**Part - II**

**Guesstimate Questions**

**Flowchart for Guesstimation**

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| **Step** | **Description** |
| Approach Selection | Choose between Demand Side or Supply Side Approach |
| Define Starting Points | Start with definite numbers like population/city area |
| Estimation Steps | Break down the estimation into smaller steps |
| Calculation | Apply ratios and aggregate data |
| Final Estimation | Calculate the final percentage |

**Question 1: Estimate the potential annual cost savings for a hospital if it reduces its readmission rate by 10%.**

**Answer:** To estimate the potential annual cost savings for a hospital if it reduces its readmission rate by 10%, we have used Apollo Hospital, Bengaluru, as our example.

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| **Step** | **Details** | **Calculation** |
| **Population Estimation** | Assume a city population - Bengaluru. | **1 cr** |
| **Urban / Rural** | Estimate 70% for the urban population and 30% for the rural population. Since Apollo Hospital is a private hospital typically located in urban areas, we are considering the urban population of Bengaluru in this case. | Urban population: 1 cr x 0.7 = **70 lakhs** |
| **Income** | Assuming most people living in the Bengaluru urban area are middle to high-income individuals. Here is the breakdown: 92% are middle-income, 6% are upper-middle-income, 1.5% are high-income, and 0.5% are high net worth individuals. | * Middle-Income: 70 lakhs x 0.92 = 64.4 lakhs **~ 64 lakhs** * Upper- Middle-Income: 70 lakhs x 0.6 = 4.2 lakhs ~ **4 lakhs** * High-Income: 70 lakhs x 0.15 = 1.05 lakhs **~ 1 lakhs** * High Net Worth Individuals: 70 lakhs x 0.005 = **35 k** |
| **Private Hospital Admissions** | Assuming only individuals in the upper-middle-income, high-income, and high net worth categories can afford admission to an expensive private hospital. | The number of people who can afford admission to private hospitals: Upper-Middle-Income + High-Income + High Net Worth Individuals = **5.3 lakhs ~ 5 lakhs.** |
| **Apollo Hospital Admission** | Apollo Hospital is one of the most renowned private hospitals. We assume that around 30% of the population that can afford admission to private hospitals and requires treatment chooses Apollo Hospital, Bengaluru. | Total Apollo Hospital Admission in Bengaluru (Annually):  5 lakhs x 0.3 = **1.5 lakhs.** |
| **Age Distribution** | Assume the age distribution is as follows: 30% of the population is between 0 and 14 years old, 40% is between 15 and 30 years old, 25% is between 31 and 50 years old, and 5% is over 50 years old. | Number of Patients in Apollo Hospital Per Age Group (Annually):   * Age Group: 0 – 14: 1.5 lakhs x 0.3 = **45k** * Age Group: 15 – 30: 1.5 lakhs x 0.4 = **60k** * Age Group: 31 – 50: 1.5 lakhs x 0.25 = 37.5k ~ 37k * Age Group: >50: 1.5 lakhs x 0.05 = **7.5k** |
| **Readmitted population** | Among the four age groups, those over 50 years old are more susceptible to chronic diseases that cannot be permanently cured. Therefore, we are assuming that 80% of the over-50 age group may require readmission. Additionally, we are considering that an average of 20% of previously admitted patients from other age groups who suffer from chronic diseases are readmitted to Apollo Hospital in a year. | Readmission of each age group:   * >50: 7.5k x 0.8 = **6 k** * 0 – 14: 45k x 0.2 = **9 k** * 15 – 30: 60k x 0.2 = **12 K** * 31 – 50: 37k x 0.2 = **7.5 k**   Total readmission (Annually) = **34.5 k ~ 35k** |
| **Calculate current readmission rate** | On average, 35k individuals are readmitted to Apollo Hospital, Bengaluru, in a year, out of 1.5 lakh individuals. | Current Readmission Rate: (35k / 1.5 lakhs) x 100 = **23.33% ~ 23%** |
| **Readmission rate after reduction** | As per the problem statement, we are reducing the current readmission rate by 10%. | New readmission rate: 23% - 10% = 13%.  Readmitted population after reduction of 10%: 35k– (35k x 0.13) = **30.4k ~ 30k** |
| **Cost per readmission** | Assume it costs approximately   ₹10k for each readmission at Apollo Hospital. | Cost before reduction of 10%: 35k x 10k = **₹ 35 cr.**  Cost after reduction of 10%: 30k x 10k = **₹ 30 cr**. |
| **Annual Cost Saving** | Calculate the annual cost saved by Apollo Hospital, Bengaluru, in a year if the readmission rate is reduced by 10%. | Cost Saved:  ₹ 35 cr - ₹ 30 cr = **₹ 5 cr** |

By estimating the potential annual cost savings for a hospital if it reduces its readmission rate by 10% is ~ ₹5cr.

