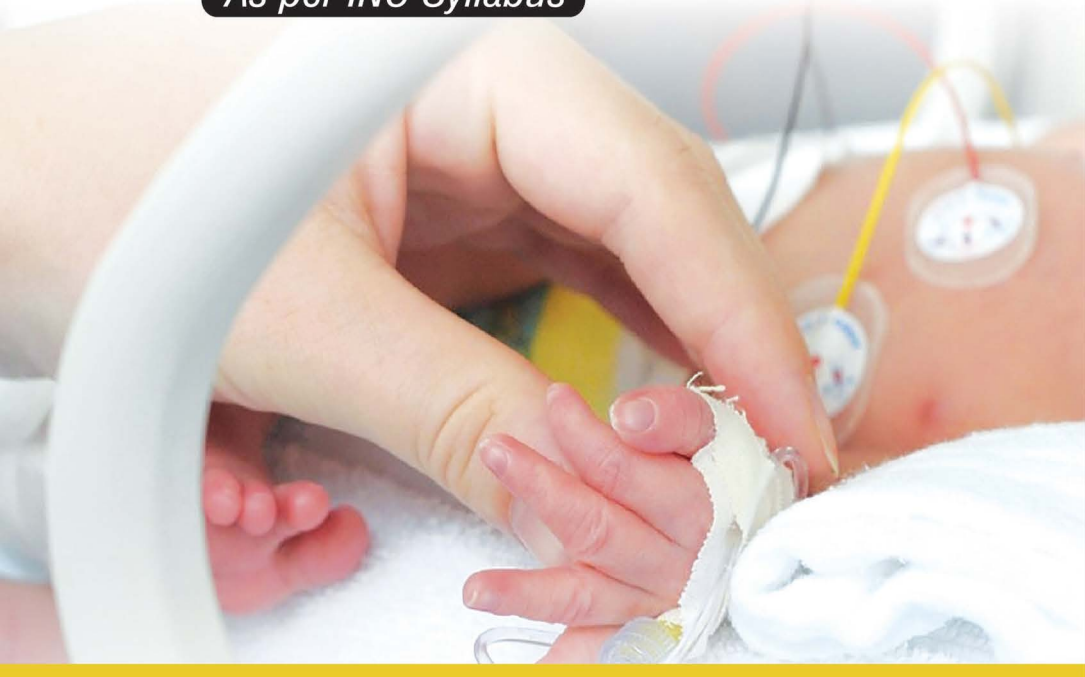
Advanced Critical Care in MEDICAL SURGICAL & NEONATAL NURSING

As per INC Syllabus



SN Nanjunde Gowda
Jyothi Nanjunde Gowda

Foreword
Nagarajaiah

JAYPEE

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Chapter

3

Therapeutic Management of Cardiovascular System

NURSING ASSESSMENT OF CARDIAC SYSTEM

Nursing History

The history collection and recording is detailed in Box 3.1.

Box 3.1: History collection

Demographic data

Name of the patient: ..... Inpatient number.....
Age: ..... Gender: .....
Marital status: ..... Nationality: .....
Language spoken: ..... Religion: .....
Occupation: ..... Home town/City: .....
Education: ..... Income: :.....
Date of admission: ..... Treatment received on arrival to hospital:
Provisional diagnosis: ....

Name of the doctor who is treating the patient: .....
Unit: .....

Reason for visit: .....
When did the symptoms start? .....
General status of health: .....
Was the onset sudden or gradual? .....
How often the problem occurs? .....
Has the problem occurred before? .....
Document the progression of the first manifestation: .....

Chief complaint

History of present illness: .....
Ask any or all of the following as appropriate and write a summary .....
.....

Rely on objective testing (laboratory values)
Chest pain is one of the most common manifestations of cardiac disease (expanded cardiac assessment)
Onset of chest pain
Location: .....
Duration: .....
Characteristics: .....

Associated manifestations

- Gastrointestinal disorders such as burning colic, aching and tightness
- Musculoskeletal disorders such as aching
- Neurological disorders such as aching/constant burning and needle sharp

Contd...

Contd...

- Psychogenic states such as vague burning/diffuse
- Chest pain, typical pressure, burning/heaviness/gradual onset

Worsened by

- Exertion
- Eating
- Emotion
- Cold
- Deep breathing
- Position changes

Relieved by

- Rest
- Nitroglycerin
- Pain pills
- Spontaneously

Palpitation

Specific review of systems

Past medical history: .....

