Lecture Notes

Payer Analytics

You will learn about one of the most important areas of healthcare analytics - the payers. Among all the different types of healthcare stakeholders, payers have adopted analytics the most. Among all the payer industries of the world, those from the US have the largest budgets because the healthcare expenditure of US is the largest. Moreover, almost everyone in the US is covered under a health insurance plan which is provided by the payers. Due to this reason, the payer industry is very huge, considering the expenditure and the population covered.

Payer market in US

The size of public funding and private funding in the US is almost equal. Refer figure 1 to see the size of public and private insurance across different countries.

	Out-of-pocket	Public insurance	Private insurance
Emerging economies	35.8	52.5	11.5
China	33.8	55.8	10.3
Latin America	32.1	52.6	15.1
India	58.2	32.2	9.5
Advanced economies	14.7	61.1	24.1
U.S.A.	11.8	47.1	41.1
European countries	14.1	76.1	9.7

Figure 1: Funding coverage across various economies of the world

As you can see, US has the highest private funding which creates a lot of scope for analytics because private insurance companies are willing to share healthcare data with other data analytics firms.

The **per-capita expenditure** in the US is the highest, and a lot of it is spent on analytics.

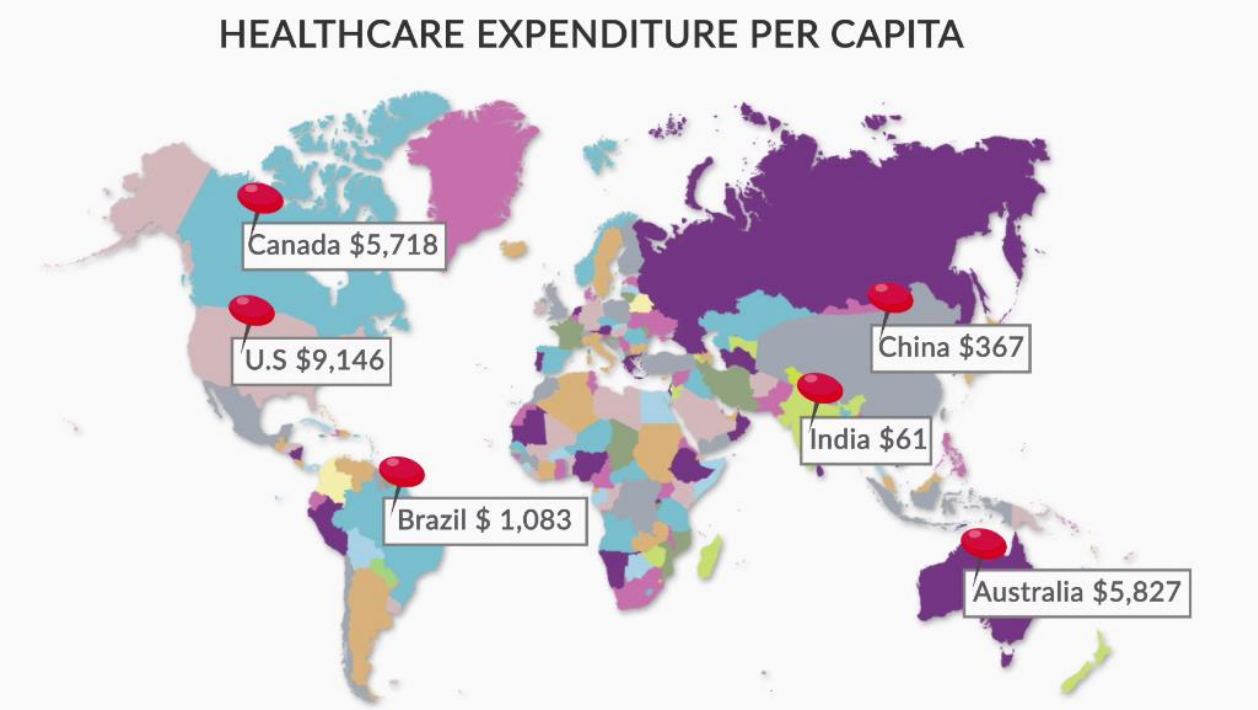


Figure 2: Healthcare expenditure per capita

The top payers in the US are shown below.

