



Patient Medical Data on Changes in their Situation that are Related to Chronic Diseases

*Ms. Mangal Kamble^{*1}, Mr. Ashish Ekhande², Mr. Suryateja Akella³, Deepali Suryavanshi⁴*

Sanjay Ghodawat University, School of Pharmaceutical Science, Atigre, Kolhapur-416118.

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ABSTRACT:

Goal of this review, it is possible to successfully obtain direct patient information regarding health and illness by employing contextual approaches, which integrate more and less organized techniques in community and home environments. Medical area includes vast amount of data which issuitable for data analysis. Lots of research work in medical bigdata has been done in recent years, targeting on data collection, data analysis and visualization. The goal of this review was to provide a framework for understanding the difficulties involved in gathering contextual data. the improvement of clinical care, patient outcomes, or satisfaction in patients with chronic diseases when using a patient-held medical record (PHR) as opposed to standard care.

Keywords: Chronic disease, Age, Treatment, Medical record.

Introduction

Chronic diseases (such as diabetes, asthma, heart disease, lung disease, cancer, depression, stroke, hypertension, and Alzheimer's) are responsible for seven out of ten deaths each year, and treating people with chronic diseases accounts for 86% of health care costs according to the Centers for Disease Control and Prevention. In the United States, more than 140 million Americans live with one or more chronic conditions, and the population is expected to grow by at least 10 million new cases per decade (Anderson 2010). Along with the growing patient population, the costs of chronic care have also escalated over the last decades, and account for over 75% of the total national health expenditures in the United States (CDC 2014)[1]. Of all Medicare beneficiaries, 68% suffer from two or more chronic diseases.2 Readmission rates associated with chronic diseases have recently garnered attention from policy makers and healthcare providers due to their highcost burden on the healthcare system. Information systems and analytics research may be extremely helpful in generating fresh ideas for health strategies and solutions as professionals in the field, healthcare practitioners, and policy makers hunt for novel approaches to reduce healthcare costs while enhancing the process and delivery of treatment. Precision medicine is one example of the type of care being provided; other examples include how and where care is provided (e.g., remote monitoring); patient portals and telemedicine are examples of how patients interact with providers; online patient communities are examples of how patients interact with caregivers and other patients; conversational agents are examples of how patients receive medical information; and organizations within the healthcare ecosystem exchange information and coordinate around patient care[2].

There are few steps which involved in collection of patient medical data;

1. Medical History Assessment:

- Thorough examination of the patient's medical history to identify past illnesses, familial predispositions, and relevant events contributing to the chronic condition.

2. Symptom Documentation:

- Systematic recording of specific symptoms associated with the chronic disease, enabling healthcare professionals to gauge severity and progression over time.

3. Diagnostic Investigations:

- Inclusion of results from diagnostic tests, such as blood work, imaging studies, and biopsies, providing a foundation for accurate diagnosis and ongoing monitoring.

4. Lifestyle Factors Analysis:

- Collection of data on the patient's lifestyle choices, including diet, exercise routines, and stress levels, to assess their impact on the chronic disease and inform tailored interventions.

5. Medication History and Adherence:

- Documenting current and past medication regimens, along with evaluating the patient's adherence to prescribed treatments, ensuring a comprehensive understanding of the therapeutic landscape.

6. Quality of Life Assessments:

- Incorporating tools to measure the patient's quality of life, considering physical, emotional, and social wellbeing, offering insights into the broader impact of the chronic disease on daily living.

7. Healthcare Utilization Tracking:

- Monitoring hospital admissions, emergency room visits, and outpatient consultations to assess the effectiveness of current management strategies and identify areas for improvement.

8. Patient-reported Outcomes:

- Encouraging patients to actively contribute by self-reporting symptoms, challenges, and treatment-related experiences, fostering a collaborative approach to care.

9. Remote Monitoring Technologies:

- Leveraging technological advancements like wearables and telehealth tools to collect real-time data, enhancing continuous monitoring and early intervention opportunities.