- Thyroid disease
- Valvular heart disease
- Heart murmur
- Rheumatic heart disease
- Childhood infectious disease
- Immunizations
- Hospitalizations
- Major illness/Infectious disease
- Prior history of rheumatic fever
- Streptococcal infection
- Congenital abnormalities
- Previous hospitalization
- Outcome treatment

Medication prescription/Cold medications/Nasal spray/Habits illicit drug use/ Caffeine intake: .....

- Central/Peripheral/Unilateral/Bilateral
- Congenital heart disease
- Pulmonary disease
- Tobacco use

Allergies

- Environmental
- Food
- Medication
- Iodine or contrast dye

Medication history

- Prescription
- Over-the-counter medication:
  - Vitamins: .....
  - Herbal: .....

Contd...

Contd...

- Aspirin: .....
- Nitroglycerin: .....
- Laxatives: .....
- Nasal spray: .....

Dietary habits

- Restriction advised: Yes/No
- Cholesterol/Salt/Fluid/Sugar/Caffeine intake

Family history

- Cardiovascular disease
- Hypertension
- Diabetes mellitus
- Stroke
- Renal disease
- Liver disease
- Relationship to member affected and treatment provided: .....

Physical examination

Assessment proceed from head to toe

General appearance

- Does the client lie: Quietly/Restless
- Position: Lie flat/Upright/Erect
- Respiratory distress/Cyanosis/Pallor/Dyspnea

Patient general level of consciousness

- Client behavior appropriate for surroundings
- Fear/Depression/Anger
- Identify significant others
- Identify time

Vital signs

Temperature: .....

Respiration: .....

Breath easily/Does the client have to sit-up to breathe easily: Yes/No

Weight:

Blood pressure (BP), while client:

- Lying: .....
- Sitting: .....
- Standing: .....

Pulse

- Apical: .....
- Radial: .....
- Tachycardia [100 beats per minute (bpm)]
- Bradycardia (60 bpm)
- Irregular pulse/Bounding pulse/Absent pulse/Tachypnea

Head and neck

- Eyes: A light gray ring around the iris (possibly caused by cholesterol deposits)
- Examine ear lobes normal: Yes/No
- Lips and buccal mucosa normal: Yes/No

Contd...

Contd...

Neck vein assessment
- Jugular vein: Engorges/Slight provocation/Distention absent with client at 45° angle

Abdomen
- Ascites, hyperactive/hypoactive bowel sounds

Skin
- Central cyanosis/Peripheral cyanosis/Decreased turgor/Warm to touch/Cool to touch/Edema

Nail
- Clubbing/Splinter hemorrhage

Diagnostic testing

Diagnostic procedures are both noninvasive and invasive; nursing responsibilities for these various tests include:
- Scheduling the procedures
- Explaining the purpose, procedure and answering any question
- Procure consent
- Providing prescribed medication for preprocedure
- Providing physical and psychological support
- Providing postprocedure care

Name of the test *Test result*

Non-invasive tests
- Electrocardiography test .....
- Holter monitoring .....
- Exercise testing (treadmill test) .....
- Echocardiography .....
- Upright tilt-table test .....
- Radiographic cardiac test .....
- Chest X-ray .....
- Computed tomography (CT) angiography .....
- CT scan pulmonary embolism protocol .....
- Magnetic resonance imaging (MRI)
- Magnetic resonance angiography (MRA) .....
- Visibility scan (positron emission tomography) .....

Invasive cardiac test
- Transesophageal echocardiography .....
- Cardiac catheterization .....
- Left heart catheterization .....
- Right heart catheterization .....
- Electrophysiological studies .....
- Coronary angiography .....
- Hemodynamic monitoring .....
- Arterial BP .....
- Pulmonary artery pressure .....
- Pulmonary artery wedge pressure (PAWP) .....

Contd...

Contd...