**Question 2:** Estimate the potential annual revenue generated by a hospital if 20% of its consultations are shifted to telemedicine.

**Answer:**

**Number of Consultations per Year:** Let's assume a large hospital in India conducts 200,000 consultations per year.

**Revenue per In-Person Consultation:** We'll assume the average revenue per in-person consultation in India is ₹350.

**Telemedicine Consultation Revenue:** We'll assume the average revenue per telemedicine consultation is slightly lower, say ₹280, due to lower operational costs.

Given these assumptions, we can calculate the revenue:

**In-Person Consultations Revenue:** If 20% of consultations are shifted to telemedicine, 80% remain in-person.

**Number of in-person consultations:** 80% of 200,000 = 160,000 consultations.

**Revenue from in-person consultations:** 160,000 \* ₹500 = ₹80,000,000.

**Telemedicine Consultations Revenue:** Number of telemedicine consultations: 20% of 200,000 = 40,000 consultations.

**Revenue from telemedicine consultations:** 40,000 \* ₹400 = ₹16,000,000.

**Total Revenue:**

Total annual revenue = Revenue from in-person consultations + Revenue from telemedicine consultations.

Total annual revenue = ₹80,000,000 + ₹16,000,000 = **₹96,000,000**.

So, if 20% of the consultations are shifted to telemedicine, a large hospital in India could potentially generate an annual revenue of **₹96,000,000**.

By incorporating these detailed factors, the revenue estimation for the hospital can be made more accurate and reliable.

**Question 3:** Estimate the potential annual market size (in dollars) for a new medical device designed for diabetes management in the United States.

**Answer:**

|  |  |  |
| --- | --- | --- |
| **Step** | **Details** | **Calculation** |
| **Identify the Target Population** | Taking US Population into Consideration | * + **Total US Population:**330 million   + **Population with Diabetes:** 10.5%   + **Number of People with Diabetes:** 10.5% \* 330 million = **34.65 million** |
| **Segment the Market** | Population from categories  **Type-1 Diabetes & Type-2 Diabetes** | * + **Avg. Type 1 Diabetes (5-10% of diabetic population)** = 7.5%   + **Avg. Type 2 Diabetes (90-95% of diabetic population)** = 92.5%   + **Number of People with Type 1 Diabetes:** 34.65 million \* 7.5% = **2.60 million(approx.)**   + **Number of People with Type 2 Diabetes:** 34.65 million \* 92.5% =**32.05million(approx.)** |
| **Target Adoption Rate** | The percentage of the target population that is expected to start using the new medical device. | * + **Adoption Rate for Type 1 Diabetes:** 50% (more likely to adopt advanced management devices)   + **Adoption Rate for Type 2 Diabetes:** 15% (less likely due to lifestyle management)   + **Number of Adopters (Type 1):** 2.60million \* 50%= **1.30 million**   + **Number of Adopters (Type 2):** 32.05 million \* 15% = **4.81 million**   + **Total Potential Adopters:** (1.30 + 4.81) million = **6.11 million** |
| **Average Selling Price (ASP)** | Average Selling Price of the device | * + Initial Cost of Device: **$500**   + Annual Maintenance/Subscription Costs: **$100** |
| **Calculate the Annual Revenue** | Annual revenue generation due the product sales | * + **Initial Market Penetration Revenue:** 6.11 million users \* $500 = **$3.055 billion**   + **Recurring Annual Revenue:** 6.11 million users \* $100 = **$611 million** |
| **Total Potential Annual Market Size** | Total Potential Annual Market Size | * + **First Year Market Size:** $3.055 billion (initial device sales) + $611 million (annual maintenance) = **$3.666 billion**   + **Subsequent Years Market Size:** $611 million (assuming no new device purchases, only recurring costs) |

**Conclusion:**

By considering different segments, adoption rates, and a growth factor for new users, we can estimate that the potential annual market size for a new medical device designed for diabetes management in the US is around $3.666 billion in the first year, with subsequent years bringing in approximately $611 million annually from recurring costs, plus additional revenue from new adopters.

