

Software Based Medical Assistance and Hospital Database Management

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Of the degree of

Electronics and Telecommunication Engineering

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Project Report Approval for B.E

This project report entitled **Software Based Medical Assistance and Hospital Database Management** by *Sharique Mulla, Arzan Pathan, Ubaid Rehman Qureshi* and *Shaikh Md.Tauqeer*, under the guidance of *Prof. Zarrar Khan* is approved for the degree of Electronics and Telecommunication Engineering

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Declaration

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Abstract

Identifying a particular type of disease within exact and particular amount of time is extremely crucial for doctors and casualties both. The hurry is not only till detecting the disease but it turns up to be never ending thing as complex treatment methods with 1.8 million casualties only in India creates a havoc for doctors, patients and for complete treatment mechanism. Hence, it is important to have a system, which carry complete data in systematic manner for doctors, patients and even for nurse perspective.

This project consists of data analysis software, which will provide an ease to doctors as it helps to detect what type of disease it is and moreover it helps to estimate the severity of any particular disease. Patients themselves will get the complete sample history of previously affected patients on the other hand nurses will not only rely on files for knowing the history and next required steps for current casualties.

Contents

	Page no.
Abstract	
1. Introduction.....	1
2. Literature survey.....	4
3. Problem Statement.....	9
4. Diseases Covered.....	10
4.1 Diabetes.....	10
4.2 Malaria.....	13
4.3 Food Poisoning.....	17
4.4 Dengue.....	19
4.5 Cholera.....	23
5. Software details.....	27
5.1 Windows Forms.....	27
5.2 Visual Studio.....	28
5.3 Microsoft SQL Server.....	29
5.4 Entity Framework.....	30
6. Results and GUI.....	32
6.1 Form 1 - Startup form.....	32
6.2 Form 2 - Symptoms and Diseases	33
6.3 Form 3 – Disease information.....	34
6.4 Form 4 - Find Hospitals	35
6.5 Form 5 - Hospital Section.....	36

7. Conclusion.....	38
8. Future Scope.....	39
References.....	41

List of Figures

	Page no.
Figure 2.1 Network of Classifications of Medical Errors.....	8
Figure 4.1 Diabetes Analytics.....	10
Figure 4.2 Malaria Analytics.....	13
Figure 4.3 Food Poisoning Analytics in India.....	17
Figure 4.4 Dengue Analytics in India.....	20
Figure 4.5 Cholera Analytics in India	23
Figure 5.1 Windows forms application.....	27
Figure 5.2 Visual Studio Logo.....	28
Figure 5.3 Microsoft SQL server Logo.....	29
Figure 5.4 Entity Framework in visual studio.....	30
Figure 5.5 Entity framework model.....	31
Figure 6.1 Startup form.....	32
Figure 6.2 Symptoms and diseases section.....	33
Figure 6.3 Disease information.....	34
Figure 6.4 Find Hospitals Section.....	35
Figure 6.5 Hospital database section.....	36
Figure 8.1 Doctor's information and appointment.....	39
Figure 8.2 Real-time location using IP address.....	39

List of Tables

	Page no.
Table 2.1 IEEE papers referred.....	4

Chapter 1

Introduction

The development of this software is carried out on Microsoft Visual Studio, which is an Integrated Development Environment (IDE) made by Microsoft. Windows form application is developed as it provides front end designing with C# language for all back end-coding aspects. SQL server database is used to store all kind of data regarding patient's current details and history with the samples of previously affected patients including each treatment methods and also mentioning the details of doctors which were in charge.

This project currently provides three services, one is to estimate a disease a patient is having, second is to eradicate all the difficulties in data handling because of paper dependency. All the records of current patient and previous patients of will be stored in a particular manner, which can further be used for analyzing any future havoc. Thirdly, this project helps to find out the nearest hospital available to serve accordingly.

Software is developed with respect to different point of views of doctors, patients, physios, nurses, etc. and deals with different medical elements to provide complete management of the hospital database.

It is a windows desktop application, which deals with the various conceptual and practical data for prominently common diseases in India and its treatment with respect to each and every specialization of its kind. A section within this software provides check boxes for almost every symptom and the software is programmed in such a way that if one less prominent symptom is missed or added extra then the most expected disease will only be shown. Though at any level a machine cannot replace a doctor hence this software does not prescribe any medicines it just shows all home remedies and precautions only.

This software is going to provide an another level of ease to everyone related to medical system, for casualties as everything will be known and expected for every kind of disease irrespective of its rareness. This application will be available because of live updating of data per patient, rather than updating data within files, it will be more adequate to do that digitally. Because of this any person, including doctors, nurses and casualties can access the position of patient any point of time.

Hospital search is available in two ways; you can search through the name or either through the address. Also, new hospitals can be added in the database by the user for their future references. Patient's data can be added, altered or removed any time from admin login.

The use of healthcare analytics software is at an all-time high at health systems across developed countries. In fact, an eHealth Initiative survey asked 102 healthcare organizations about their use of data and analytics and discovered that a whopping 90 percent use analytics for their quality improvement initiatives and revenue cycle management. In that same questionnaire, 82 percent identified the importance of using analytics for population health management even though some haven't started to use analytics for this purpose yet.

Why the sudden analytics trend? The reality is that analytics can unlock the tremendous insight of stored hospital data and help organizations become data driven. The knowledge can then be used to drive system wide improvements for clinical and operational benefits. In fact, a 2015 report from CDC states that because of analytics, organizations are already realizing gains like these: 82 percent improvement in patient care, 63 percent reduced readmissions rates, 62 percent improvement in overall health outcomes, and 54 percent improved financial reporting capabilities.

Foundational reporting applications automate the process of providing users with access to data through an efficient reporting and data distribution system. In addition, the applications display dashboards and basic registries for a broad range of clinical and operational conditions. They also show critical information about trends and patterns in the data.

How one health system used a foundational application to improve clinical inefficiencies?

Texas Children's Hospital had an electronic health record (EHR), but it was not meeting clinicians' needs for providing useful data. What data physicians did get was through a cumbersome, time-consuming process. To solve this problem, first, Texas Children has implemented an EDW. Then it adopted a foundational application, Population Explorer. With the application's registries and library of commonly defined measures, the hospital's improvement teams could identify and choose short-term and future projects quickly. Texas Children's has been able to reduce the time required to develop clinical program improvement projects by 85 percent.

Changing an organization's culture to become data driven can be a challenge. But this change is necessary for organizations to realize the full value of an analytics investment. There is, however, a way to successfully bring about this shift in culture by gaining leadership's (both clinical and administrative) buy-in and support. The right vendor will assist organizations with this process.

The best analytics software solution in the world is of no value if it's not affordable, which is why it's important to measure the total cost of ownership (TCO). To do this, add up the three-year labor costs, licensing fees (including third-party), support fees, and hardware costs associated with the solution in mind. The TCO over three years should be evenly distributed, not front-end loaded. The contract should be structured with escape clauses if the vendor's solution cannot prove value in the first year. In today's market, health systems should expect initial value from their software in less than six months, and preferably only three months. If a vendor cannot or will not commit to this timeframe, look for another vendor.

Chapter 2

Literature Survey

Table 2.1 IEEE papers referred

Author	Year	Title	Work
<ul style="list-style-type: none"> • Vahid Azizi • Mojgan Lotfi • Farzad Jalali 	2012	Designing of Electronic Health Record Software in the Nursing and Midwifery Faculty of Tabriz.	An Electronic Hospital concept is use so as to store the patient's data efficiently rather than on some file.
<ul style="list-style-type: none"> • Mohamed Ramadan • Khalid Al-Saleh 	2013	Development of an Expert System for Reducing Medical Errors.	Medical Errors has been taken into consideration so as to get proper treatment to patient.
<ul style="list-style-type: none"> • Esmail Mehraeen • Maryam Ahmadi, • Ousef Mehdipour • Tayyebeh Noori 	2014	Evaluation of Hospital Information Systems in Selected Hospitals of Iran.	HIS (Hospital Information System) is use in selected hospitals so as to avoid duplication of data and to improve the care quality.

Title: -

Designing of Electronic Health Record Software in the Nursing and Midwifery Faculty of Tabriz.

Work done: -

An Electronic Hospital concept is use so as to store the patient's data efficiently rather than on some file.

Methods

This is a research and development (R&D) study that led to the construction of the educational software of the patient-health assessment in pediatric burn units. Research and development in economy and industry is a creative work including human knowledge to create a new product.⁷ At first several health assessment models, such as Roy, Martha Rogers, Orem and Gordon were reviewed.

Gordon model was selected for ease of use as an electronic database of the patients' records. This model with eleven categories examines the health status of the patients. Then the daily charts were added in order to complete relevant information. Microsoft C#NET was used as programming language. This is one of the newest and the most popular object-oriented programming language that is compatible with windows products. The user interface was designed by the latest components of TELERIK Company that supports Microsoft's standards. Microsoft SQL Server was used to design database system of this software, which was consistent with C#NET programming language that is one of the most important operating systems in use today. SAP Crystal Report was used for reporting, which is one of the most powerful reporting systems, compatible with the .NET programming language technology. Then in the next three months the charts and tables were converted into an electronic software package.