TOP PRIVATE HEALTHCARE PAYERS IN THE US

Rank	Name	Revenue	Subscribers
1	United Health Group	$154bn	70mn
2	Anthem	$89bn	40mn
3	Aetna	$63bn	23mn
4	Humana	$54bn	14mn
5	Cigna	$40bn	15mn

Figure 3: Top private healthcare payers in the US

Types of Health Insurances

There are three types of health insurances:

1. Group health insurance
    a. Employer-based
    b. Discounted coverage
    c. The employer and employee split costs of premiums

2. Individual health insurance

    a. Has fewer benefits than group insurance
    b. Costlier than group health insurance
    c. Flexible services according to the premium

3. Government-sponsored health insurance
    a. Health insurance obtained through a government agency or program
    b. Medicare and Medicaid are two large government-sponsored health insurances

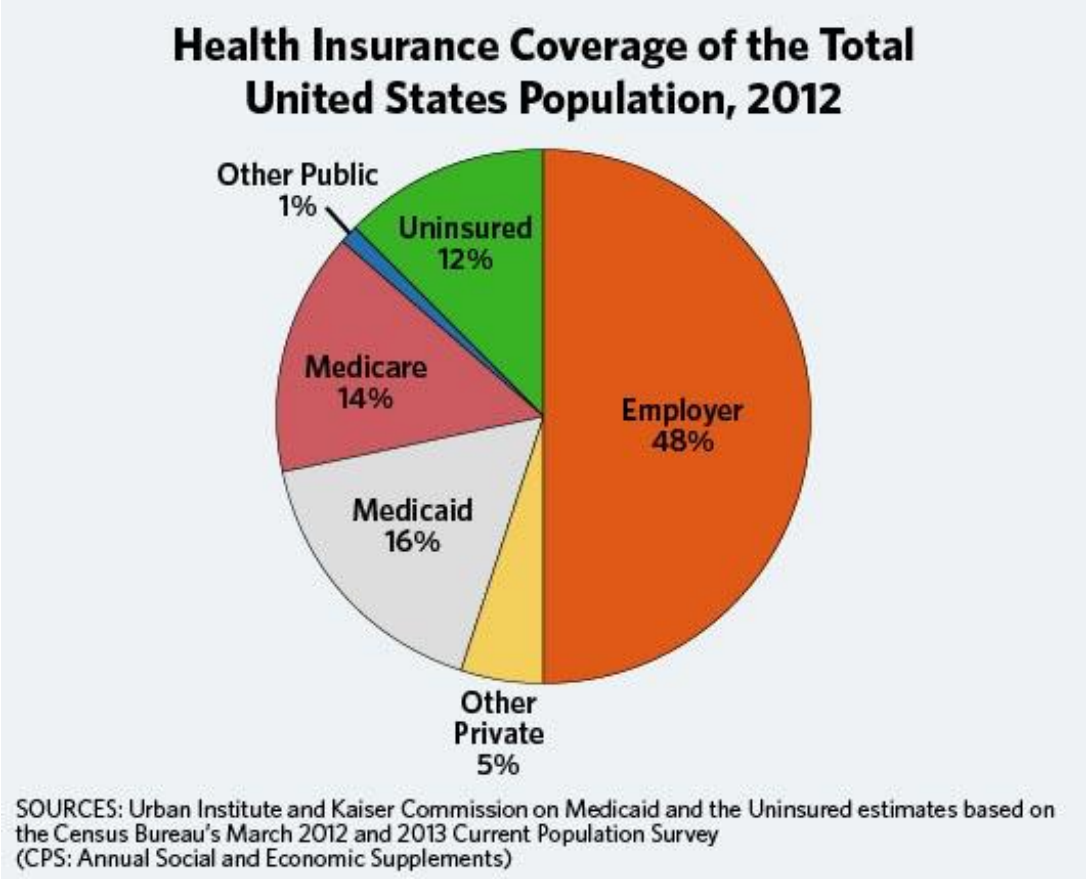


Figure 4: Health insurance coverage in US

Medicare provides coverage to people who are more than 65 years old or people who have a disability. It also has different parts which cover various types of cost –

1. Part A covers all hospital charges
2. Part B covers preventive care medicine and medical equipment charges
3. Part C allows private payers to provide medical coverages for Medicare subscribers
4. Part D covers drug charges
5. Medigap plans cover services not covered in parts A, B, C, and D

Medicaid provides coverage to people who come under the low-income group.