Cardiovascular assessment	
Criteria	*Remarks*
• Obtains a baseline heart rate (HR) and BP	.....
• Obtains and interprets a baseline cardiac rhythm strip	.....
• Auscultates the heart sounds for the following:	.....
– S_1, S_2	.....
– S_3, S_4	.....
– Murmurs	.....
– Pericardial friction rub	
• Assesses the skin for color, temperature, turgor, edema and diaphoresis	.....
• Inspect the nail bed for capillary refill after temporary compression	.....
• Palpates the peripheral arterial pulses for rhythm, amplitudes and bilateral equality	.....
• Inspects the internal jugular veins for distension with the patient at a 45° angle	.....
• Assesses for the presence of central and peripheral intravenous (IV) lines	.....
• Assesses the hemodynamic waveforms and measurements of the arterial central or pulmonary artery catheter	.....
• Identifies the presence of a permanent or temporary pacemaker; if a temporary pacemaker is present, note the type and settings (milliamperes, sensitivity, mode and rate)	.....

CORONARY ARTERY DISEASE

Terminology

Arteriosclerosis: It is commonly called hardening of the arteries, which includes a variety of conditions that cause the artery walls to thicken and lose elasticity.

Atherosclerosis: It is a form of arteriosclerosis in which the inner layers of artery walls become thick and irregular because of the deposits of a fatty substance. As the interior walls of arteries become lined with layer of these deposits, the arteries become narrowed and flow of blood through the arteries is reduced.

Coronary artery disease (CAD): It is the presence of atherosclerosis in the coronary arteries.

Coronary heart disease (CHD): It is CAD and the presence of symptoms as manifested by angina (specific chest pain) or a history of acute myocardial infarction (AMI). The term atherosclerotic heart disease is synonymous with CHD.

Ischemic heart disease: It is a more general term that includes all causes of myocardial ischemia (poor blood supply to the heart muscle).

Pathology and Natural History

Atherosclerosis is a slow progressive disease that may have its beginning early in life. Significant disease may be present before the age of 20 and long before the function of the heart muscle is impaired. There is an asymptomatic period when risk-factor modification may halt or reverse the process. The inner portion of the arterial wall becomes thickened with deposit of fats (lipid and cholesterol) and eventually calcium. The result is gradual narrowing of the arterial lumen. When the blood flow is severely reduced by atherosclerosis, a clot can form as blood trickles and sludges through the narrowed vessels causing a sudden, complete stoppage of blood flow. Injury to the heart muscle occurs because of this decrease or interruption of blood flow, creating an imbalance between the demand of the heart muscle for oxygen and the ability of the narrowed coronary artery to meet the demand. Atherosclerosis is a generalized disease process that may involve arteries in different areas such as heart (leading to a heart attack), brain (leading to a stroke) or legs (leading to pain precipitated by walking or leg cramps during exercise).

Clinical Manifestation of Coronary Heart Disease

A person with CAD may show no signs or signals of heart disease (asymptomatic) or have a sign that suggests CHD (symptomatic). In a person with asymptomatic CAD, coronary artery narrowing progresses overtime. This is the period before enough decrease in blood supply occurs to produce symptoms of heart disease. Symptomatic CHD can manifest as chest discomfort (angina pectoris), a heart attack (MI) or sudden death, which are discussed in detail here. Occasionally some people, especially those with diabetes may have severe CHD on testing, but otherwise have no symptoms. This is known silent ischemia, such as patients are more likely to die or have a heart attack (as compared with those without silent ischemia).

ANGINA PECTORIS

Angina pectoris is a common symptom of CHD, is a transient pain or discomfort due to temporary lack of adequate blood supply to the heart muscle. The pain may be located in the center of chest or it may be more diffuse, i.e. through front of the chest. It is usually described as being crushing, pressing, constricting, oppressive or heavy. It may spread to one (more often the left) or both shoulders and/or arms or to neck, jaw, back or epigastrium without anterior chest discomfort may also be a manifestation of angina. It is a steady discomfort often brought on by any

factor that increases the heart rate, including exercise, unusual exertion and emotional or psychological stress. It commonly lasts from 2 to 15 minutes. The most frequent causes of angina is coronary atherosclerosis. As the severity of the coronary narrowing increases, the amount of exertion needed to bring on angina decreases. Angina is usually promptly relieved by rest or nitroglycerin. With severe CHD few days or weeks before a heart attack, angina may occur at rest or may even awaken someone from sleep.

Types of Angina

Unstable Angina

Unstable angina is a clinical syndrome that is characterized by rapidly worsening angina (crescendo angina), angina on minimal exertion or angina at rest. An acute coronary syndrome (ACS) may present as a new phenomenon or against a background of chronic stable angina.

Chronic Stable Angina

Chronic stable angina refers to a chest pain that occurs intermittently over a long period with a same pattern of onset.