Results

Most of the researches indicate that one of the perique-sites for introducing computer-based nursing process documentation is the use of standard and predefined health care strategies so that all the records would be based on nursing standards. The advantages of using predefined programs are as follows:

- 1) This leads to higher efficiency of health care plans and decreasing problems of the documentations as well as being related to the use of nursing terminology

- 2) Standards will lead to clear nursing care; its components will be comparable with each other. It can be an essential step in improving the quality of nursing management, too.
- 3) The learners will be supported by using these standards, which offer the possibility of knowledge exchange between nursing team members.
- 4) More information can be recorded and the data loss will be reduced.

Using predefined health care standards will facilitate understanding of the nursing process and consequently, support nursing training. The findings indicated that the acceptance of the computerized documentation was easier for the care units in which nursing process was accepted. The studies showed that when introducing computerized systems, the expected goals should be clearly specified, including the development of the clinical records (as a guide for better nursing management), improving quality of clinical records, reduction in efforts in data recording, the increasing use of the clinical information recorded in nursing researches, and finally the enhancement communication between the care team members. Achieving these goals is possible with co-ordination of different clinical teams; so nurses will be prepared to accept the use of predefined care plans as well as nursing standards. There are many studies on psychological effects of using software tools and electronic documentation methods in the clinical environments.

According to the results, psychological changes due to computerization can lead to stress, uncertainty and confusion in medical staff. On the other hand, the users' satisfaction and attitudes towards the electronic methods is the main factor in using digital documentation software. Other studies showed that this method is more effective than paper records. According to many studies the factors influencing nurses' attitudes towards the acceptance of the digital documentation systems include: job variables such as working hours per week, education level, organizational position and workplace environment. Various software formats have been designed by some countries including Germany, the USA, and Canada. This kind of software aims to improve the healthcare and the quality of documentation. However, in Iran, there is no model that can independently support nursing documentations.

Title: - Development of an Expert System for Reducing Medical Errors.

Work: - Medical Errors has been taken into consideration so as to get proper treatment to patient.

Based on the above literature, errors in the medical field can occur in many different ways, with potentially diverse, wide-ranging and hazardous effects. A review of the varied errors related to fundamental areas such as medication, diagnosis, treatment procedures and clerical procedures in terms of their number, ethology and possible ramifications, is a complex domain. Consideration of the number of possible alterations of specific elements or actions in a health-related setting that might be identified as errors, connected with the large variety of “system” type errors, drives us to conclude that we are dealing with a tremendous range of possibilities. A classification is an arrangement of concepts into classes and their subdivisions linked to express the semantic relationships between them. For example, ‘contributing factors’ precede and perform a role in the generation of any ‘incident type’. An incident can be a reportable circumstance, near miss, or harmful incident (adverse event).

A reportable circumstance is a situation in which there was significant chance for harm, but no incident occurred (i.e., a busy intensive care unit remaining grossly understaffed during all shift time, or taking a defibrillator to an emergency and finding it out does not work although it was not needed). A near miss is an incident, which did not reach the patient (e.g., a unit of blood being connected to the wrong patient’s vascular, but the error was discovered before the infusion started). A no harm incident is one in which an event reached a patient but no discernible harm resulted (e.g., if the unit of blood was infused, but was compatible). A harmful incident is an incident that results in harm to a patient (e.g., the wrong unit of blood was infused and the patient died from a haemolytic reaction).

Incidents are classified into a number of several types. An incident type is a class made up of incidents of a widespread nature, grouped because of shared agreed features and is a “parent” class under which many ideas may be grouped. For example, an incident in which an infusion pump was set up wrongly and delivered a sedative overdose, causing respiratory arrest, would be allocated both ‘medication’ and ‘equipment’ incident types. Incident types include clinical administration, clinical procedure, documentation, healthcare-associated

infection, medication, blood, blood products, nutrition, oxygen, gas, vapour, medical device, medical equipment, behaviour, patient accidents, infrastructure fixtures, resources and organizational management.

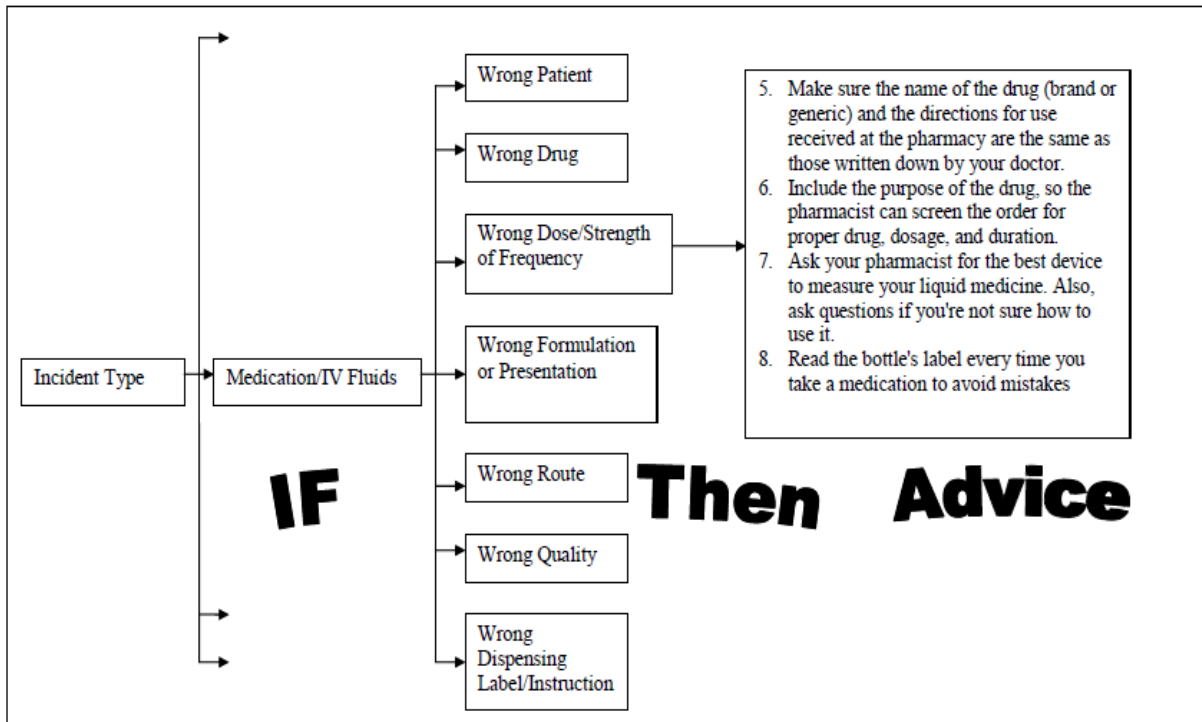


Figure 2.1 Part of the Network of Classifications of Medical Errors

Chapter 3

Problem Statement

In today's world healthcare is becoming expensive day by day because of large population to be served by few doctors. This is not the only problem, since India services 1.8 million casualties with old school method in data handling and analyzing.

Hence, a strong software is needed which overcomes basic flaws within medical system like a lot of paper dependencies. Also, data of any particular patient has to be every time accessible to doctors, nurses and patients.

Chapter 4

Diseases Covered

4.1 Diabetes

How can you tell if you have diabetes? Most early symptoms are from higher-than-normal levels of glucose, a kind of sugar, in your blood. The warning signs can be so mild that you do not notice them. That's especially true of type 2 diabetes. Some people do not find out they have it until they get problems from long-term damage caused by the disease. With type 1 diabetes, the symptoms usually happen quickly, in a matter of days or a few weeks. They are much more severe, too.

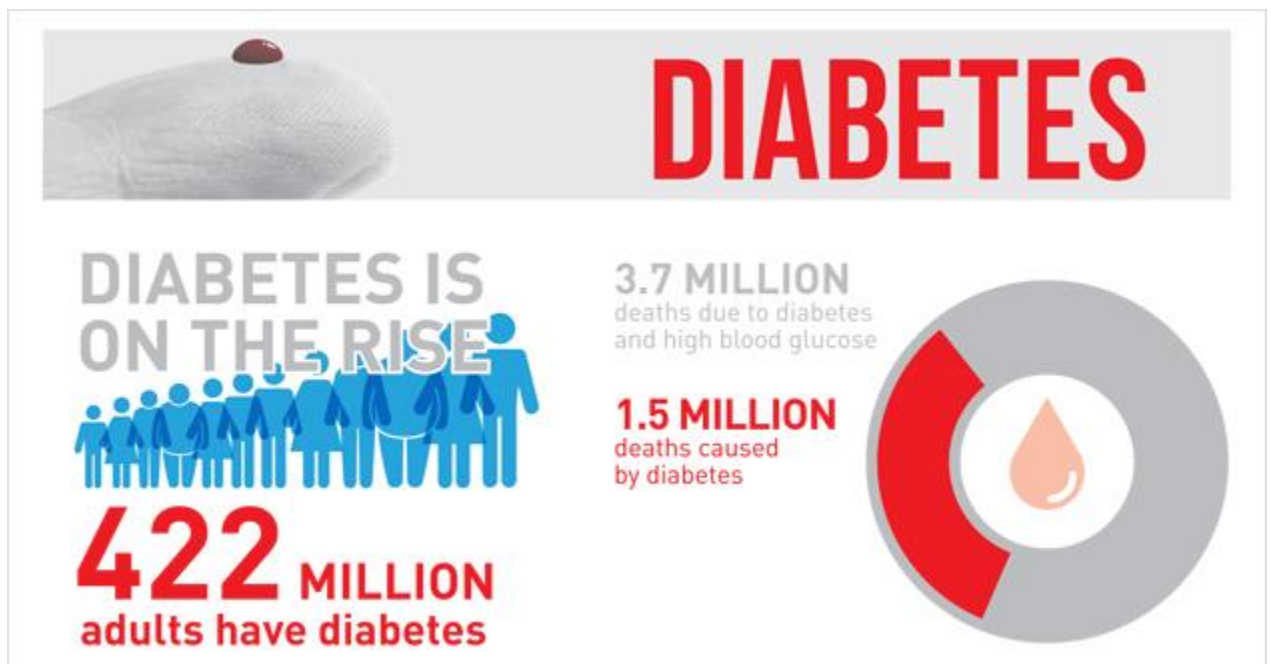


Figure 4.1 Diabetes Analytics

Both types of diabetes have some of the same tell-tale warning signs. Hunger and fatigue. Your body converts the food you eat into glucose that your cells use for energy. But your cells need insulin to bring the glucose in.