Types of Insurance Plans

When someone opts for a health insurance, they become a member of the health insurance, and the insurance that they get is called a plan. Now, there are different types of plans available in the US. These different types of plans vary in two key aspects - flexibility/choice and premium. The various types of plans that are available in the US are:

1. Indemnity plan
2. HMO (Health maintenance organisation) plan
3. PPO (Preferred provider organisation) plan
4. EPO (Exclusive provider organisation) plan
5. POS (Point of service) plan

Benefits

When someone signs up for an insurance and selects a plan, they are provided with health **'benefits'**. These benefits are mentioned in the health insurance coverage documents along with some other key terminologies. The key terminologies mentioned in the health insurance plan's coverage document are:

- **Benefits**: The healthcare items or services covered under a health insurance plan
- **Copayment**: A fixed amount a member pays to the provider for a covered health care service. This is also known as a copay. In general, the copay is paid for every physician visit (consultation).
- **Deductible**: The amount member owes for health care services each year before the insurance company begins to pay. This makes sure that the member takes charge of their health and does not waste resources of the provider by unnecessarily showing up for a service. In general, a patient is not required to pay from his/her deductible for a physician visit (consultation)
- **Co-insurance**: The amount member has to pay calculated as a percent of the allowed amount for the service, after considering copayment and deductible.

- **Out-of-pocket maximum (OOPM)**: The most a member should have to pay for healthcare during a year, excluding the monthly premium. After member reaches the annual OOPM, health insurance or plan begins to pay 100 percent of the allowed amount for covered health care services. One thing to note here is, even after paying the OOPM, a member is required to pay the copay amount for any physician visits that they make.
- **Lifetime maximum**: The maximum benefit a plan will pay for all the healthcare services. This concept has become obsolete today.

All these variables are calculated using data analytics. The goal is to choose such values of the variables that increases the profit of the payer.

Coordination of benefits

When multiple coverages cover a person, as shown in figure 5, the payer organisation use something called as coordination of benefits. It contains rules which tells the payers who has to pay how much.

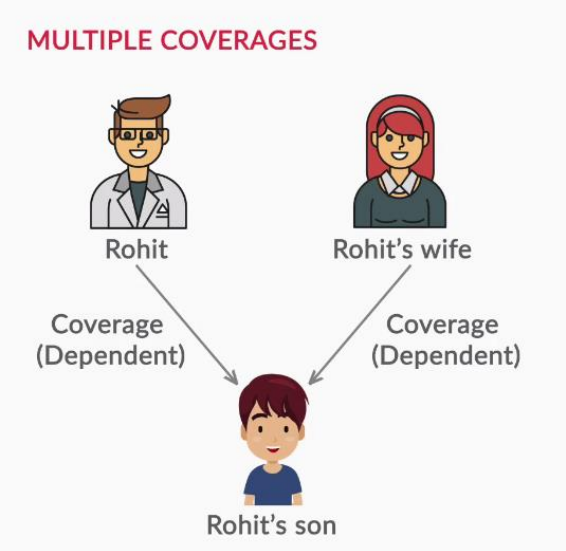


Figure 5: Multiple coverage

Provider Management

Provider management is a crucial part of any payer organisation. Now, the primary task of any payer organisation is to make sure its members stay healthy. This helps them to save healthcare spending and make more profit which is their ultimate goal. In an ideal case scenario, if all of its members are healthy then its members don't need to avail healthcare services at all, and the payer will make loads of money.

