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| Chapter title | Aspect of Care (sub-chapter) | Hook (lesson) | Content |
| Prevention, screening and diagnosis | Diabetes overview | Diabetes is a group of metabolic disorders characterized by hyperglycaemia, which can lead to complications if left untreated | * Diabetes mellitus, commonly known as diabetes, is a group of metabolic disorders characterized by the presence of hyperglycaemia (raised blood sugar) in the absence of treatment. The underlying causes of diabetes include defects in insulin secretion, insulin action or both. The most common types are outlined below.      * Long-term complications of diabetes include retinopathy (eye complications), nephropathy (kidney complications) and neuropathy (complications of the peripheral nervous system). These complications are more likely to occur if blood glucose is not controlled. * People with diabetes are also at increased risk for cardiac, peripheral arterial and cerebrovascular diseases, cataracts, erectile dysfunction and non-alcoholic fatty liver disease. * Having a diagnosis of diabetes is associated with an increased risk of some infectious diseases such as tuberculosis and COVID-19, and people with diabetes are more likely to experience poor outcomes. * Prompt diagnosis and appropriate management of diabetes is necessary to prevent the development of complications and preserve quality of life. * Watch Professor Kamlesh Khunti explain the importance of early intervention in diabetes management.   <<INSERT VIDEO HERE>> |
| Diabetes is associated with the dysfunction and/or destruction of pancreatic beta-cells | * The underlying characteristic common to all forms of diabetes is the dysfunction and/or destruction of pancreatic beta-cells, which are responsible for producing insulin. The human pancreas cannot renew beta-cells after the age of 30 years, so these cells are not replaced, and the typical process of blood glucose regulation is disrupted.      * Many mechanisms can lead to a decline in function or the complete destruction of beta-cells. These mechanisms include genetic predisposition and abnormalities, epigenetic processes, insulin resistance, autoimmunity, concurrent illnesses, inflammation and environmental factors. * Insulin reduces blood sugar by allowing glucose to move into cells where it is used for energy.      * In the absence of sufficient insulin or reduced insulin sensitivity, such as occurs in diabetes, the body is not able to utilize glucose for energy in its cells. Instead, glucose remains in the bloodstream, leading to hyperglycaemia. |
| Prediabetes is defined as impaired fasting glucose and impaired glucose tolerance | * Impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) are insulin resistance conditions with associated beta-cell dysfunction. Insulin resistance is the condition where a given concentration of insulin does not sufficiently induce the intended biological response. Factors associated with insulin resistance are shown below.      * Prior to the development of type 2 diabetes, pancreatic beta-cells can usually compensate for insulin resistance by producing more insulin, so the individual remains metabolically healthy, though metabolically challenged. * Increased insulin production puts strain on the beta-cells and their function gradually deteriorates, causing blood glucose levels to slowly increase (see figure). At this point, individuals do not reach the cutoff for the diagnosis of diabetes, but this ‘prediabetes’ state confers high risk for the development of diabetes and can consist of IFG, IGT or a combination.      * Some people with prediabetes can revert to normal glucose tolerance via sustainable physical activity and weight loss. However, approximately 70% of people with prediabetes progress to type 2 diabetes. |
| Type 1 diabetes, type 2 diabetes and gestational diabetes are very different from each other and have different treatment approaches | * In type 1 diabetes, the pancreas stops producing insulin as a result of beta-cell destruction by autoantibodies. The onset of type 1 diabetes is most common in childhood and early adulthood, but can occur at any age, and requires daily administration of insulin. Type 1 diabetes has previously been described as insulin-dependent diabetes, juvenile-onset diabetes or immune-mediated diabetes. * In type 2 diabetes, the pancreas continues to produce insulin but production decreases over time. Symptoms of type 2 diabetes can be mild and slow to develop. As a result, the disease may be diagnosed several years after onset, when complications have already arisen. * Gestational diabetes is characterized by blood glucose values above normal but below those diagnostic for diabetes. Women with gestational diabetes have an increased risk of complications during pregnancy and at delivery. These women and possibly their children are more likely to develop type 2 diabetes in the future. |
| Risk factors, prevention and screening | Onset of type 2 diabetes can often be prevented or delayed through lifestyle changes | * Unlike type 1 diabetes, type 2 diabetes is often preventable. This is because the diseases have different aetiologies. Risk factors for type 1 diabetes are not entirely clear, but include:   + certain genetic haplotypes   + unknown environmental factors * There are multiple risk factors for type 2 diabetes, many of which are modifiable.     Reflection question: How many patients do you routinely see who have one or more risk factors for type 2 diabetes?   * Addressing modifiable risk factors via lifestyle changes can help to prevent or delay onset of type 2 diabetes.      * Risk factors for gestational diabetes include an age above 25 years, obesity, hypertension and a family history of diabetes. |