If your body doesn't make enough or any insulin, or if your cells resist the insulin your body makes, the glucose can't get into them and you have no energy. This can make you hungrier and tired than usual.

Millions of people all over the world are slacking the rope between too little sugar in the bloodstream or too much. People with diabetes, deal with health problems

every single day. If diabetes is poorly controlled or left untreated, it may lead to blindness, kidney disease, blood vessel damage, infection, heart disease, nerve damage, high blood pressure, stroke, limb amputation, and coma. We give you the list of home remedies for diabetes that includes food remedies for weight control and blood sugar levels.

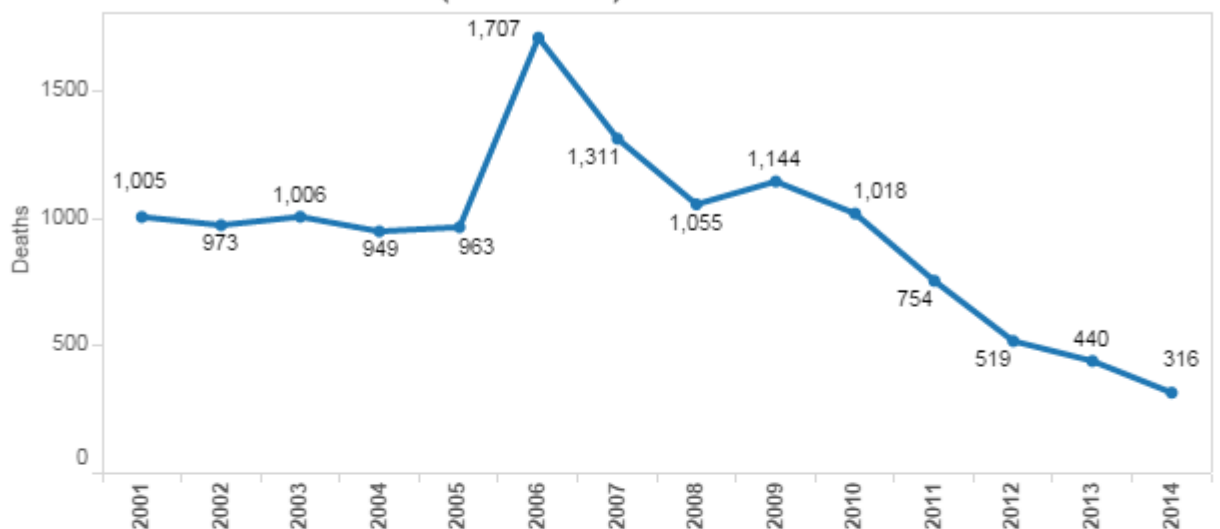
- **Natural uncooked food:** Natural uncooked food is the best medicine for all types of diseases. They have got their own enzymes. They are not diluted with chemicals. Food such as sprouts, fruits, juices, nuts and so on can be taken raw. Eating a diet rich in fibre helps the body to absorb sugars slowly, which in turn keeps blood sugar levels balanced. Soluble type of fibre does the best job of stabilising blood sugar levels. Apples, apricots, beets, berries, carrots, citrus fruits, parsnips, and winter squash are some fruits and vegetables which are rich in soluble fibre. Soluble fibre is also helpful in lowering elevated LDL cholesterol levels, a serious problem in many people with diabetes.
- **Whole sum diet:** Diet, which is a combination of vegetables and fruits get a rich array of antioxidants such as vitamin C. Antioxidants, prevents the oxidation and damage of artery walls, which otherwise can lead to plaque build-up and heart disease.
- **Exercise:** Exercise has the potential to control the diabetes by nonmedical means. It reduces the severity of the disease and significantly reduces the risk of long-term complications. The energy needed for exercise can help people to lose weight, which helps to take some of the risk related to central obesity. Exercise is known to increase insulin sensitivity, which essentially helps to tackle the root cause of type 2 diabetes. In addition, regular exercise can also help to reduce cholesterol levels and help people to reduce high blood pressure. Even a little extra activity each day can help.
- **Meditation:** Meditation lowers the insulin resistance in our body. Stress hormones such as cortisol, adrenaline and noradrenalin intensify the production of insulin and glucose levels. Reducing these neurohormones through the Transcendental Meditation technique helps to balance glucose and insulin in the blood. This helps to normalize metabolic syndrome and diabetes.

- Basil leaves Basil leaves have power to lower blood sugar levels. Basil leaves contain potent antioxidants that relieve oxidative stress; it is this stress that compounds problems in diabetics.
- Cactus juice and flax seeds: Cactus juice from is also helpful. Cactus juice can help decrease and stabilize blood glucose and insulin levels. Consuming flax seed reduces postprandial sugar level by 28 per cent.
- Leaves of bilberry plant and cinnamon: The leaves of the bilberry plant are known to lower blood sugar levels. In addition, 1gram cinnamon in the diet for a month lowers the blood sugar levels
- Green tea: This tea is unfermented and hence has high polyphenol content, which has strong antioxidant and hypoglycaemic effects. The polyphenols help in a controlled release of blood sugars.
- Cinnamon water: Cinnamon is proven to be an effective way of treating diabetes at home. Drinking Cinnamon water with warm water on an empty stomach helps increasing metabolism.
- Drumstick leaves: The fibre content in the leaves increases satiety and slows the breakdown of food.
- Isabgol: Also known as psyllium husk is often used as a laxative. When isabgol comes in contact with water, it swells to form a gel-like substance. This slows the breakdown and absorption of blood glucose. Metformin, a drug commonly used in diabetic treatment, can upset your stomach for which isabgol works as a save guard.
- Reiki: Reiki is more effective than any other dummy treatment at improving the health. It balances the sugar level and natural energy flow in the body.

4.2 Malaria

Malaria is extremely common and a serious disease that causes chills, shivering and high fever. You can get infected from a bite by a malaria parasite carrying mosquito. Malaria is most commonly found in Africa, Southern Asia, South America and Central America. The elderly, children and people with lower levels of immunity are a greater risk. Early diagnosis and anti-malarial medication will help in the effective treatment of malaria. Usually, the malaria is caused by a bite from a mosquito infected with parasites.

Deaths from malaria in India (2001-2014)



Malaria cases detected (2001-2014)

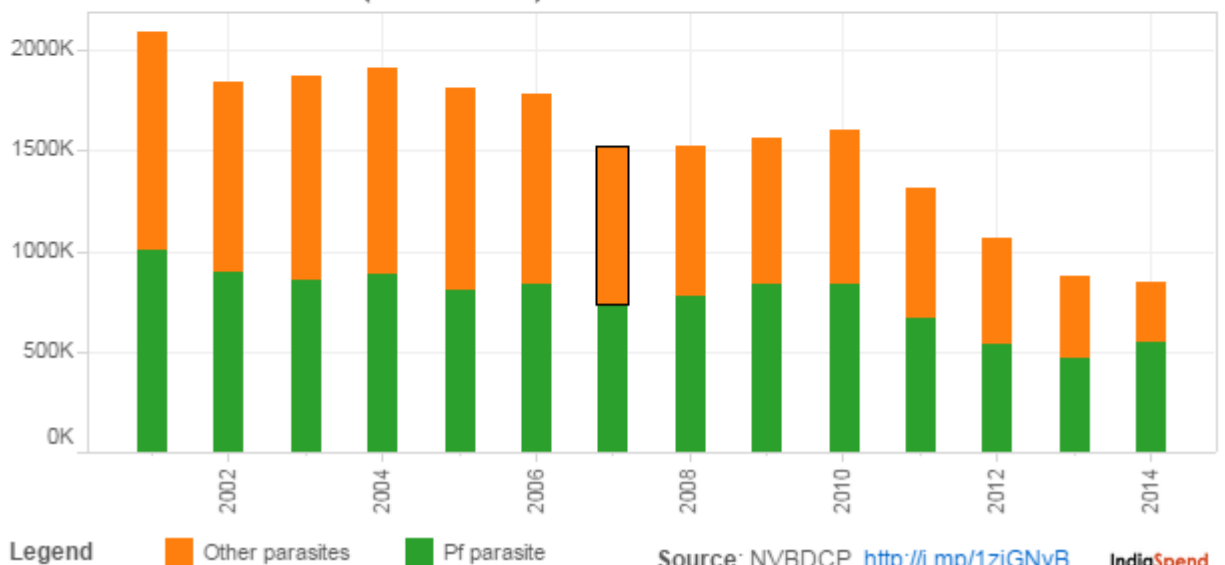


Figure 4.2 Malaria Analytics

Malaria can be transmitted from mother to her developing foetus. Malaria cannot be transmitted from one person to the other directly, in rare cases people are affected with malaria if they come into contact with infected blood. Naturopathy has proved that some natural remedies are effective in preventing and treating ringworm, psoriasis and malaria.