So, you saw that there are two goals that provider management aims for to keep the patients healthy -

- Make sure that providers are providing **standardised care**.
- **Incentivise** providers based on their performance. This acts as a motivator to the providers so that they keep their performance bar high.

There are two **types of providers** as shown in figure 6. The two types are:

- **In-network providers**: All the providers who have a contract with the payer are called in-network providers. A member can avail all the benefits at these places.
- **Out-of-network providers**: All the providers who have no contract with the payer are called out-of-network providers.

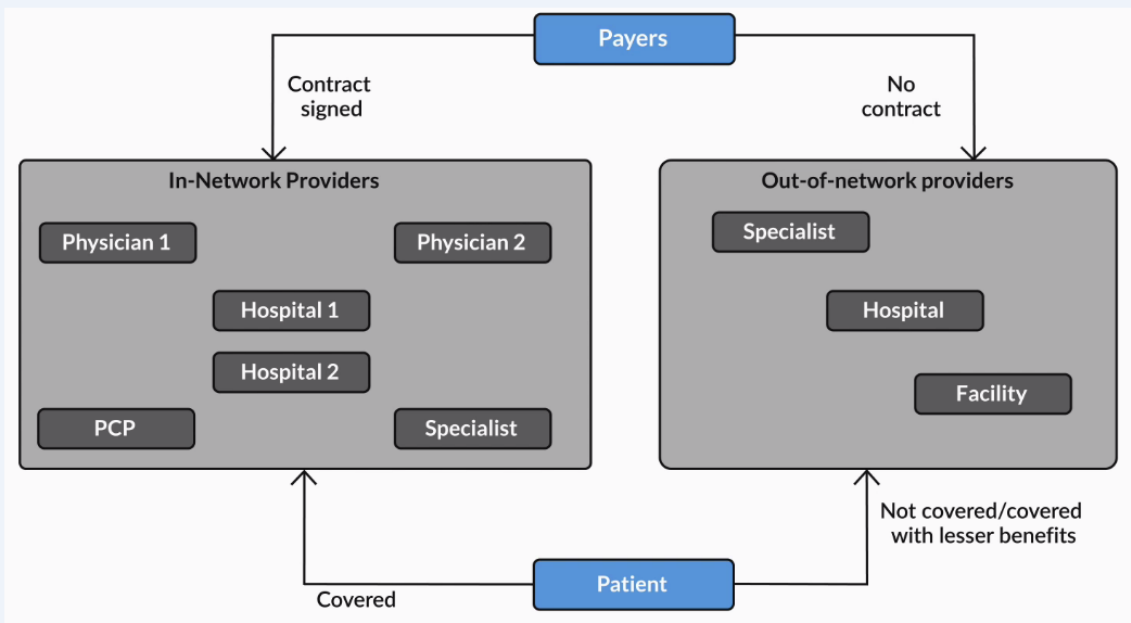


Figure 6: Types of providers based on contracts

There are six **kinds of providers**:

- Individual physicians
- Group practitioners
- Independent practice associations (IPAs)
- Speciality management companies
- Integrated delivery networks (IDNs)
- Retail health clinics

A crucial part of provider management is to add providers to the current network of providers that a payer has. There are four key things that a payer looks at before adding a provider to its network:

- **Provider credentialing**: Before considering any provider, the payer performs a background check of the provider.
- **Provider access**: Here, the payer looks at its current network and looks whether this network is robust enough for providing good healthcare services to its members or not. So, the aim here is to make sure the payer has a right mix of providers and that they are easily accessible to its members.
- **Population characteristics**: Here, the payer researches the kinds of members it has. According to the characteristics of its members, it would add appropriate providers in that area.
- **Provider characteristics**: After analysing population characteristics, the next thing that a payer does is an analysis of the characteristics of a provider. Then, it matches the characteristics of the providers with the requirements of its population. If they match, then the provider is added to the network.