10. Psychosocial Assessment:

- Considering psychological and social factors, such as mental health status, support systems, and socioeconomic influences, to address holistic aspects of chronic disease management.

This systematic approach to data collection empowers healthcare providers with a comprehensive understanding of the patient's journey, laying the groundwork for personalized and effective chronic disease care.

Certainly, here's a few chronic diseases which we have selected for medical data collection:

1. Hypertension (High Blood Pressure)
2. Diabetes
3. Thyroid
4. Jaundice
5. Arthritis

Hypertension[3-4]

Hypertension, commonly known as high blood pressure, is a chronic medical condition characterized by elevated blood pressure levels in the arteries. Blood pressure is the force exerted by the blood against the walls of the arteries as the heart pumps it around the body. It is measured in millimeter of mercury (mmHg) and is expressed as two values: systolic pressure over diastolic pressure.

Systolic Pressure (Top Number): Represents the pressure in the arteries when the heart contracts or beats.

Diastolic Pressure (Bottom Number): Reflects the pressure in the arteries when the heart is at rest between beats.

Typically measured in millimeters of mercury (mmHg), a normal blood pressure reading is around 120/80 mmHg. Hypertension is diagnosed when blood pressure consistently exceeds 130/80 mmHg.

Key Points:

1. Prevalence: Hypertension is a widespread health concern globally, often referred to as the "silent killer" because it may not present noticeable symptoms while exerting significant strain on vital organs.

2. Risk Factors: Various factors contribute to the development of hypertension, including age, genetics, lifestyle choices (such as diet, physical activity, and tobacco use), and underlying health conditions.

3. Complications: Untreated hypertension can lead to severe complications, including heart disease, stroke, kidney damage, and vision impairment.

4. Classification:

- **Normal:** Systolic < 120 mmHg and Diastolic < 80 mmHg
- **Elevated:** Systolic 120-129 mmHg and Diastolic < 80 mmHg
- **Hypertension Stage 1:** Systolic 130-139 mmHg or Diastolic 80-89 mmHg
- **Hypertension Stage 2:** Systolic \geq 140 mmHg or Diastolic \geq 90 mmHg

5. Diagnosis: Blood pressure is measured using a sphygmomanometer, and a diagnosis of hypertension is typically based on multiple readings taken on separate occasions.

Regular blood pressure monitoring and routine health check-ups are crucial for early detection and effective management of hypertension, reducing the risk of associated complications and promoting overall cardiovascular health.

Diabetes [5-6,11]

Diabetes, also referred to as diabetes mellitus, is a long-term metabolic disease marked by high blood glucose (sugar) levels. This disorder happens when the body either cannot create enough insulin or cannot adequately utilize the insulin it produces. The pancreas secretes the hormone insulin, which controls how readily cells absorb glucose for energy.

Key Points:

1. Types of Diabetes:

Type 1 Diabetes: Results from the immune system attacking and destroying the insulin-producing cells in the pancreas. People with Type 1 diabetes require insulin injections for life.

Type 2 Diabetes: Occurs when the body does not use insulin properly, often coupled with inadequate insulin production. It is more common and is often associated with lifestyle factors like obesity and physical inactivity.

2. Symptoms:

Common symptoms include excessive thirst, frequent urination, unexplained weight loss, fatigue, and blurred vision. However, some individuals may not exhibit noticeable symptoms.

3. Diagnosis:

Diabetes is typically diagnosed through blood tests measuring fasting glucose levels, oral glucose tolerance, or glycated haemoglobin (HbA1c) levels.

4. Complications:

Chronic hyperglycemia (high blood sugar) in diabetes can lead to long-term complications affecting various organs, such as the eyes (diabetic retinopathy), kidneys (diabetic nephropathy), nerves (diabetic neuropathy), and cardiovascular system (increased risk of heart disease and stroke).