Malaria, a parasitic disease involves high fevers, flu-like symptoms, shaking chills, and anaemia. Malaria is caused by a parasite passed from one human to another through the bite of infected Anopheles mosquitoes. When infected the parasites called 'sporozoites' travel through the bloodstream to the liver. The parasites mature and release a form of merozoites, which enter the bloodstream and spread the infection to the red blood cells.

The parasites then multiply inside the cells that break open within 48 to 72 hours spreading the infection. The symptoms take 10 days to 4 weeks after infection. They may be noticed within eight days or after a year of infection. Some of the most evident signs of malaria are chills, shaking chills that range from moderate to severe along with high fever, headache, vomiting and diarrhoea.

The Most Common Symptoms are:

- Anaemia, caused by destruction of red blood cells
- Merozoites being released into the bloodstream
- Chills in the body
- High fever and headache
- Blood in stools
- Excessive sweating
- Vomiting
- Feeling of Nausea
- Coma
- Jaundice

- Convulsion

The parasite for malaria seems to disappear over the winter. More than one million people die of malaria every year. It is a major hazard for travellers to warm climate. In some parts of the world, the mosquitoes carrying malaria have become resistant to insecticides and the parasites have developed resistance to antibiotics. This has made it much more difficult to control the spread of diseases and rate of infection.

Possible Complications are with the advent of advanced medication, malaria has become a preventable and curable diseases, but it can lead to other serious health complications if it goes undiagnosed and untreated for too long.

The parasites in the body can create different types of complications:

- Cerebrates – brain infection
- Haemolytic anaemia – destruction of blood cells
- Kidney failure
- Meningitis
- Liver failure
- Pulmonary Edema – Fluid in lungs causes respiratory failure
- Haemorrhage – Spleen rupture leading to heavy internal bleeding

Transmission of Malaria

A human being can be infected by malaria parasite if the Anopheles or female mosquito transmits it while feeding on human blood. It must be remembered that male or Culex mosquitoes cannot transmit malaria, only female mosquitoes can be a carrier of malaria that takes the parasite while feeding on the blood of an infected person. The malaria (plasmodium) parasites mix with the saliva of the infected mosquito and are passed on to the host. Because the parasite of malaria exists in the red blood cells, therefore, it can be transmitted from one person to another person through other factors like sharing needles and syringes, blood

transfusion or organ transplant. It can also be passed on from a pregnant woman to her child during delivery which is known as congenital malaria. Malaria is not an airborne disease and cannot be transmitted through cough or sneeze of the infected person.

Prevention

People living in areas where malaria is common found usually develop immunity to the disease. However, visitors will not have this immunity and need to take preventive medications. The symptoms such as fever and chills can be controlled with the Indian home remedies for cold and fever. Before traveling overseas or other areas of your country, you need to see your health care provider. The treatment may begin 2 weeks before your trip for the prevention of malaria. It may also continue for a month after you leave the area.

There are different types of anti-malarial medications prescribed for a different area of visit. Anti-malarial medications will not completely protect you from becoming infected. You need to avoid mosquito bites by using mosquito repellents, creams, wearing protective clothing that will cover your arms and legs and using screens on windows. Maintain clean surroundings by avoiding swamps and drainage flow beside your residence.

It is also important for people living in malaria-prone areas to learn the ways to prevent the diseases. The first and foremost thing to do is administer vector control. This means staying away or controlling the vector of the disease. Controlling the mosquito population is an effective way to reduce the incidence of malaria and other mosquito-borne diseases.

The most important thing is to improve the standard of living of the people by installing screened windows and using mosquito nets. Insecticide-treated bed nets or ITNs are effective in reducing malaria rate. Mosquitoes can pass through the untreated nets if there are tiny holes, but the treated nets make sure that the mosquitoes and other insects are killed.

Anti-malarial medications can also be administered that prevents the parasite from developing in the blood stream. This type of control is also known as suppression.

4.3 Food Poisoning

“Food poisoning” is a broad term that can actually cover a whole lot of different infections. Your exact symptoms and their severity will vary. That will depend on the kind of bacteria, virus, or parasite that has infected you, how much is in your system, and how well your immune system is fighting it off.

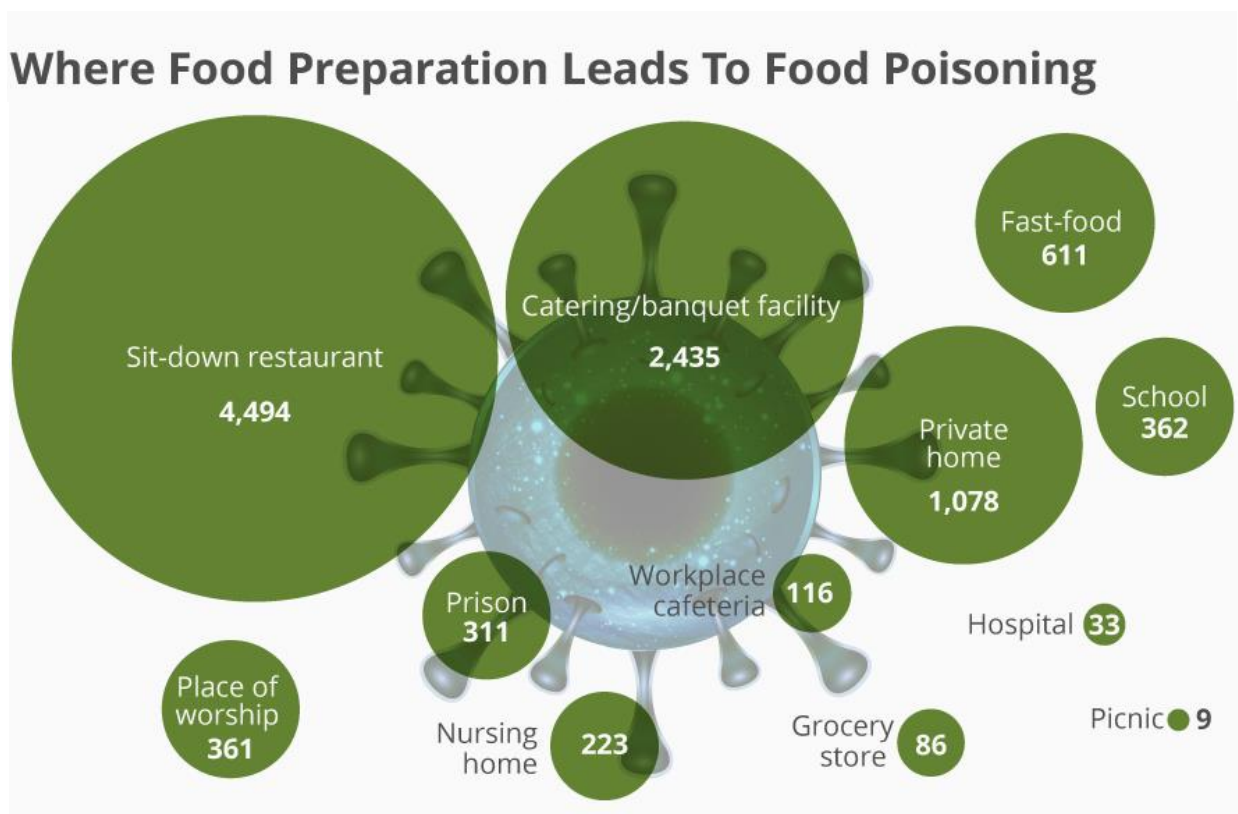


Figure 4.3 Food Poisoning Analytics

Despite the wide range of types, most cases of food poisoning cause some mix of the following:

- Diarrhoea
- Nausea

- Vomiting

If you have a mild case, you might think you have a stomach flu or virus. You may get better without any treatment. But some people have such bad symptoms that they may need to go to the hospital.