When a payer has decided to add a provider to its network, a contract is made. The contents of the contract are crucial for you to know how to analyse provider performance. So, a contract contains the following items:

- **Scope of services**: All the services that a payer wants a provider to provide to its members are listed in the scope of services.
- **Fee schedules**: A fee schedule is a complete listing of service-wise fees used by a payer to pay the provider that it has contracted it based on the services that the provider has given to the members.
- **Credentialing**: All the policies, procedures and administrative guidelines are covered under credentialing.

While making a contract, the payer and provider also decide on how the provider is going to be compensated for the services that they're going to provide. There are three types of compensations:

- **Capitation**
    - A payer will pay a fixed amount to the provider. One such fixed payment is called per member per month where a provider receives a fixed amount for each patient for the entire month.
    - This is very risky for the provider because patients with chronic diseases can visit providers frequently, but they will only a fixed amount.

- **Fee-for-service**
    - The provider will get money for each service that it provides based on the fee schedules that it mentioned in the contract.
    - This type of compensation is very risky for the payer because the provider will not take proper care of the patient.

- **Bundled payment**
    - The provider is compensated a fixed amount for each episode of care. An episode of care contains all services provided to a patient with a medical problem within a specific period.
    - This is neither too risky for the payer not for the provider.
    - Some patients with extreme conditions incur a lot of loss on the providers which for which there is a **stop-loss clause** that helps providers get compensated for the extra expenses.

Pay for performance (P4P)

Recall the two goals of provider management:

- Make sure that providers are providing **standardised care**.
- **Incentivise** providers based on their performance. The incentives can be negative too, i.e., a penalty is charged in case they're not performing up to the mark.

Pay for performance model achieves both the goals. Providers are evaluated using HEDIS measures. Then they derive certain metrics from HEDIS measures, such as:

- **Threshold values**: The measures are compared with threshold values to know about the areas where are performing below and above the threshold value.
- **Percentage improved**: The measures are compared to last years' value to see how much the provider has improved (or declined).
- **Provider rankings**: Based on the HEDIS measures, they can rank all the providers.

After evaluating the performance, providers are incentivised/penalised according to their performance in the following ways:

- **Cash lump sum bonuses**: A cash bonus is given to the provider, in case they are performing exceptionally well.
- **Fee schedule adjustments**: If providers are doing well, the payer can increase the fee for the services that they provide. Similarly, they can reduce it, in case they are not performing well.
- **Withhold adjustments**: Providers can increase or decrease based on the performance of providers. While compensating the providers, payers withhold some amount with them. Providers ideally want to get rid of the withheld amount.

Analytics Opportunities in Provider Management

All the things that you've studied till now will prove to be fruitful when you look at the analytics opportunities that are present in provider management domain.