5. Management:

Lifestyle Modifications: A cornerstone of diabetes management includes adopting a healthy lifestyle, which involves a balanced diet, regular physical activity, weight management, and avoiding tobacco use.

Medications: Depending on the type and severity of diabetes, medications may be prescribed to lower blood glucose levels, improve insulin sensitivity, or enhance insulin production.

Insulin Therapy: Essential for individuals with Type 1 diabetes and may be prescribed for some with Type 2 diabetes when other treatments are insufficient.

Thyroid [7-8]

The thyroid is a butterfly-shaped gland that sits beneath the Adam's apple in the front of the neck. By generating the hormones triiodothyronine (T3) and thyroxine (T4), it is essential for controlling the body's numerous metabolic activities. These hormones affect growth, metabolism, energy production, and the way tissues and organs operate.

Key Points:

1. Hormones Produced:

Thyroxine (T4): A prohormone that gets converted to the more active form, T3, in the body.

Triiodothyronine (T3): The more active thyroid hormone, influencing metabolism and energy utilization.

2. Regulation by the Pituitary Gland:

The thyroid gland is regulated by the pituitary gland in the brain. The pituitary releases thyroid-stimulating hormone (TSH), which stimulates the thyroid to produce and release T3 and T4.

3. Thyroid Disorders:

Hypothyroidism: Occurs when the thyroid produces insufficient hormones, leading to symptoms such as fatigue, weight gain, cold sensitivity, and depression.

Hyperthyroidism: Results from an overactive thyroid, causing symptoms like weight loss, increased heart rate, anxiety, and heat sensitivity.

Thyroid Nodules: Abnormal growths in the thyroid gland that may be benign or, in some cases, cancerous.

4. Autoimmune Thyroid Disorders:

Hashimoto's Thyroiditis: An autoimmune condition where the immune system attacks the thyroid, leading to hypothyroidism.

Graves' Disease: An autoimmune disorder causing hyperthyroidism by stimulating excessive thyroid hormone production.

5. Diagnosis:

Blood tests measuring TSH, T3, and T4 levels help diagnose thyroid disorders. Imaging studies, such as ultrasound or radioactive iodine scans, may be used to evaluate the structure and function of the thyroid.

6. Treatment:

Hypothyroidism: Usually treated with synthetic thyroid hormone replacement medications (levothyroxine).

Hyperthyroidism: Treatment options include medications to reduce hormone production, radioactive iodine therapy, or in some cases, surgery to remove part or all of the thyroid gland.

7. Thyroid Cancer:

Thyroid cancer can develop in the thyroid nodules. Treatment may involve surgery, radioactive iodine therapy, and sometimes external beam radiation.

Jaundice[15]

Jaundice, also known as icterus, is a medical condition characterized by the yellowing of the skin, mucous membranes, and the whites of the eyes. This yellow discoloration is caused by an excess buildup of bilirubin, a yellow pigment produced during the breakdown of red blood cells. Bilirubin is usually processed by the liver and excreted in the bile, but when there's a disruption in this process, jaundice can occur.

Key Points:

1. Bilirubin Formation:

Bilirubin is a byproduct of the normal breakdown of haemoglobin in red blood cells. It is transported to the liver for further processing.

2. Types of Jaundice:

Pre-hepatic Jaundice: Caused by an excess production of bilirubin, often due to rapid red blood cell breakdown. Conditions like haemolytic anaemia can contribute to this type.

Hepatic Jaundice: Results from liver dysfunction, where the organ is unable to process bilirubin effectively. Hepatitis, cirrhosis, and certain medications can cause hepatic jaundice.

Post-hepatic Jaundice (Obstructive Jaundice): Occurs when there's a blockage in the bile ducts, preventing the excretion of bilirubin. Gallstones, tumors, or inflammation can lead to posthepatic jaundice.

3. Symptoms:

Yellowing of the skin, eyes, and mucous membranes.