Signs You Have Food Poisoning

Cramps in your stomach and gut, diarrhoea, and vomiting may start as early as 1 hour after eating tainted food and as late as 10 days or longer. It depends on what is causing the infection. Some other possible, common symptoms of a variety of food poisonings might include:

- Worst Foods for Digestion
- Bloating and gas
- Fever
- Muscle aches
- Weakness
- Abdominal pain and cramping
- Signs of Botulism

You have probably also heard of one of the nastiest: botulism, a rare but severe type of bacterial food poisoning. Symptoms of botulism might include:

- Slurred speech or blurred vision
- Muscle weakness
- Hard time swallowing
- Dry mouth
- Muscle paralysis from the head down through the body
- Vomiting

A mild case usually passes on its own with just rest and many fluids. You should call a doctor, however, if you or a loved one have:

- Any signs of dehydration: dry mouth, little or no urination, dizziness, or sunken eyes
- Any diarrhoea in a new born or infant
- Inability to hold down liquids without vomiting
- Diarrhoea that lasts longer than 2 days (1 day in a child) or is severe
- Severe gut pain or vomiting
- Fever of 102 F or higher, or a rectal temperature of 100.4 F in a baby younger than 3 months
- Stools that are black, tarry, or bloody
- Muscle weakness
- Tingling in your arms
- Blurry vision
- Confusion
- Diarrhoea or flulike illness in pregnant women
- Jaundice (yellow skin), which can be a sign of hepatitis A

4.4 Dengue

Global incidence of dengue has drastically upped in the last few years. According to the World Health Organization (WHO), there are about 390 million cases of dengue fever worldwide, and of the total number of cases, 96 million require medical treatment. India also saw a doubling up of cases of dengue from 2014 to 2015 and the worst hit city was Delhi with over 1800 cases of the fever. 2016 isn't expected to be any better and this has become a cause of concern for the country.

Dr Sushila Kataria, Division of Internal Medicine, Medanta the Medicity warns, "This year, monsoon is expected to be heavier and so, we must expect as many dengue cases. We are expecting at least a 25 per cent hike in its incidence than the previous year." Though dengue trends have shown a more severe outbreak in alternate years, Dr Sushila believes that for past few years, the incidence has been getting worse each passing year.

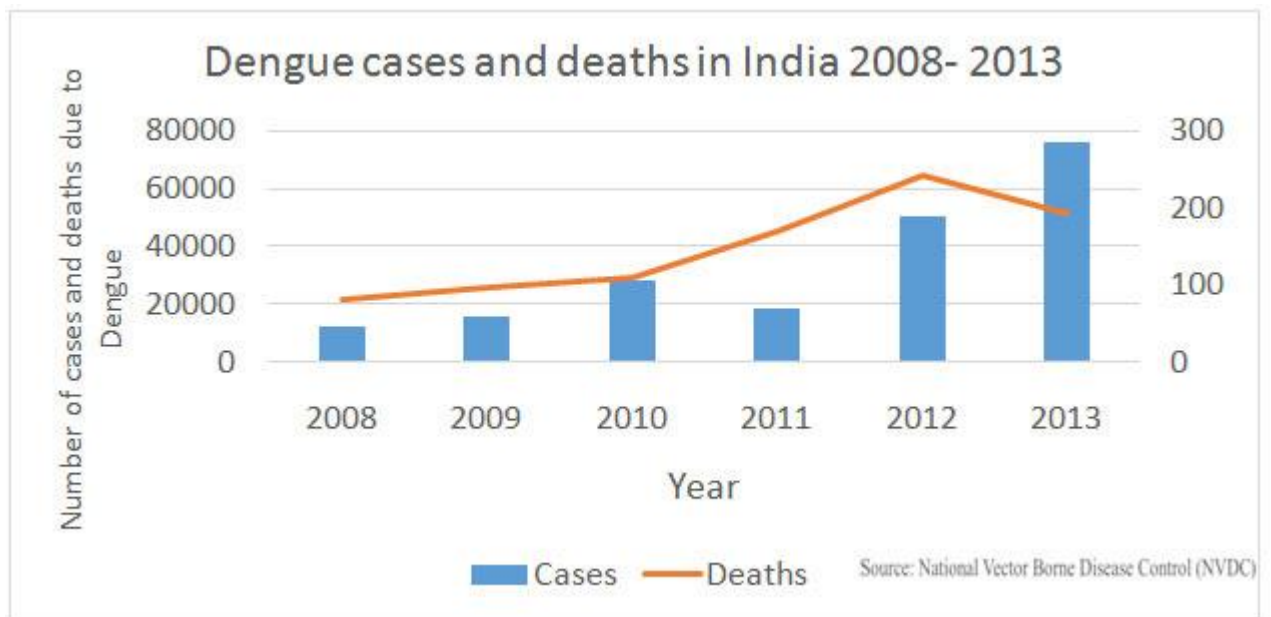


Figure 4.4 Dengue Analytics in India

Dengue and its symptoms

Dengue (pronounced daen-gay) is a mosquito-borne viral disease caused by one of the many closely related dengue viruses. It is an acute illness caused by one of the many types of mosquitoes in the genus *Aedes Aegypti*. Talking about its symptoms, Dr Mukesh Mehra, Senior Consultant, Internal Medicine, Max Super Specialty Hospital, Patparganj says, "Typically people infected with dengue virus are asymptomatic (80 per cent) and only 5 per cent have severe illness."

Early signs of dengue may include high fever, joint pains, headache, nausea, appetite loss, vomiting, dip in blood pressure and would perpetuate with a characteristic skin rash. Though mostly the fever doesn't last beyond a week, some cases may develop more critical and pose life threatening danger. The latter situation is characterized by a drop in the level of blood platelets, blood plasma leakage or a severely low blood pressure.

Dr.Mukesh adds that these symptoms show within the first 2 to 4 days of dengue's commencement. Post that, one may experience a rapid drop in temperature and intense sweating occurs. A day with normal temperature and well-being goes by and the following day one might see an abrupt rise in temperature again. That's when red rashes develop on the body. "However, rashes rarely occur on the face. The palms of the hands and soles of the feet may be swollen and bright red."

The rare case when dengue develops into a life threatening disease is referred to as Dengue Hemorrhagic Fever or Dengue Shock Syndrome. The former is characterized by Hemorrhage (severe bleeding), blood plasma leakage, and an exceptionally low platelet count. While, the latter occurs due to dangerously low blood pressure, which may lead to a circulatory collapse (shock).

Incidence of Dengue

Though the fever can attack anybody, the ones with a weak immune system are at greater risk than others. "Dengue like all other viruses has undergone mutation and nearly four variant strains of dengue have been identified," said Dr Amitabh Parti - Additional Director, Internal Medicine - Fortis Memorial Research Institute, Gurgaon.

Dengue prevention plan

- Dengue virus is mostly active in the early morning and later afternoon.
- Tropical and sub-tropical areas are more prone to dengue outbreaks. Travelers from and across such regions can also carry the disease.
- Reduction of number of mosquitoes by improved water storage, proper waste disposal, and checking water stagnancy.
- Mosquito repellents are also quite effective but they should be used with the following points of caution: Avoid them for infants below 2 months of age; For infants older than 2 months, apply repellents containing 10 per cent DEET; Avoid applying them on palms, near eyes or mouth; Always read the instruction on the label, particularly for babies, pregnant and breastfeeding women.
- Avoid wearing dark and tight clothing because mosquitoes are attracted to dark colors. Wear loose, white and long clothes, which cover the whole body. Mosquitoes find it difficult to bite through loose clothes than tight fitting clothes.
- The worst hit age group has been school and college children. Dr.Sushila believes that an effective implementation of wearing full-sleeved clothes policy can bring down the number of cases by up to 50 per cent.
- The government should ensure a live reporting of its incidence. This will keep people informed and aware of the areas it is more prevalent in, which should translate into a

heightened cautiousness. The practice of a politicized under-reporting of cases should be completely discarded, adds Dr Sushila.

Diagnosis

Dr.Sushila believes that any fever during the rainy season, be it acute or otherwise, should be considered dengue. Proper tests should be run to check the infection because any delay in doing so can prove fatal. Though usually, the fever that lasts beyond 7 days is not dengue, she added.

Diagnosis of this disease isn't difficult. A blood test for the disease against the virus can tell whether the person is affected or not. But what remains a concern is that more often than not, people can brush aside the symptoms of dengue as a less dangerous viral fever. So even if you have a speck of doubt, do not delay to go for the test.

Treatment

What makes the situation grimmer is the absence of an outlined treatment for the disease. An early detection and a proper medication are considered positive factors and help in lowering fatality rate of the disease. See a doctor, take the prescribed medication which are mostly pain relievers, rest and drink maximum fluids. If the situation worsens in the first 24 hours, do not delay going to a hospital for checking against criticalities.

"Aspirin and other NSAID's (like Ibuprofen, Diclofenac) should not be given to patients. These will cause severe bleeding. Hence, it is advisable to take paracetamol to relieve muscle and joint aches, fever and headache," said Dr. Mukesh. He further advises sponging the patient with water at room temperature using a wet, squeezed out towel for about 20 minutes at a time. This will help to lower the high temperature. He warns not to use ice water for this purpose.

Immunization against Dengue

Vaccine for dengue is in its developmental stages. The first vaccine Dengvaxia (CYD-TDV) by Sanofi Pasteur was registered last year (2015) December in Mexico. WHO Strategic Advisory Group of Experts (SAGE) has recommended that the vaccine should be considered only in geographic settings with high endemicity. A vaccine position paper by WHO is expected in July 2016.