| Screening can help to diagnose type 2 diabetes earlier, potentially leading to improved long-term outcomes | * Screening is a rough sorting process that separates people who probably do have a condition from those who probably do not. * Type 2 diabetes has a long latent, asymptomatic period; it is estimated that onset of disease occurs 4 to 7 years before diagnosis. Consequently, many people with type 2 diabetes already have microvascular complications at the time of diagnosis. * Screening for hyperglycaemia can help to identify people who are at risk for preventable diabetes complications so that earlier treatment can be offered. Early diagnosis and treatment of type 2 diabetes are associated with improved life expectancy and quality of life. * People between the ages of 40 and 70 or younger people with at least one known risk factor should be screened for type 2 diabetes annually, where possible.   Reflection question: How could you introduce a screening programme for your patients?   * Screening for type 2 diabetes should be carried out more frequently in adults who have overweight or obesity and at least one other risk factor (see figure).      * Screening can identify individuals with prediabetes who can be treated earlier in the disease course to delay or prevent progression to type 2 diabetes. * Gestational diabetes is diagnosed through prenatal screening. Women who are diagnosed with gestational diabetes should have life-long testing at least every 3 years. |
| Meet Neema, a 55-year-old woman with obesity and hypertension | *Let’s reflect on what we have learnt so far in this chapter and begin to put learnings into practice.*    Neema is a 55-year-old woman with obesity and hypertension. She is attending the clinic for a blood pressure review. Her last visit to the clinic for check-up was 2 years ago, and no blood tests were performed at this time. Neema has three children, who are now adults. She had gestational diabetes while she was pregnant with her youngest child 27 years ago.  Vital signs  Weight: 89.8 kg (198 lb)  Height: 157.5 cm (5’2”)  BMI: 36.2 kg/m2  BP: 149/99 mmHg  **Family history**  Father has type 2 diabetes (diagnosed aged 61) and cardiovascular disease  **Reflection questions**  Consider what you would do in the scenario, with a focus on the following questions. If you are unsure about the answers, consider recapping the content of this chapter.   * Considering Neema’s clinical profile and history, why is she at increased risk for developing type 2 diabetes? * Which risk factors could be addressed with effective lifestyle interventions? Which cannot? * Would you screen Neema for type 2 diabetes at this visit, or would you offer lifestyle advice and review in 3 months? * If you decide not to screen now, but Neema does have undiagnosed diabetes, what are the possible health consequences?   **Now that you have reflected on these questions, see below for an example of how you could respond.**  Neema has uncontrolled, high blood pressure and obesity, two important risk factors for development of type 2 diabetes. Her age (over 40 years) and medical and family history also put her at risk – she had gestational diabetes when pregnant with her youngest child, and she has a first degree relative (father), with type 2 diabetes.  Both Neema’s hypertension and obesity can be addressed with lifestyle interventions (and medication), which make these ‘modifiable’ risk factors. Neema’s age, history of gestational diabetes, and family history, are non-modifiable risk factors.  Lifestyle advice is important for Neema, but she should be screened for type 2 diabetes as a priority due to the presence of risk factors. If she is not screened now and she does have type 2 diabetes, Neema is at high risk of developing health complications associated with hyperglycaemia including eye disease, kidney disease, nerve damage, and cardiovascular disease. |
|  | Diagnosing diabetes | Symptoms of type 1 diabetes often present suddenly, while symptoms of type 2 diabetes are slower to evolve | * Most people with prediabetes and type 2 diabetes do not experience symptoms. Because type 2 diabetes is often asymptomatic, it is important to follow screening advice for individuals who present with risk factors. * Type 1 diabetes should be suspected in younger patients (<40 years) and those without risk factors for type 2 diabetes. At the time of diagnosis of type 1 diabetes, the patient should always be referred to a hospital for immediate initiation of insulin treatment. * Some people with undiagnosed or unmanaged diabetes experience impaired growth and have a higher susceptibility to certain infections. * When diabetes is not promptly diagnosed or adequately managed, acute, life-threatening consequences include diabetic ketoacidosis (predominantly in type 1 diabetes) and hyperglycaemic hyperosmolar non-ketotic syndrome (predominantly in type 2 diabetes). |
|  |  | Diabetes can be diagnosed using multiple different tests | * Multiple tests are available for diagnosing type 2 diabetes. A good diagnostic test identifies individuals with the disease and is precise, standardized, easy to perform and inexpensive. * Diagnosis of diabetes is based on values of plasma glucose or glycated haemoglobin (HbA1c) and can be diagnosed using several tests, outlined in the table below.   + If the patient is asymptomatic, the same screening test should ideally be repeated on a different day to confirm the diagnosis.      * Each of these tests has advantages and disadvantages. |
|  |  | A diagnosis of diabetes can have psychological implications | * A diabetes diagnosis can be upsetting for many individuals. The lifestyle changes and treatment associated with diagnosis can feel overwhelming and unmanageable.   Reflection question: How would you respond if you or a family member was diagnosed with diabetes?   * Helping people with diabetes and their families adjust to the behavioural demands of living with this condition may reduce the risk of long-term complications as well as promote a positive quality of life. * It is also helpful to understand how people feel about their diagnosis, and their beliefs about diabetes as a disease. Personal perceptions of diabetes can be assessed by asking simple questions such as: “*What does it mean to you to have diabetes?*” or “*What do understand about diabetes?*”      * Working with individuals and their families to better understand their disease, its potential consequences and treatments, might help to foster a positive mindset towards long-term self-care. |