Nocturnal Angina and Decubitus

Nocturnal angina and decubitus occurs only at night. Angina decubitus is chest pain that occurs only, while the person is lying down and is usually relieved by standing or sitting.

Prinzmetal's Angina or Vasospastic Angina

Prinzmetal's angina or vasospastic angina is caused by coronary artery spasms and occurs at or with exercise, rest. The pain may occur during rapid eye movement, when myocardial oxygen consumption increases.

Diagnosis

- History and assessment of chest pain
- 12-lead electrocardiography (ECG)
- Chest X-ray
- Exercise stress test
- Echocardiography
- Positron emission tomography
- Coronary angiography
- Creatine kinase-muscle bone (CK-MB)
- Cardiac troponin
- Myoglobin
- Lipid profile.

Management

Patient should be admitted urgently to hospital, because there is a risk of death or acute MI during the unstable phase and appropriate medical therapy can reduce the incidence of adverse events. Bedrest, antiplatelet therapy (Aspirin 300 mg followed by 75–325 mg daily long term).

Drug Therapy for Chronic Stable Angina

Short-acting nitrates: Nitrates dilating coronary artery, increasing blood flow to the ischemic area of the heart. Sublingual nitroglycerin will usually relieve pain in 3 minutes.

Statins: Lower cholesterol level.

Beta blockers: Decrease pulse, BP and cardiac output, prevent release of renin.

Angiotensin-converting enzyme (ACE) inhibitors: Reduces peripheral arterial resistances.

Nursing Management

- Assess anginal pain/history of chest pain, type, location and pain radiation to other areas
- Obtain vital signs, BP, apical pulse, respiration and oxygen saturation
- Administer medication as prescribed
- Administer sublingual nitroglycerin as ordered
- Notify physician after any vital sign changes chest pain unrelieved by nitrates
- Reassess patient condition support emotionally
- Inform physician, if any changes in ECG
- Teach patient regarding medication, dosage and side effect
- Discuss lifestyle modification including modifiable and non-modifiable risk factors
- Teach patient to report the healthcare facilities, if they notice any changes in chest pain, increased diaphoresis
- Instruct the patient to carry nitroglycerin at all times
- After taking nitroglycerin pain is not relieved, report immediately to emergency department or near healthcare center.

ACUTE MYOCARDIAL INFARCTION (ACUTE CORONARY SYNDROME)

A heart attack occurs when an area of the heart muscle is deprived of blood (oxygen) for a prolonged period (usually > 20–30 min). It is usually results from severe narrowing or complete blockage of a diseased coronary artery and result in death of the heart muscle cells supplied by that artery. Myocardial infarction is also known as a Q wave MI, usually caused by a

complete blockage of the artery. MI can occur at any age; silent ischemia occurs without pain and carries great risk. The people with hypertension or diabetes are most often noted to have silent ischemia.

Causes

- Due to the formation of occlusive thrombus at the site of rupture or erosion of atheromatous plaque in a coronary artery
- Prolonged ischemia can produce cellular damage.

Signs and Symptoms

- Chest pain is the classic symptoms of MI, crushing, vise-like chest pain with radiation to arm, shoulder, neck, jaw or back
- More common locations are substernal, retrosternal or epigastric areas
- The chest discomfort is similar to angina in location, character and radiation, but is usually more intense, lasts considerably longer, and is not relieved by rest or nitroglycerin
- Sweating, nausea or shortness of breath, dizziness
- Indigestion or gas pain
- Client often denies that they are having an MI because their symptoms are similar to other mild conditions, e.g. indigestion
- Silent ischemia occurs without pain and carries greater risk.

Diagnosis

- Patient history
- Electrocardiography findings, changes during MI include ST-segment elevations, segment inversion and necrosis large Q wave, and it is usually helpful in confirming the diagnosis
- Lactate dehydrogenase (LDH) elevates 14–24 hours after onset of myocardial damage
- Troponin level, increase 7–14 hours after myocardial injury
- Plasma biochemical markers are creatine kinase (CK), CK start to rise at 4–6 hours, peak at about 12 hours and falls to normal within 48–72 hours
- The CK-MB and cardiac specific proteins, troponins T and I, which are released within 4–6 hours and remain elevated for up to 2 weeks
- The C-reactive protein (CRP) levels are elevated in the presence of inflammation
- Magnesium levels are also checked
- Myoglobin is rapidly released when myocardial injury takes place and can be detected within 2 hours
- Prothrombin time (PT) and partial thromboplastin time (PTT)
- Leukocytosis is usually reaching a peak on the 1st day

- The erythrocyte sedimentation rate (ESR) becomes raised and may remain so for several days.