4.5 Cholera

Cholera is an acute enteric infection caused by the ingestion of bacterium *Vibrio cholerae* present in fiscally contaminated water or food. Primarily linked to insufficient access to safe water and proper sanitation, its impact can be even more dramatic in areas where basic environmental infrastructures are disrupted or have been destroyed. Countries facing complex emergencies are particularly vulnerable to cholera outbreaks. Massive displacement of IDPs or refugees to overcrowded settings, where the provision of potable water and sanitation is challenging, constitutes also a risk factor. In consequence, it is of paramount importance to be able to rely on accurate surveillance data to monitor the evolution of the outbreak and to put in place adequate intervention measures. Coordination of the different sectors involved is essential, and WHO calls for the cooperation of all to limit the effect of cholera on

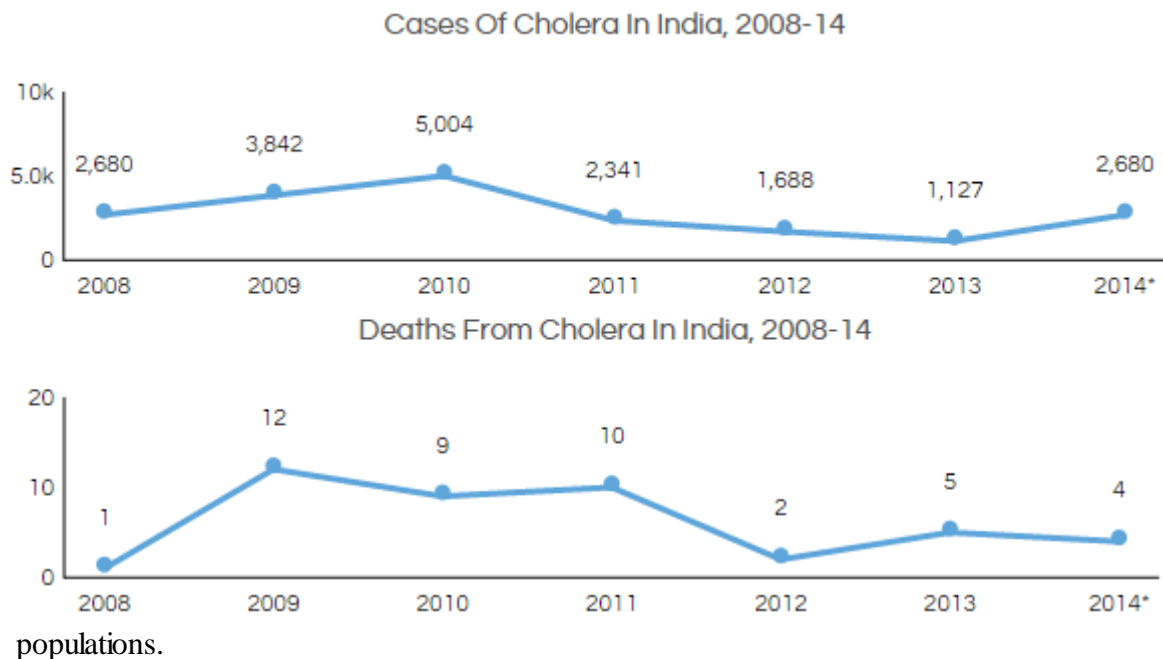


Figure 4.5 Cholera Analytics in India

Symptoms

Cholera is characterized in its most severe form by a sudden onset of acute watery diarrhea that can lead to death by severe dehydration. The extremely short incubation period - two hours to five days - enhances the potentially explosive pattern of outbreaks, as the

number of cases can rise very quickly. About 75% of people infected with cholera do not develop any symptoms. However, the pathogens stay in their faeces for 7 to 14 days and are shed back into the environment, possibly infecting other individuals. Cholera is an extremely virulent disease that affects both children and adults. Unlike other diarrheal diseases, it can kill healthy adults within hours. Individuals with lower immunity, such as malnourished children or people living with HIV, are at greater risk of death if infected by cholera.

Cholera can rapidly lead to severe dehydration and death if left untreated. Prevention and preparedness of cholera require a coordinated multidisciplinary approach

Diagnosis

The presence of *V. cholerae* in stools is confirmed through laboratory procedures. However, a new rapid diagnostic test (RDT), now available, allows quick testing at the patient's bedside. WHO is currently in the process of validating this RDT, to be able to include it on the list of its pre-qualified products.

In the meantime, WHO suggests that all samples tested positive with the RDT are re-tested using classic laboratory procedures for confirmation. Not all cases fitting the WHO clinical case definition need to be tested. Once an outbreak is confirmed, a clinical diagnosis using WHO standard case definition is sufficient¹, accompanied by sporadic testing at regular intervals.

Once *Vibrio cholerae* has been confirmed, the WHO clinical case definition is sufficient to diagnose cases. After that laboratory testing is required for antimicrobial sensitivity testing and for confirming the end of an outbreak. Rapid diagnostic tests can facilitate early warning and detection of first cases.

Prevention

Measures for the prevention of cholera mostly consist of providing clean water and proper sanitation to populations who do not yet have access to basic services. Health education and good food hygiene are equally important. Communities should be reminded of basic hygienic behaviours, including the necessity of systematic hand-washing with soap after defecation and before handling food or eating, as well as safe preparation and conservation of food. Appropriate media, such as radio, television or newspapers should be

involved in disseminating health education messages. Community and religious leaders should also be associated to social mobilization campaigns.

In addition, strengthening surveillance and early warning greatly helps in detecting the first cases and put in place control measures. Conversely, routine treatment of a community with antibiotics, or *mass chemoprophylaxis*, has no effect on the spread of cholera, can have adverse effects by increasing antimicrobial resistance and provides a false sense of security.

Provision of safe water, proper sanitation, and food safety are critical for preventing occurrence of cholera. Health education aims at communities adopting preventive behavior for averting contamination.

Control

Among people developing symptoms, 80% of episodes are of mild or moderate severity. The remaining 10%-20% of cases develop severe watery diarrhoea with signs of dehydration. Once an outbreak is detected, the usual intervention strategy aims to reduce mortality - ideally below 1% - by ensuring access to treatment and controlling the spread of disease. To achieve this, all partners involved should be properly coordinated and those in charge of water and sanitation must be included in the response strategy. Recommended control methods, including standardized case management, have proven effective in reducing the case-fatality rate.

The main tools for cholera control are:

- proper and timely case management in cholera treatment centres
- specific training for proper case management, including avoidance of nosocomial infections
- sufficient pre-positioned medical supplies for case management (e.g. diarrhoeal disease kits);
- improved access to water, effective sanitation, proper waste management and vector control;
- enhanced hygiene and food safety practices;
- improved communication and public information.

Cholera Vaccines

There are two WHO prequalified oral cholera vaccines (OCV) currently available on the market. These vaccines were proven safe, effective and well accepted and are available for individuals aged one year and above. They are administered in two doses given at least 7 days apart. Overall, more than 1.6 million doses of WHO prequalified OCVs have been deployed in mass vaccination campaigns since 1997. WHO official recommendations for the use of OCV have been issued, and state that:

- OCV should always be used as an additional public health tool and should not replace usually recommended control measures such as improved water supplies, adequate sanitation and health education. It needs also to be linked to strengthened surveillance and early warning.
- Pre-emptive vaccination campaigns with OCV should be used in areas where the disease is endemic, including during humanitarian crises, as an additional means for cholera prevention and control, but should not replace usually recommended control measures such as improved water supply, adequate sanitation, food safety, and health education. In such settings, vaccination should be targeted at high-risk areas and high risk population groups, such as displaced populations in camps with precarious living conditions, underserved populations in resource poor settings, etc.
- Mass vaccination campaigns may be organized on a reactive basis, as part of the response to a cholera outbreak which has already commenced, to reduce mortality and limit the spread of the disease. However, vaccination should not disrupt the provision of other high-priority health interventions to control or prevent cholera. Considering the lack of experience with implementing reactive vaccination against cholera, the feasibility and impact of vaccination in halting on-going outbreaks should be documented and results widely disseminated. The use of the parenteral cholera vaccine has never been recommended by WHO due to its low protective efficacy and the high occurrence of severe adverse reactions.

Chapter 5

Software Details

5.1 Windows Form Application

Windows Forms is the new platform for Microsoft Windows application development, based on the .NET Framework. This framework provides a clear, object-oriented, extensible set of classes that enable you to develop rich Windows applications. Additionally, Windows Forms can act as the local user interface in a multi-tier distributed solution.



Figure 5.1 Windows forms application

A form is a bit of screen real estate, usually rectangular, that you can use to present information to the user and to accept input from the user. Forms can be standard windows, multiple document interface (MDI) windows, dialog boxes, or display surfaces for graphical routines. The easiest way to define the user interface for a form is to place controls on its surface. Forms are objects that expose properties which define their appearance, methods which define their behavior, and events which define their interaction with the user. By setting the properties of the form and writing code to respond to its events, you customize the object to meet the requirements of your application.

As with all objects in the .NET Framework, forms are instances of classes. The form you create with the Windows Forms Designer is a class, and when you display an instance of the form at run time, this class is the template used to create the form. The framework also allows you to inherit from existing forms to add functionality or modify existing behavior. When you add a form to your project, you can choose whether it inherits from the 'Form' class provided by the framework, or from a form you have previously created. Additionally, forms are controls, because they inherit from the Control class.

