



Management of DM and its complications

Problem Statement

- Diabetes which is a chronic diseases on its own and major risk factor for other chronic diseases.
- IDF-2009: the number of people with diabetes in India is around 50.7 million
- Expected - 70 million by 2025
- CARRS-2015: In Delhi DM -25.2% and prediabetes-47.6%
- DUDS: Diabetes @18.3% and Prediabetes @39.1%

Problem Statement

- Indians succumb to diabetes, high blood pressure and heart attacks 5-10 years earlier
- Loss of productive years to the country.
- Huge economic loss (237 billion dollars by the year 2015)

What is Diabetes

- Diabetes - body does not produce or properly use the hormone *INSULIN*
- Leads to *abnormally elevated* levels of glucose in blood, a condition classically termed as diabetes

Type I diabetes (T1DM)

- Younger people, children and adolescents
- Diagnosis - more likely below 15 yrs of age
- Onset is usually acute and severe and insulin is required for survival
- Autoimmune destruction of the beta cells in the pancreatic islets
- Family history of diabetes is rare
- Presence of features of associated autoimmune disorders

Type 2 diabetes (T2DM)

- Commonest type of diabetes
- Occurs usually after the age of forty years
- But even at lower age among Indians
- Onset - insidious and may be mild to severe
- Family history is usually positive and strong
- No insulin dependence till late

Gestational Diabetes (GDM)

- Occurs among women during pregnancy
- It is associated with a risk of complications during pregnancy and delivery
- Children of women with GDM are at an increased risk of Type 2 diabetes in the future.

Who is at risk?

- Above the age of 30 years
- Overweight (BMI is more than 23kg/m^2).
- Physically inactive
- High blood pressure
- Smoker,Alcoholic
- Prediabetes
- Triglyceride and/or cholesterol levels are higher than normal.
- Family history
- If she delivered a baby whose birth weight was 4 kgs or more.
- If she has had diabetes or even mild elevation of blood sugars during pregnancy.

When to suspect?

- Symptoms of uncontrolled hyperglycemia: *Excess thirst, Excess urination, Excess hunger with loss of weight*
- Frequent infections
- Non-healing wounds
- Fatigue
- Impotence in men

Criteria for diagnosis (*venous sample*)

	Fasting Glucose	2-hour Post-Glucose Load
Diabetes Mellitus	≥ 126	≥ 200
Impaired Glucose Tolerance	< 100	>140 to <200
Impaired Fasting Glucose	≥ 110 to <126	

Criteria for diagnosis (*Capillary sample*)

	Fasting Glucose	2-hour Post-Glucose Load
Diabetes Mellitus	≥ 126	≥ 220
Impaired Glucose Tolerance	< 100	> 160 to < 220
Impaired Fasting Glucose	≥ 110 to < 126	

Role of HbA1c

- Reflects long term plasma glucose values (3 months)
- If $<6\%$: NORMAL
- $6\%-6.5\%$: PREDIABETES
- $>6.5\%$: DIABETES
- Ref: RSSDI Guidelines 2015
- *Note: Lot of variations in HbA1c values in Indian labs, at best it is not recommended to use HbA1c as the sole diagnostic criteria for DM*

Management of Type 2 Diabetes at Sub-centre and PHC/CHC level

Initial Assessment

- History and physical examination
- Assessment of blood glucose level
- Presence of CVD risk factors (lipid profile, hypertension)
- End-organ damage (urine for protein/ ECG/ fundus examination)

History and physical examination

History (Ask for)	Physical Examination (Look for)
Symptoms of hyperglycemia	Weight
Duration since onset of symptoms	Body Mass Index
Precipitating factors such as recent infections, stress, change in dietary habits or physical activity levels	Waist circumference, Waist-hip ratio
Symptoms of Micro and Macro-vascular Complications: visual disturbances, edema, breathlessness, angina, intermittent claudication, numbness, paraesthesiae	Acanthosis nigricans *
Hypertension, pre-existing cardiovascular Diseases	Blood pressure
Drug history	Peripheral pulses
Diet	Feet: calluses, ulcers, prominent veins, edema, injuries
Physical Activity: type, frequency	Fundus examination
Family History	Cardiovascular system
-Diabetes and complications -Age at onset -Cardiovascular disease, if any	Peripheral nervous system Thyroid