Early Management

Immediate Measure

1. Client should seek within 5 minutes for any unrelieved chest pain.
2. Client with AMI must receive immediate treatment in less than 30 minutes; thrombolytic therapy should start within 30 minutes.
3. Delay may increase damage to the heart and reduce the chance of survival.
4. Provide high-flow oxygen.
5. Intravenous (IV) access keep vein open (KVO).
6. 12-lead ECG monitor.
7. Analgesic morphine sulfate IV, as prescribed to relieve severe distress, reduce pulmonary and systemic vascular resistance.
8. Sublingual nitroglycerin as prescribed.
9. Antiplatelets Aspirin, oral administration of 75–300 mg first dose should be given within first 12 hours.
10. Vital signs including pulse oximetry is monitored.
11. Monitor dysrhythmias.
12. Obtain baseline blood work, e.g. cardiac markers.
13. First-line thrombolysis therapy (as per institutional policy) leads to perfusion with relief of pain, resolution of acute ST elevation as immediately as possible (within the first few hour) and streptokinase 1.5 million units in 100 mL of saline given as an IV infusion over 1 hour. Alteplase other choice of drugs as prescribed.
14. Beta blockers as prescribed.
15. Anticoagulants as prescribed. Subcutaneous heparin given in addition to oral Aspirin may prevent reinfarction after successful thrombolysis and reduce the risk of thromboembolic complications.
16. Vasodilators as prescribed.
17. Observe continuous monitoring.
18. Antidysrhythmic medication should be on hand.
19. Heparin is contraindicated in clients with known bleeding conditions or recent stroke.

Note: If perfusion is not attained or if the client is contraindicated for thrombolytic therapy, then primary angioplasty, stenting of coronary artery bypass grafting (CABG) may be performed as decided by clinician.

Nursing Management of Patient with Myocardial Infarction

Nursing Diagnosis

- Acute pain related to decreased coronary blood flow
- Ineffective tissue perfusion related to altered blood flow to myocardial tissue

- Decreased cardiac output related to cardiac ischemia
- Anxiety and fear-related threat of death, changes in lifestyle, chest pain
- Risk for activity intolerance related to imbalance between oxygen supply and demand
- Risk for constipation related to bedrest, pain medications
- Ineffective health maintenance related to disease condition, medical regimen and lifestyle.

Nursing Intervention

- Assess location, duration, intensity and radiation of chest pain
- Monitor 12-lead ECG as ordered
- Administer:
  - Pain medication as prescribed
  - Aspirin as prescribed
  - Nitrate sublingually as prescribed
  - Oxygen as prescribed and maintain continuous oximetry
  - Thrombolytic therapy as directed.
- Attach the client to cardiac monitor and explain the patient function of monitor
- Notify clinician regarding client response of pain medication
- Send blood specimen for laboratory as instructed
- Administer other medication as per frequency and maintain drug flow chart
- Report any changes in ECG
- Limit visitors and maintain calm environment
- Keep ready intubation and ventilator by side
- Keep ready defibrillator at the bedside
- Maintain intake and output
- Maintain IV fluid as prescribed and IV line patent
- Observe for any signs of pallor, cyanosis, coolness and diaphoresis
- Monitor hemodynamic status, if initiated
- Report to clinician if any changes in client condition
- Observe output, if output less than 0.5 mL/h inform clinician
- Monitor arterial blood gases (ABGs) levels and report
- Inform the family members regarding client progress
- Inform client and significant other about treatment plan
- Place the patient in Fowler's position or as required usually 35°–45° head elevated
- Record weight
- Reassure the client
- Provide bedpan/commode in time in bedside

- Discuss with patient not to strain during defecation
- Assist the patient with activities of daily living (ADL), until he/she is able to do these for themselves
- Encourage self-care as soon as it tolerated
- Provide calling with calling bell for getting nursing assistance, when needed
- Teach client about medication, dosage, route, duration, side effect of each medication and investigation required
- Encourage active and passive exercise as tolerated
- Provide opportunities for the client to express feelings about oneself and the illness
- Help the client identify strength and areas of control
- Encourage early ambulation
- Progressive physical activity should be balanced with a period of rest in between the activity, all activities should be supervised
- Before discharge from the hospital, the patient and significant others should be taught about the heart disease and make the patient to accept the therapeutic regime
- Teach about lifestyle modification; how he/she can bring modification in his/her lifestyle, food, rest activities, smoking, alcohol, obesity and managing associated disease.