Within a Windows Forms project, the form is the primary vehicle for user interaction. By combining different sets of controls and writing code, you can elicit information from the user and respond to it, work with existing stores of data, and query and write back to the file system and registry on the user's local computer.

5.2 Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft Windows, as well as web sites, web applications and web services. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation,



Figure 4.2 Visual Studio Logo

Windows Store and Microsoft Silverlight. It can produce both native code and managed code. Visual Studio includes a code editor supporting IntelliSense (the code completion component) as well as code refactoring. The integrated debugger works as both a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. It accepts plug-ins that enhance the functionality at almost every level—including adding support for source-control systems (like Subversion) and adding new toolsets like

editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Team Foundation Server client: Team Explorer).

Visual Studio supports different programming languages and allows the code editor and debugger to support (to varying degrees) nearly any programming language, provided a language-specific service exists. Built-in languages include C, C++ and C++/CLI (via Visual C++), VB.NET (via Visual Basic .NET), C# (via Visual C#), and F# (as of Visual Studio 2010). Support for other languages such as Python, Ruby, Node.js, and M among others is available via language services installed separately. It also supports XML/XSLT, HTML/XHTML, JavaScript and CSS. Java (and J#) were supported in the past.

In this project work, we will be making a Windows form Application using visual C# language for the backend coding.

5.3 Microsoft SQL Server

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications—that may run either on the same computer or on another computer across a network (including the Internet).



Figure 5.3 Microsoft SQL server Logo

Microsoft markets at least a dozen different editions of Microsoft SQL Server, aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users.

5.4 Entity Framework

The Entity Framework is a set of technologies in ADO.NET that support the development of data-oriented software applications. Architects and developers of data-oriented applications have struggled with the need to achieve two very different objectives. They must model the entities, relationships, and logic of the business problems they are solving, and they must also work with the data engines used to store and retrieve the data. The data may span multiple storage systems, each with its own protocols; even applications that work with a single storage system must balance the requirements of the storage system against the requirements of writing efficient and maintainable application code.



Figure 5.4 Entity Framework in visual studio

The Entity Framework enables developers to work with data in the form of domain-specific objects and properties, such as customers and customer addresses, without having to concern themselves with the underlying database tables and columns where this data is stored. With the Entity Framework, developers can work at a higher level of abstraction when they deal with data, and can create and maintain data-oriented applications with less code than in traditional applications. Because the Entity Framework is a component of the .NET Framework, Entity Framework applications can run on any computer on which the .NET Framework starting with version 3.5 SP1 is installed.

The following sections in this topic provide more detail about the Entity Framework:

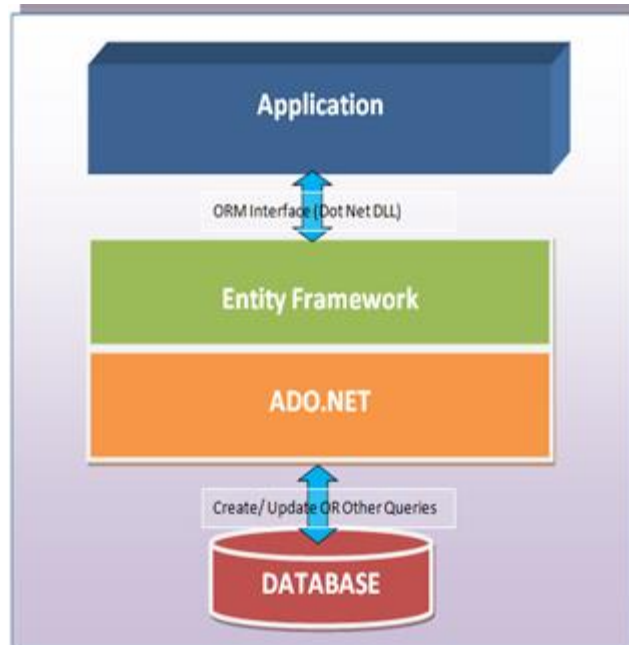


Figure 5.5 Entity framework model

- Giving Life to Models
- Mapping Objects to Data
- Accessing and Changing Entity Data
- Data Providers

Chapter 6

Results and GUI

Following are the results we achieved in the form of front end designing and server based backend coding. We used a number of tools from the windows forms toolbox available in the Microsoft Visual Studio.

Complete details of the tools we learnt to use and how to operate the selected window of the application is being explained separately with each of the form/window.

6.1 Form 1 - Startup form

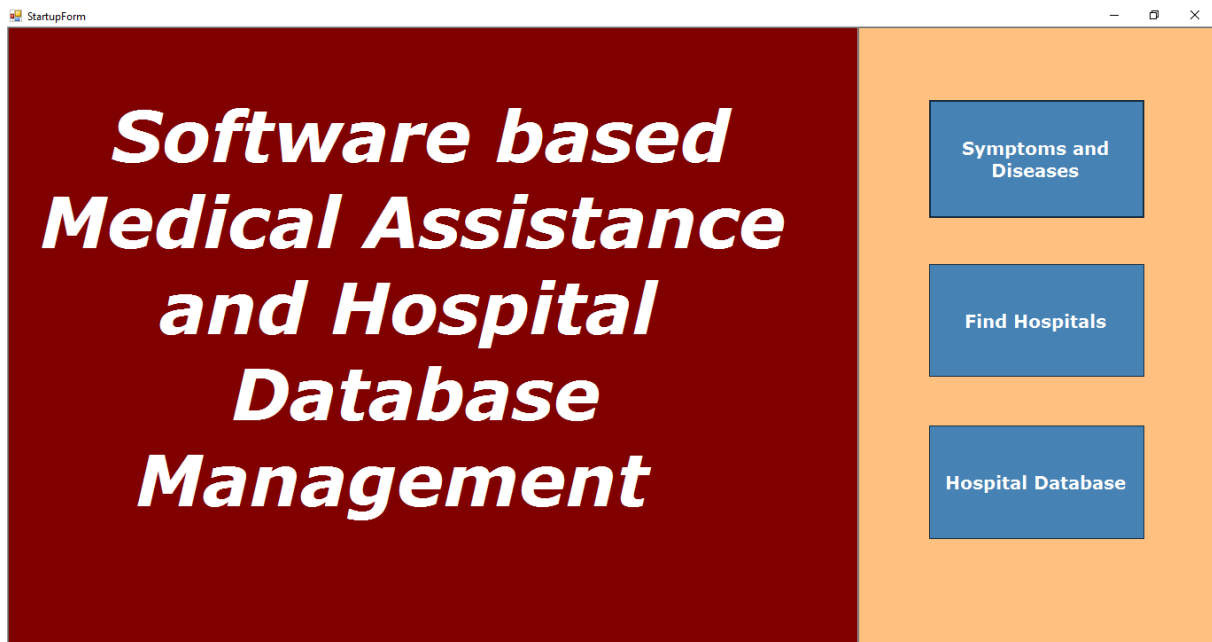


Figure 6.1 Startup form

This is the startup form which will appear as the application starts. This window includes the panel to select the section a user wants to access.

Windows forms tools used in the above form are as follows:

1. Panel
2. Labels
3. Buttons

The panels are used to separate the sections in a window, as in this form, the name of the project is placed over the red panel, whereas the buttons for the accessing the different sections of the application are placed over the left panel.

When any of the three sections, i.e. ‘Symptoms and diseases’, ‘Find Hospitals’ and ‘Hospital Database’, is clicked, the application will open the requested form. These forms are explained below.

6.2 Form 2 - Symptoms and Diseases

SELECT SYMPTOMS	APPROXIMATE DISEASES	DISEASE INFORMATION
<input checked="" type="checkbox"/> Diarrhea <input type="checkbox"/> Thirst <input checked="" type="checkbox"/> Frequent Urination <input type="checkbox"/> Hunger <input checked="" type="checkbox"/> Fatigue <input checked="" type="checkbox"/> Nausea <input checked="" type="checkbox"/> Dizziness <input checked="" type="checkbox"/> Fever 104F+ <input checked="" type="checkbox"/> Anemia <input checked="" type="checkbox"/> Vomiting <input checked="" type="checkbox"/> Headache <input checked="" type="checkbox"/> Muscle/joint pain <input checked="" type="checkbox"/> Swollen lymph nodes <input type="checkbox"/> Itchy rashes <input checked="" type="checkbox"/> Insufficient urine production <input type="checkbox"/> Abdominal cramps <input checked="" type="checkbox"/> Loss of appetite <input checked="" type="checkbox"/> Muscle Cramps <input checked="" type="checkbox"/> Dehydration <input checked="" type="checkbox"/> Dry mouth	Malaria Cholera	<input type="checkbox"/> Diabetes <input checked="" type="checkbox"/> Malaria <input type="checkbox"/> Food Poisoning <input type="checkbox"/> Dengue <input checked="" type="checkbox"/> Cholera
Get Diseases	Clear List	Get Details

Figure 6.2 Symptoms and diseases section

Windows forms tools used in the above form are as follows:

1. Panel
2. Labels
3. Buttons
4. CheckedListBox
5. ListBox

This is the form which will appear when a user clicks ‘Symptoms and Diseases’ button. There are three panels which include selection of symptoms, approximate disease displays and the disease details.