**Acanthosis nigricans is a brown to black, poorly defined, velvety hyperpigmentation of the skin, usually present in the posterior and lateral folds of neck, axilla, groin, umbilicus, and other areas. This occurs due to insulin spillover (from excessive production due to obesity or insulin resistance) into the skin which results in its abnormal growth, and the stimulation of colour producing cells. The most common cause would be insulin resistance, usually from type-2 diabetes mellitus.*

Principles of Management

- Modify Lifestyle: diet and physical activity
- Reduce Insulin resistance through reduction in weight, specifically reduction of fat mass.
- Pharmacological treatment (if inadequate control): Metformin/ Sulfonylureas.
- Treatment for high blood pressure: ACE Inhibitors, Calcium channel blockers such as amlodipine and diuretics such as hydrochlorothiazide.
- Lipid control with statins.

Lifestyle Modification

- Healthy and balanced diet
- Reduce weight
- Reduce intake of oil and fats
- Increase intake of fruits and vegetables
- Quit tobacco and alcohol
- Take medicines regularly
- Eye Screening: by an ophthalmologist at the time of diagnosis and every two years thereafter

Cont.

- *Prediabetes: Loose 5-10% of body weight, 150 mins of physical activity per week and 6-8 hrs of uninterrupted sleep at night*
- *Quit Alcohol/ Tobacco*

DIABETES:

- *Daily: 30 mins of aerobics, 15 mins of work related activity and 15 mins of muscle strengthening.*
- *Small, frequent meals at fixed times of day - avoid changing meal times frequently.*
- *Quit Alcohol/ Tobacco*
- *Reinforce above advice at each visit*

Pharmacotherapy

Biguanides (Metformin)

- Mechanism of Action: Insulin sensitizer
- **Dose:** varies from 250mg to 2000mg/day.
 - Administer dose after a major meal
 - Dose of metformin can be titrated based on blood glucose monitoring at intervals of 2-4 weeks
 - Start the patient on metformin and increase the dose to at least 1g/day
 - If despite this dose, optimum glucose control is not achieved, a sulphonylurea should be added

Cont.

Advantages of Biguanides (Metformin)

- No weight gain; some patients may experience weight loss. Hence metformin is useful in large majority of patients who are overweight.
- No hypoglycaemia
- For monotherapy in obese patients
- Can be combined with other anti-hyperglycemic agents including insulin

Cont.

Contraindications of Biguanides (Metformin)

- Renal (Creatinine > 1.5mg% in men; Creatinine > 1.4mg% in women) / hepatic disease
- Cardiac / respiratory insufficiency; other hypoxic condition severe infection
- Alcohol abuse
- History of lactic acidosis
- Use of I/V radiographic contrast media Pregnancy
- Temporarily withhold: surgery, acute illness

Phenformin is a banned drug and is not recommended

Pharmacotherapy

Sulphonylureas (Glibenclamide)

- Dose:
 - varies from 2.5-20mg/day, given in one or two doses
 - Dose can be titrated based on blood glucose monitoring at intervals of 1-2 weeks
- General rule: glucose lowering effect plateaus after half-maximal recommended dose
- Approved Indications: monotherapy; in combination with metformin and insulin
- Caution: Hypoglycemia can occur most likely among elderly, those with worsening renal function and among those with irregular meal schedules.

General Guidelines for using oral anti-diabetic agents

Non-obese people with type 2 diabetes:

- Start with a sulphonylurea/ meglitinide or glitazone. If even after two to four weeks of initiation of treatment, symptoms still persist then a drug from another group like metformin can be added.
- If the initial blood sugar levels are very high or acute complications like ketosis are present, insulin has to be considered for treatment even at the onset, for a brief period.
- If the initial assessment shows presence of complications like diabetic retinopathy or nephropathy, insulin therapy on a continuous basis should be considered.

Cont..

Obese people with type 2 diabetes:

- Starting drug is ideally metformin.
- Similar Guidelines as mentioned in previous slide can be used to achieve good metabolic control with addition of other drugs like sulphonylureas/ meglitinides or glitazones and/ or insulin.