Complications

- Dysrhythmias
- Cardiogenic shock
- Heart failure/Pulmonary edema
- Rupture of muscles or valves of the heart, septal rupture
- Pericarditis.

MANAGEMENT OF PATIENTS WITH CARDIAC MONITOR

Cardiac Monitor as a Diagnostic Tool

Cardiac monitor (Fig. 3.1) is one of the most valuable diagnostic tools in general medicine and is essential to recognize disorders of the cardiac rhythm. It can also help with diagnosis and alert healthcare staff to changes in a patient condition. However, cardiac monitor must be carried out meticulously. Poor technique can lead to misinterpretation of an ECG, a mistaken diagnosis, wasted investigation and management of patient.

The phrase cardiac monitoring generally refers to continuous monitoring of the heart activity, generally by ECG with assessment of the patient's condition relative to their cardiac rhythm. It is different from hemodynamic monitoring, which monitors the pressure and flow of blood within the circulatory system. The two may be performed simultaneously on critical heart patients.

Advanced Critical Care in MEDICAL SURGICAL & NEONATAL NURSING

Salient Features

- Critical care nurses provide a high level care and often facilitate communication among all the people involved in the care of the patient. Their expertise and continuous presence allow early recognition of subtle but significant changes in patient conditions, thereby preventing worsening condition and minimizing complications that arise from critical illness or injury
- Contains major advances made in cardiovascular, respiratory, urology, neonatal and pediatric nursing
- Includes all important emergencies and explores intensive technology in the care of critically ill
- Mainly discusses cardiovascular emergency; respiratory emergency; important critical procedures/ emergency care; emergency drug management; dialysis, and neonatal and common pediatric emergencies.

SN Nanjunde Gowda MSc (N) DPN PhD is Professor and Principal, Anil Baghi College of Nursing, Ferozepur, Punjab, India. He obtained his GNM and post BSc Nursing from Victoria Hospital School of Nursing and Government College of Nursing, Bengaluru, Karnataka, India, Master's degree from MS Ramaiah Institute of Nursing, Bengaluru. He started his career in nursing as a staff nurse and worked in General Hospital, Tumkur; KNTB Hospital, Kolar; Sanjay Gandhi Accident Complex and Victoria Hospital, Bengaluru. He has varied experience of over 35 years in nursing including successful innings as a registered nurse in Royal Commission Hospital, Yanbu, Saudi Arabia, and Staff Development Officer in Ministry of Health (MOH), Sultanate of Oman. He was a regional master trainer in eye health care and IV therapy, Nursing Administration in Nizwa region, Sultanate of Oman.

He has published *Foundations of Nursing, Fundamentals of Nursing for General Nursing and Midwifery, Perioperative Nursing Manual, IV Therapy for Nurses, Clinical Practice Dairy* and *Cumulative Record of Clinical Learning Experience for Post Basic BSc Nursing.* He has presented scientific papers in international, national and regional conferences, and also conducted and attended many conferences and workshops. He has held various positions in Nursing Associations like GNAK and TNAI and Founder and President of Indian Society of Medical Surgical Nurses (ISMSN).

Jyothi Nanjunde Gowda MSc (N) DPN is Vice-Principal, Anil Baghi College of Nursing, Ferozepur, Punjab, India. She obtained her Bachelor's degree in Nursing from Government College of Nursing and Master's degree in Community Health Nursing from Goutham College of Nursing, Bengaluru, Karnataka, India. She started her career in nursing as a staff nurse and worked in General Hospital, Tumkur; KNTB Hospital, Kolar and ESI Hospital, Bengaluru, and had successful innings as a Deputy Principal Nursing Officer in Ministry of Health, Sultanate of Oman. She has attended international and national conferences and workshops. She is a Life Member of TNAI, SOCHINI. She is regional master trainer for Baby Friendly Hospital Initiation (BFHI), Eye Health Care (EHC) and Family Planning Program which is a WHO-sponsored program under the Ministry of Health (MOH), Sultanate of Oman.

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