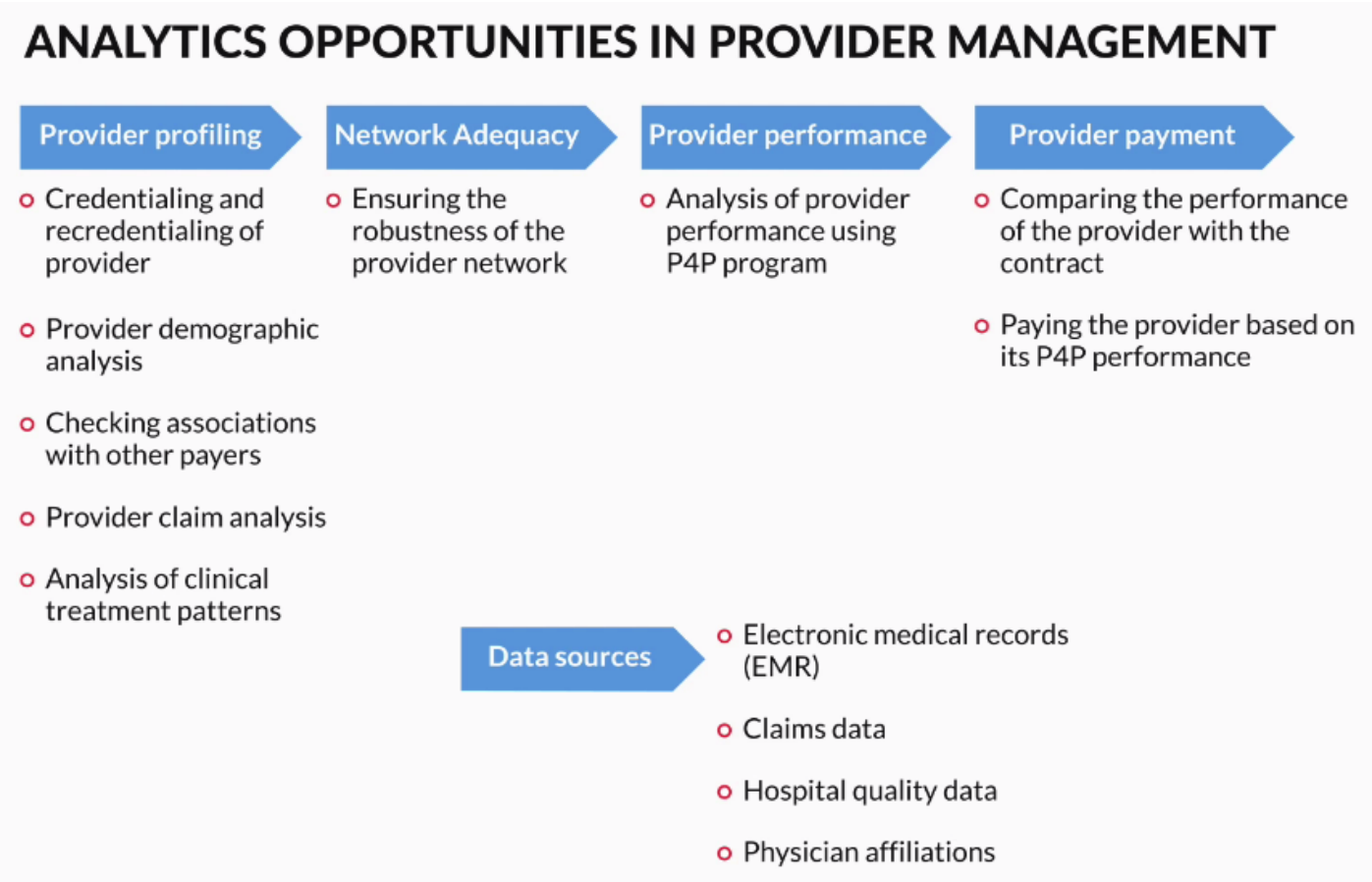


Figure 7: Analytics Opportunities in Provider Management

Life Cycle of a Health Insurance Claim

A claim is filed by a provider to a payer so that the provider can be compensated for the services that were provided to a patient who is a member of the payer. To do meaningful analytics in claims management, one needs to understand the life cycle of health insurance claims. The following figure shows the entire life cycle.