Lean people with type 2 diabetes:

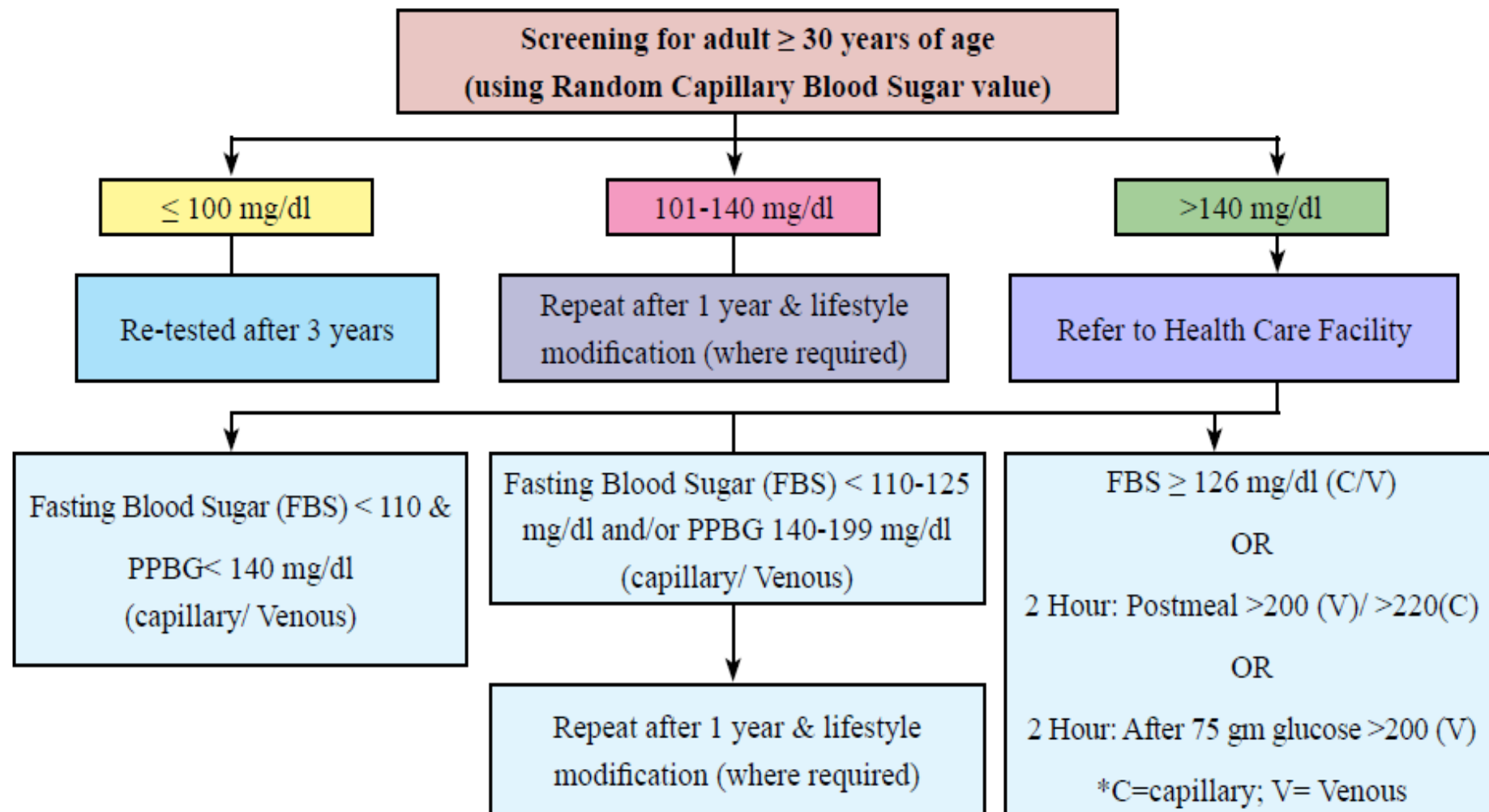
- Metformin is better avoided and the use of sulphonylureas and glitazones may be considered as first line of management.
- Quite often, such people with diabetes may require insulin for better control.

Combination of oral drugs with insulin

- When the glycemic control is not achieved with the maximum dose of an oral agent/ combination therapy, this is called “secondary failure to oral hypoglycemic agents (OHA).
- While using combination therapy, the oral drugs may be continued in optimal doses, while intermediate acting/long acting/short acting insulin is added either at bed time or in the morning depending on the blood sugar profile of person with diabetes.
- However, if indicated, one should not hesitate to use insulin in multiple doses to achieve tight metabolic control.