Dark urine due to the presence of excess bilirubin.

Pale-colored stools as a result of decreased bilirubin excretion.

4. Underlying Causes:

Various conditions can contribute to jaundice, including liver diseases (hepatitis, cirrhosis), haemolytic disorders, bile duct obstruction, and certain genetic conditions.

5. Diagnosis:

Blood tests measure bilirubin levels and help identify the underlying cause of jaundice.

Imaging studies, such as ultrasound or CT scans, may be used to visualize the liver, bile ducts, and surrounding structures.

6. Treatment:

The treatment of jaundice depends on the underlying cause.

Management may involve addressing the specific condition causing jaundice, such as antiviral medications for hepatitis or surgical intervention for bile duct obstruction.

Arthritis

Arthritis is a broad term referring to the inflammation of one or more joints, causing pain, stiffness, swelling, and reduced joint mobility. There are more than 100 different types of arthritis, each with its unique features, but the two most common forms are osteoarthritis and rheumatoid arthritis.

Key Points:

1. Osteoarthritis (OA):

Degenerative Joint Disease: OA is the most prevalent form of arthritis and is characterized by the breakdown of joint cartilage over time.

Risk Factors: Aging, joint overuse, obesity, and joint injuries are common risk factors for developing osteoarthritis.

2. Rheumatoid Arthritis (RA):

Autoimmune Disorder: RA is an autoimmune disease where the immune system attacks the synovium, a membrane lining the joints, causing inflammation.

Symmetrical Joint Involvement: Unlike OA, which often affects one joint, RA typically affects joints on both sides of the body.

3. Other Types of Arthritis:

Spine and major joints are affected by ankylosing spondylitis.

Psoriatic arthritis: Associated with psoriasis, a skin disorder

Uric acid crystals accumulating in the joints are the cause of gout.

Children can develop juvenile arthritis.

Lupus Arthritis: Associated with the autoimmune illness lupus.

4. Symptoms:

Joint pain, swelling, and stiffness.

Reduced range of motion.

Fatigue, especially in autoimmune forms of arthritis.

Warmth and redness around affected joints.

5. Diagnosis:

A combination of medical history, physical examination, imaging studies (X-rays, MRIs), and blood tests is often used to diagnose arthritis.

6. Treatment:

Medications: Nonsteroidal anti-inflammatory drugs (NSAIDs), disease-modifying antirheumatic drugs (DMARDs), and analgesics may be prescribed.

Physical Therapy: Exercises and stretches to improve joint function and strengthen supporting muscles.

Lifestyle Modifications: Weight management, joint protection strategies, and adaptive tools can help manage symptoms.

Surgery: In severe cases, joint replacement surgery may be considered.

Patients with Chronic Disease Medical data according Age Groups:

Table no: 1 Patients with Hypertension Disease

Number of Patients	Disease	Age group	Symptoms	Treatment	Medication
1	HTN	76	Fatigue, Breathlessness	Antihypertensive ACE inhibitor	Amlodipine, Lisinopril
1	HTN	71	Dizziness, vomiting	Antihypertensive Drugs, Diet control	Nifedipine, enalapril
1	HTN	64	Anxiety, Fainting	Diet control, weight control	Amlodipine, Telmisartan
1	HTN	82	Headache, Fatigue	Medication, stress management	Enalapril, metoprolol
1	HTN	62	Palpitation sweating	low sodium diet, diuretic	Thiazide

Table no: 2 Patients with Diabetes Mellitus

Number of patients	Disease	Age Group	Symptoms	Treatment	Medication
1	DM	80	Type 2 diabetes	1st line metformin & Anti diabetics	Metformin, Glimepiride 1/500
1	DM	76	Prediabetes	Diet control, self-care, Anti diabetic medication	No any requirements
1	DM	65	Gestational diabetes	Insulin dependent or metformin	Insulin
1	DM	91	Type 2 diabetes	1st line metformin & Anti diabetics	Meglitinides, Metformin, Glimepiride
1	DM	70	Type 1 diabetes	Insulin dependent	Insulin