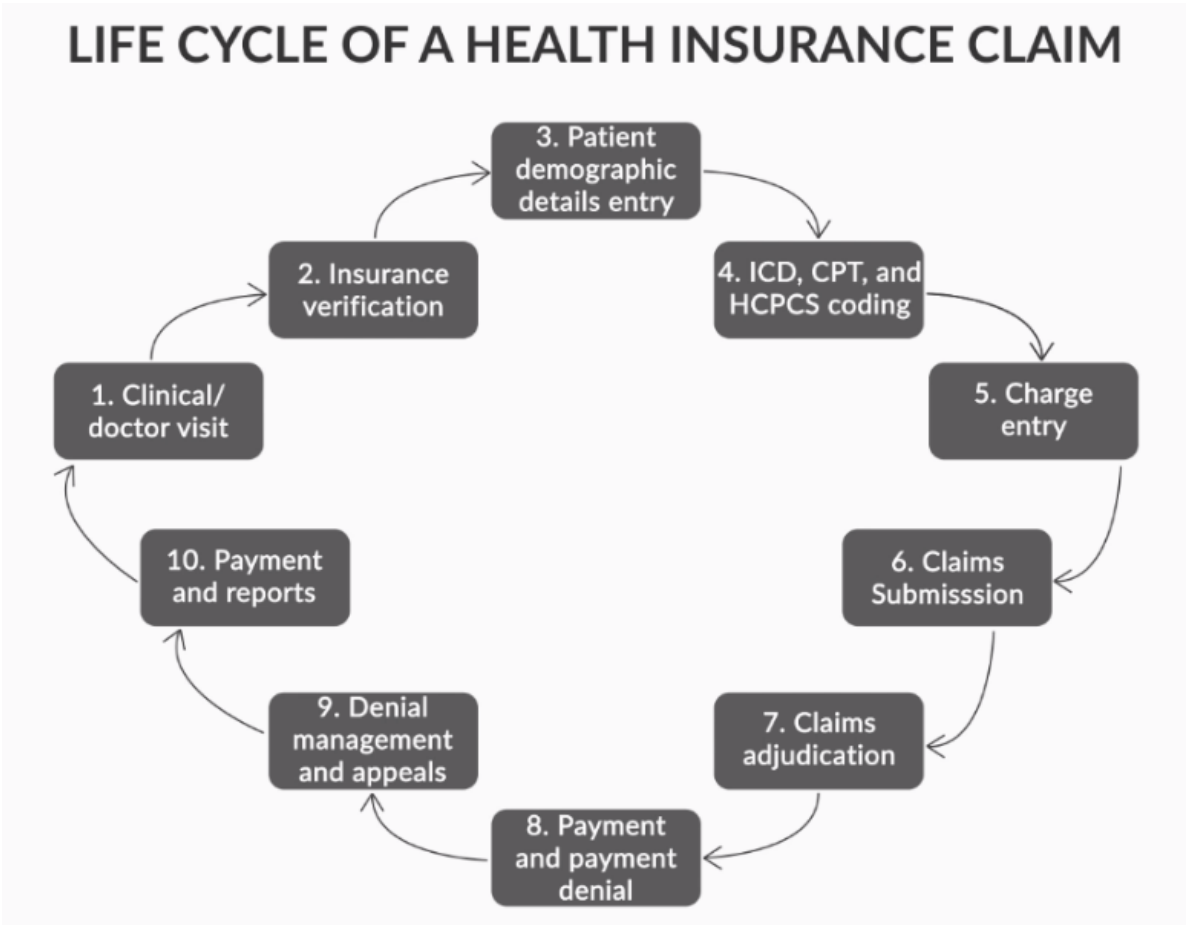


Figure 8: Life cycle of a health incurance claim

The steps of the life cycle of a health insurance claim are:

1. **Clinical/doctor visit**: Here, a patient visits a provider such as a clinic, doctor or a hospital.
2. **Insurance verification**: The provider verifies the insurance of the patient to see whether he is eligible to take the services of the provider. If insurance is not verified, the patient pays the entire amount from his/her pocket.
3. **Patient demographic details entry**: All the demographic details of the patient are noted down. Then, the patient avails the services by the provider.
4. **ICT, CPT, and HCPCS coding**: These are standard codes which you will learn in detail later in this module. All these codes are noted down after the patient receives the services of the provider.
5. **Charge entry**: The provider asks the patient to pay his/her share. You have already learnt about copayment, deductible, co-insurance etc. All these are calculated, and the patient makes the payment and leaves.
6. **Claims submission**: The provider fills the claims file and sends it to the payer. You will see how a claim form looks like later in a bit.
7. **Claims adjudication**: The payer receives the claims file and checks everything in detail. Claims adjudication is an essential part of claims analytics since providers, in general, tend to submit

fraudulent claims so that they can receive extra money. Claims adjudication is done automatically as well as manually.

8. **Payment and payment denial**: After adjudicating the claims file, the payment is made if the payer thinks all the claims were authentic. In case of fraudulent claims, the payer denies the payment. The denial can be for entire payment or a part of the payment depending on the fraud claims. The **explanation of benefits (EOB)** is also generated in this step. An EOB is a statement sent by a payer to its members explaining what medical services were paid for on their behalf. You can learn about EOB, in detail, here
9. **Denial management and appeals**: In case payment is denied, the provider can ask the payer to recheck the claims that it had submitted and the cycle goes back to step 6 and starts from there.
10. **Payment and reports**: After rechecking the claims, the payer makes a final payment to the provider.