The targets of control in Diabetes management

Ideal Targets of Control in the management of Diabetes	
Fasting Blood Glucose	<115 mg/dl
Post Meal Blood Glucose	<160 mg/dl
HbA1C	<7%
Total cholesterol	<180 mg/dl
LDL-cholesterol	<100 mg/dl
HDL cholesterol	>45 mg/dl
Blood pressure	<130/80 mmHg
Serum TG	<150 mg/dl
<i>Source: ICMR 2005 guidelines</i>	
<i>Please Note: The targets for diabetic population are lower than the non-diabetes</i>	

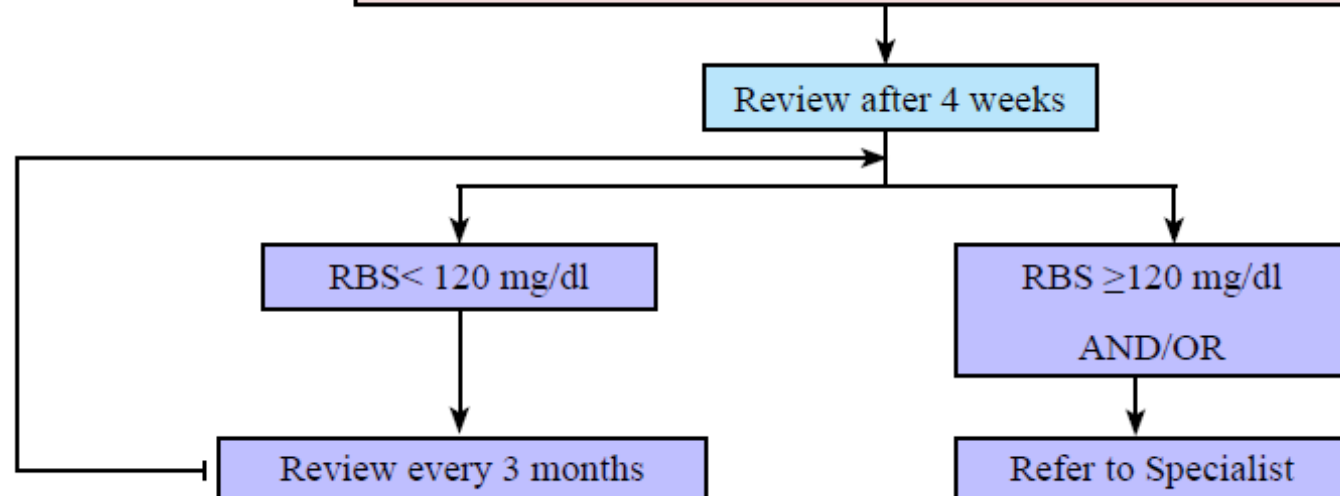


Please Note:

- 1. This algorithm is prepared on the basis of recommendation of an expert group on Diabetes (2016).*
- 2. This algorithm is meant to be used at primary health care level by the MO.*
- 3. Whenever possible, venous blood sugar testing should be preferred.*
- 4. On follow up visit both FBS and PPBS to be done preferably to assess control of diabetes in cases on treatment.*

1. Lifestyle modification
2. Metformin 500 mg twice daily
3. Get baseline evaluation done for#
 - a. Blood pressure
 - b. Eye check-up (Fundus)
 - c. S. Creatinine
 - d. Urine albumin, S. Creatinine, lipid profile
 - e. ECG
 - f. Foot care
 - g. Any other, as required

#Repeat after one year or as required



Diabetes patient education and diet counselling

Initial Visits	Follow-up Visits
What is Diabetes?	Importance of Glycaemic Control
Why does it occur?	Prevention of Complications
Lifestyle measures: Diet, Exercise	Foot Care
Detailed lifestyle advice	Newer modalities of treatment
Use of Oral Drugs	Marriage Counseling
Advice on identifying signs and symptoms of hypoglycaemia and hyperglycaemia and their Management.	Pre-conceptional counselling regarding the importance of glucose control prior to Pregnancy.
Patient should be informed about the importance of factors other than glucose control: Cholesterol, blood pressure, stopping smoking/tobacco, etc.	