Table no: 3 Patients with Arthritis

Number of Patients	Disease	Age group	Symptoms	Treatment	Medication
1	Arthritis	37	Joint Pain, stiffness	diet control, omega 3 fatty acids	steroids, injection, narcotics
1	Arthritis	48	swelling of joint pain, reduce range of motion	weight loss, regular exercises, NSAID	ibuprofen, diclofenac
1	Arthritis	68	tenderness, weakness, deformity	application of heat -cold therapy, quit smoking	naproxen, Voltari
1	Arthritis	76	reduced joint space, fatigue, joint instability	control blood sugar, healthy weight	Azathioprine, prednisone, cyclosporine
1	Arthritis	55	difficulty in stair climbing, pain, swelling, stiffness	exercise, diet control, weight loss, calcium supplements	calcium citrate, calcium vitD3

Table no: 4 Patients with Thyroid Disease

Number of Patients	Disease	Age group	Symptoms	Treatment	Medication
1	Thyroid	34	difficulty in swallowing fatigue	manage stress diet control	Synthroid, Triosin
1	Thyroid	47	weight gain, constipation, dry skin	low sodium diet, weight control	Levothyroxine, levothroid

1	Thyroid	51	weight loss, sweating, irregular heartbeat	antithyroid, exercise, stress management	liothyronine, levothyronium
1	Thyroid	37	fatigue, cold sensitivity	diet control	methimazole
1	Thyroid	58	muscle cramps, fatigue, anxiety, hair loss	low sugar processed foods, antithyroid drugs	carbimazole, levothyroxine

Table no: 5 Patients with Jaundice

Number of Patients	Disease	group	Symptoms	Treatment	Medication
1	Jaundice	47	weight loss, fever	cessation of alcohol	tab quitor
1	Jaundice	55	tiredness, loss of appetite	avoid hepatitis infection	rifampine supplements
1	Jaundice	62	abdominal pain, dark urine	cholesterol management, healthy weight	naltrexone cholestyramine
1	Jaundice	54	yellow eyes, diarrhoea, nausea	alcohol limits, balanced diet	tab liv 52 sandu jaundix syrup
1	Jaundice	67	itching, vomiting, fatigue	avoid toxins	cetirizine, fexofenadine

Discussion & Conclusion:

The first major category of challenges was concerned with the researcher-participant partnership, for example, the initial lack of mutual trust and understanding between researchers, patients, and family members. The second category concerned patient characteristics such as cognitive limitations and a busy personal schedule that created barriers to successful data collection. The third concerned research logistics and procedures such as recruitment, travel distances, and compensation. The fourth concerned scientific quality and interpretation, including issues of validity, reliability, and combining data from multiple sources. The two illustrative studies faced both common and diverse research challenges and used many different strategies to address them [15].

Data accuracy for electronic patient medical records and hospital administration data has previously been investigated for a number of clinical outcome indicators, such as diagnosis accuracy and adverse event rates. To the best of the author's knowledge, however, this is the first study that compares and shows variations in the degree of agreement and completeness of capture amongst hospital data collection techniques for length of stay and discharge destination.

Our findings show that compared to the ward-based data-set, the administrative data-set taken from i.PM contained a more comprehensive collection of hospital admission and discharge data. Crucially, no distinct data was obtained from ward-based sources that wasn't obtained through i.PM. Consequently, electronic patient management tools may be able to be relied upon by researchers, hospital managers, and doctors as a successful means of capturing

Summary

Data collection for patients with chronic diseases involves systematically gathering information on medical history, tracking symptoms, assessing lifestyle factors, and monitoring treatment adherence. Utilizing technology for real-time data enhances personalized care, facilitates early intervention, and contributes to improved outcomes in chronic disease management.

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