**Question 4:** Estimate the potential additional annual revenue for a hospital from implementing preventive care programs.

**Answer:** Preventive care programs focus on the early detection and prevention of diseases, thereby reducing the need for extensive and costly treatments. These programs are essential for promoting public health and can be a significant source of revenue for healthcare providers. Here, we estimate the potential additional annual revenue that Apollo Hospital in Bangalore could generate by implementing preventive care programs.

| **Step** | **Detail** | **Calculation** |
| --- | --- | --- |
| Population Estimation | Assuming a city where Apollo Hospital is located - Bangalore | **10 million** |
| Preventive Care | Estimate 40% of the population need preventive care | Preventive Care population = 0.40 x 1,00,00,000 = **40,00,000** |
| Apollo Services Usage | Assume 30% of Preventive Care Population use Apollo Services | Apollo Users = 0.30 x 4000000 = **12,00,000** |
| Average Spending | Average Revenue per patient for Preventive Care Program: 5000 Rs | Total Additional Revenue = 1200000 x 5000 = **6 billion Rupees** |
| Final Estimation | Final Additional Revenue | **6 billion Rupees** |

**Question 5: Estimate the potential annual cost savings for a hospital from optimizing its supply chain management.**

**Answer:** To estimate the potential annual cost savings for a hospital from optimizing its supply chain management, we will use a structured guesstimation approach. This includes defining a starting point, breaking down the problem, and making educated assumptions. We will focus on key areas where supply chain optimization can lead to cost savings, such as inventory management, procurement, logistics, and waste reduction. we have used Apollo Hospital, Bengaluru, as our example.

**Guesstimation Flow**

1. **Approach Selection:**
   * + **Supply-Side Approach:** Focus on improving the internal operations of Apollo Hospital, Bengaluru, particularly its supply chain management.
2. **Define Starting Points:**
   * + **Hospital Overview**: Apollo Hospital, Bengaluru is a major healthcare facility providing a range of medical services, including surgeries, diagnostics, and patient care.
     + **Annual Expenditure on Supplies:** A substantial portion of the budget is allocated to purchasing medical supplies, equipment, and pharmaceuticals.
3. **Estimation and Calculation**
   * 1. **Total Supply Costs:**
        + **Assumption:** Assume Apollo Hospital, Bengaluru spends approximately **₹200** crore annually on purchasing medical supplies, equipment, and pharmaceuticals.
4. **Key Areas of Optimization:**
   * 1. **Inventory Management**:
        + **Current Issue:** Overstocking and understocking, leading to high holding costs and potential stockouts.
        + **Potential Improvement:** Implement advanced inventory management systems to reduce excess inventory by 15%.
        + **Estimated Savings:** 15% of ₹200 crore = **₹30 crore**.
     2. **Procurement:**
        + **Current Issue:** Inefficiencies in procurement processes and lack of bulk purchasing.
        + **Potential Improvement:** Optimize procurement strategies, including bulk purchasing and improved supplier negotiations, to save 10%.
        + **Estimated Savings:** 10% of ₹200 crore = **₹20 crore**.
     3. **Logistics and Distribution:**
        + **Current Issue:** Inefficient logistics leading to high transportation and storage costs.
        + **Potential Improvement:** Streamline logistics and optimize distribution routes to save 5%.
        + **Estimated Savings:** 5% of ₹200 crore = **₹10 crore**.
     4. **Waste Reduction:**
        + **Current Issue:** Losses from expired or unsellable medical supplies.
        + **Potential Improvement:** Better inventory turnover management and monitoring of expiration dates can reduce waste by 10%.
        + **Estimated Savings:** 10% of ₹200 crore = **₹20 crore**.
5. **Total Savings:**
   * + **Annual Cost Savings**: ₹30 crore (Inventory Management) + ₹20 crore (Procurement) + ₹10 crore (Logistics and Distribution) + ₹20 crore (Waste Reduction) = **₹80 crore**.

**Final Estimation**

**Estimated Potential Annual Cost Savings:** By optimizing its supply chain management, Apollo Hospital, Bengaluru can potentially save approximately **₹80 crore annually**. This estimation considers improvements in inventory management, procurement processes, logistics.