MOST IMPORTANT

- **Diet and exercise – All patients and each visit**
- Glucometers may be used for assessing glucose levels
- All individuals with diabetes aged > 40 years must receive a statin or as per CVD algorithm
- Screen for main symptoms of *tuberculosis* (fever, cough, weight loss, night sweats), and if required refer

Foot Care

- Inspect your feet daily for cracks, blisters, infections, and injuries.
- Avoid walking barefoot or without socks
- Cleanse feet with lukewarm water and mild soap and dry well especially between the toes
- Clip nails carefully. Do not cut calluses or corns, and do not use chemical agents on them
- Choose soft good shoes. Let them be a size bigger
- See your doctor to check your feet during your regular visits for diabetes care

Eye Care

- The Retina/fundus of all diabetes patients need to be checked at least once a year by a trained ophthalmologist even if there are no eye symptoms and the vision is 6/6.
- The patient needs to be accordingly referred for the same to the CHC, where ophthalmologist.

Checklist for preventing diabetes complications

- Every 3-6 months the patient should have a physical review by the physician.

Checklist for the follow-up is as follows:

- Test blood sugar levels
- Test glycosylated hemoglobin levels (HbA1C) (if facilities are readily available)
- Examine feet for sensations and circulation; Also for calluses, dryness, sores, infections, injuries
- Check blood pressure
- Help the patient to give up tobacco, if he/she continues to use tobacco
- Reinforce of life style measures- increase physical activity levels and improve diet

Referral criteria for all visits:

- Uncontrolled infections,
- Co-morbid conditions, e.g., Hypertension, CAD, COPD, CKD etc.
- Severe cellulitis,
- Unresponsive UTI or other deep seated infections including bad diabetic foot needing intravenous antibiotics,
- Recurrent UTI not responding to oral antibiotics,
- Presence of ketones in urine

Hypoglycemia

Symptoms

- Severe weakness
- Unable to think clearly
- Experience severe headache
- Sweating

Actions to be done by the patient:

- Mild symptoms: Drink a glass of milk, have a bowl of curd or eat something
- Severe symptoms: 10-15 gm of sugar to suck in the mouth

Management of the unconscious patient

- Make the patient to lie down on a flat surface
- Left lateral position
- Make sure the tongue has not fallen back
- Give 50% injectable dextrose/glucose i.v. stat
- **If IV facilities are not available:**
- Take water (100- 200 ml) in steel glass. Add 10-15 heaped spoons of sugar and shake/stir vigorously with the spoon. ***Keep adding sugar and shaking/stirring vigorously, till no more sugar dissolves***
- Then pull in/suck this solution in the syringe (without the needle). Then drop by drop, drip the few drops of the solution through the syringe on the ***inside of the cheek*** which is in the extreme lateral position
- Keep dripping for 5-10 minutes
- After the patient gains consciousness make sure he is given some complex carbohydrates to eat- roti, or sandwich, or rice-dal, or some dry snacks or a handful of nuts

Daibetic Ketoacidosis

- Onset over 24-48 hrs
- Nausea, vomiting, excess thirst, severe abdominal pain, ployurea, deep and gasping breathing, confusion, lethargy, stupor and coma
- Dehydration, tachycardia, low BP, fruity breath, hyperglycemia and positive urinary ketones.
- More in uncontrolled diabetics
- Refer urgently
- Children are prone to cerebral edema: be vigilant
- Prevention: '*Sick Day Rules*'

Follow up schedule

- Every 3 months with FPG and PPPG values (HbA1c desirable), BP, weight at each visit, Diet & Exercise advice, Patient education, Foot Examination.
- Yearly full work up and review with a specialist
- Referral to higher centre whenever necessary

Follow up-complications

- Ophthal: fundus examination every 2 yrs till no retinopathy
- Smoking/ Alcohol cessation, BP, Physical Exam : Every visit
- Microalbuminuria, Lipids, Distal Peripheral Neuropathy, Peripheral Arterial Disease: Annually
- Comprehensive foot care: Annually
- Cardiovascular: As per CVD algorithm/ physicians recommendation

Management of Complications:

- **Eyes:** Diabetic Retinopathy; immediate referral for sudden loss of vision/retinal detachment
- **Diabetic Neuropathy:** symptomatic/painful neuropathy-exclude other causes. Treat as pr expert advice.
: Erectile dysfunction, Gastro-paresis, cardiovascular neuropathy
- **Diabetic Nephropathy:** KFTs, Microalbumin annually or as recommended by expert. Urgent referral in case of worsening symptoms
- **Foot Care:** Detailed foot exam at each visit, teach foot care to patient, refer for infection/ulceration



**THANK
YOU**