Symptoms can be selected by the user using CheckedListBox, which contains a list of symptoms. After selecting the symptoms, as the user press the button saying ‘Get Diseases’,

the approximate diseases according to the selected symptoms are shown in the ListBox in the center panel.

After knowing the diseases, the user can read the details of these diseases by selecting a disease from the CheckedListBox in the rightmost panel.

6.3 Form 3 – Disease information

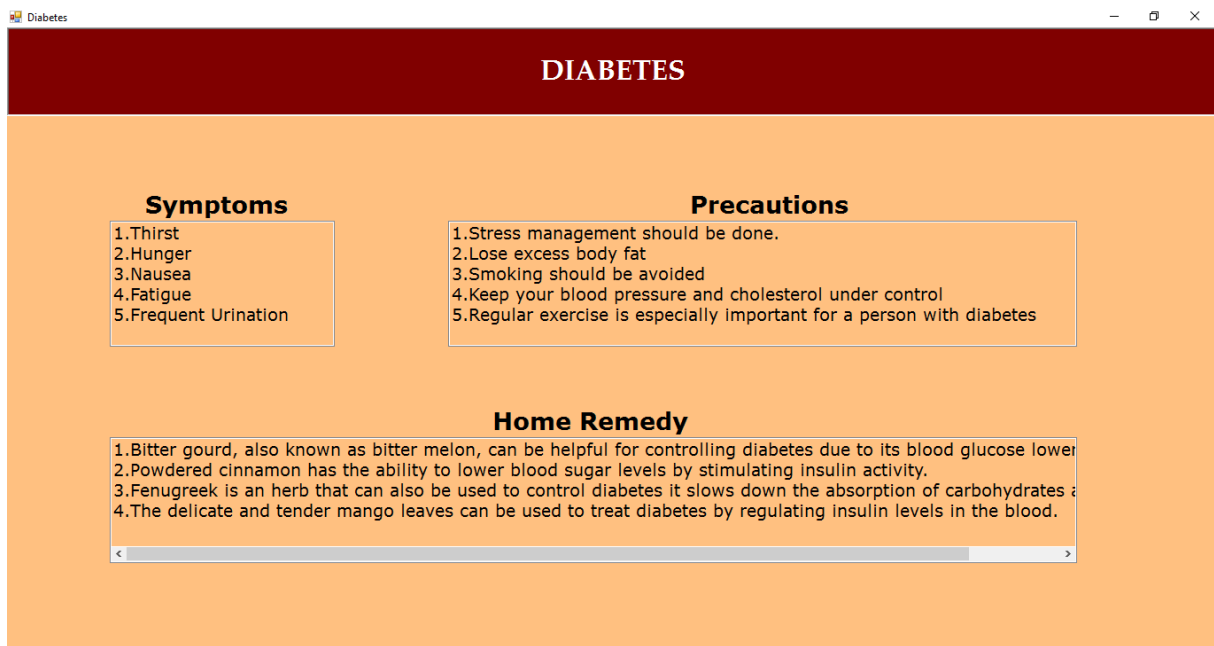


Figure 6.3 Disease information

Windows forms tools used in the above form are as follows:

1. Panel
2. Labels
3. ListBox

The details of the diseases selected by the user includes its symptoms, its precautions and the home remedies for the selected disease. All the details are being displayed using ListBox for each of them.

6.4 Form 4 - Find Hospitals

Hospital Name	Address
hosp1	addr1
hosp2	addr2
hosp6	addr6

Figure 6.4 Find Hospitals Section

Windows forms tools used in the above form are as follows:

1. Panel
2. Labels
3. Buttons
4. TextBox
5. ComboBox
6. DataGridView

This is the section of the application in which the user can find the nearest hospitals by selecting its city from the ComboBox, which is like a dropdown menu. Also, a user can search for hospitals by searching it by its name or address. As the text to search is being typed in the TextBox above the list of hospitals, the list automatically includes only the ones which match the text.

By pressing the 'Show All' button, all the hospitals stored in the SQL database will be listed in the DataGridView which binds the data from the SQL database tables. The DataGridView includes two columns namely, the name of hospital and its complete address.

Another feature provided is that the user can add new cities and hospital details for their future references.

6.5 Form 5 - Hospital Section

The screenshot displays a Windows application window titled "Hospital Database" with two main panels. The left panel, titled "ALL PATIENTS", contains input fields for "Enter Patient's Name", "Enter Age", "Gender", "Doctor InCharge", and "Disease Detected". It includes "Add Patient" and "Edit" buttons. Below these is a "Search Patient" field and a DataGridView table with columns: Patient ID, Patient Name, Patient Age, Gender, and Doctor InCharge. The table lists patients from ID 2 to 1034. At the bottom are "Remove" and "Show all" buttons. The right panel, titled "PATIENT'S FILE", has input fields for "Enter Date", "Enter Time", and "Enter Schedule", with "Add Schedule" and "Remove Schedule" buttons. It also has a "Select Patient" dropdown menu and a DataGridView table with columns: ID, Date, Time, and Schedule. The table shows schedule entries for patient1, including dates from 01-Apr-17 to 14-Apr-17. The Windows taskbar at the bottom shows the system tray with the time 7:00 PM on 20-Apr-17.

Figure 6.5 Hospital database section

Windows forms tools used in the above form are as follows:

1. Panel
2. Labels
3. Buttons
4. TextBox
5. ComboBox
6. DataGridView
7. DateTimePicker

This is the last and the most prominent part of this application which is the hospital database and the management of the patient's files in the most efficient way.

Left part of this form contains the list of patients displayed in the DataGridView which binds the patient's list from the SQL database. The hospitals can access this section

through an authorized staff login. This part allows the addition and removing of the patients from the list as they are admitted or discharged from the hospital. Also, staff can edit the details of the casualty like name, age, gender or the doctor incharge.

Right part of the form contains the detailed history of the treatment of the patients. User can just select the patient from the ComboBox and study its treatment procedure. Hospital staff can add new schedules or treatments to be carried out in future or remove a treatment or schedule from the patient's file.

To add a new patient to the database, the details to be filled are the name of the admitted patient, patient's age, gender, disease detected, and the name of the in charge doctor. After adding the required details, 'Add patient' button has to be clicked.

Editing of a patient's details can be done by selecting a patient from the DataGridView list and then adding all the required details to be altered. After adding the changed details, the user has to click on 'Edit' button.

Chapter 7

Conclusion

This project helps complete medical system since each and every element within system is serviced. Casualties gets a cross check for minor diseases with home remedies, for severe diseases they can get appointment of respective doctors by getting the details of different hospitals stored in the software database.

Moreover, it searches the nearest hospital in your area to add convenience, also the user can add new hospitals for their future references. All dependency on paper is reduced to a great extent as current and previous patient's record file will be digital and easily accessible to doctors, nurses and even patients for their own references.

Chapter 8

Future Scope

This project keeps its wings open for any further implementations since this project aims to give IT solutions for all possible errors or faults within medical system or to ease out working for casualties.

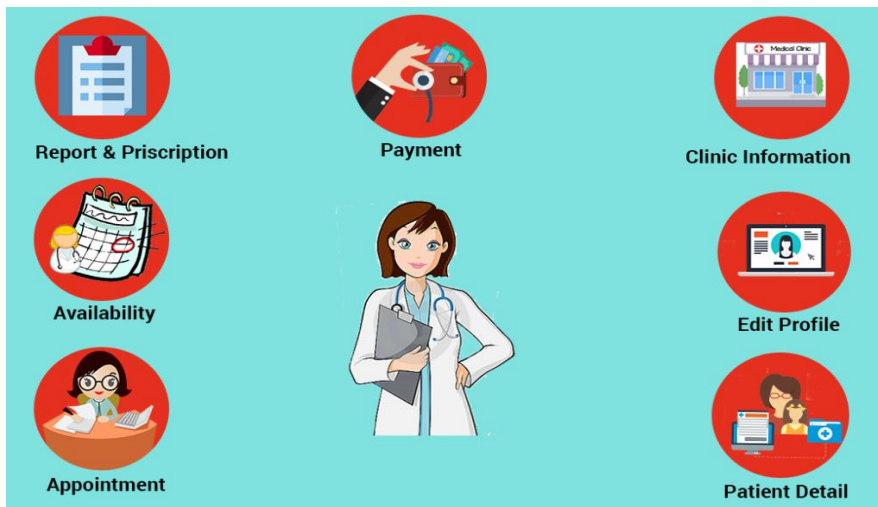


Figure 8.1 Doctor's information and appointment

All required data of currently diagnosed casualties with fast updating stack of data, which includes availability of appointment of any particular doctor.



Figure 8.2 Real-time location using IP address

Future upgrades like real time location using IP geolocation to get nearest hospitals will be possible and to add more features within software.

This is an advanced implementation of IP Geolocation utilizing measurement-based geolocation techniques along with a semantic-based approach. The accuracy of the result is directly related to the detection of nearby “landmarks” that can be referenced in the measurement of the target from a well-known location. By developing a reliable, fast, current and accurate mapping of IP addresses to physical locations it is possible to provide advanced capabilities to this software such that another level of ease can be provided within software.

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