Healthcare Coding

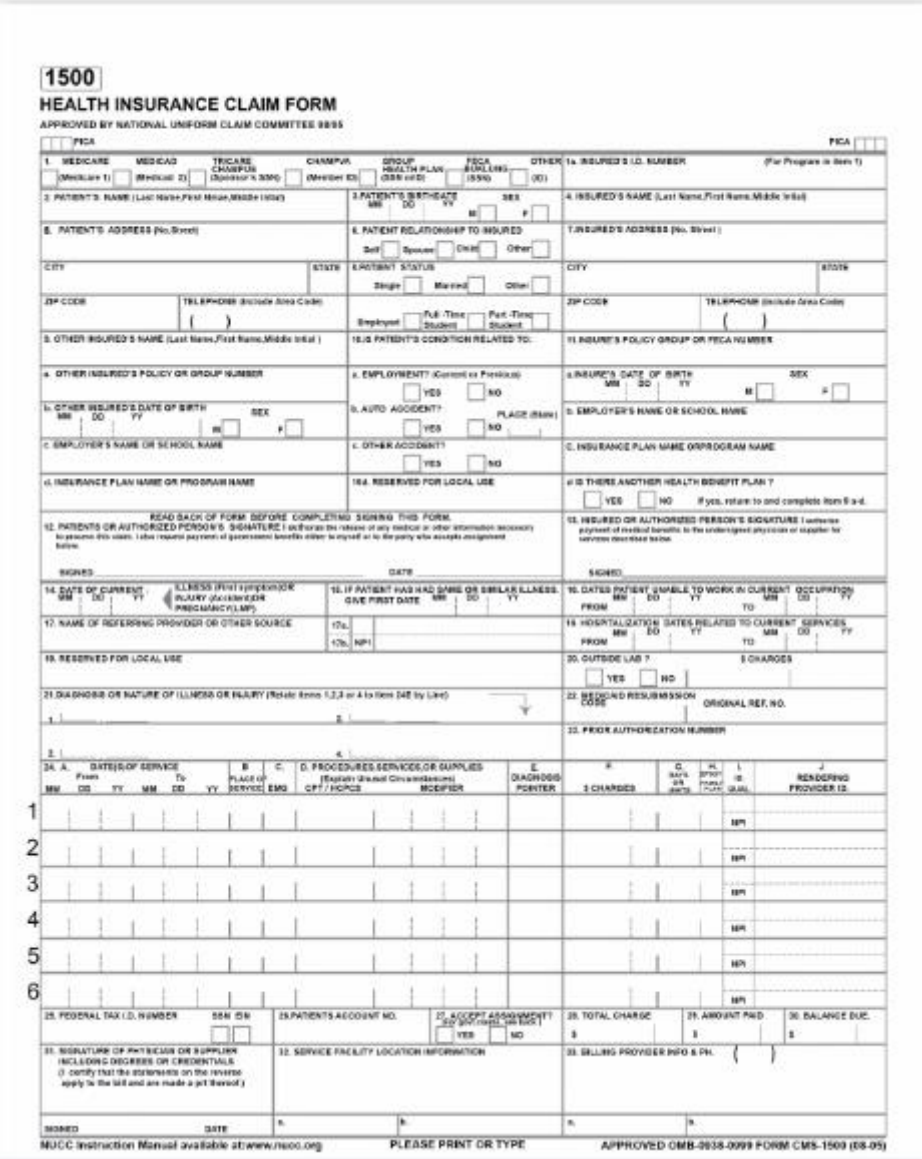
There are three types of codes used extensively, which will help you in understanding healthcare data. The codes are:

- **International Classification of Diseases (ICD)**
  - These are codes are used to represent a doctor's diagnosis and the patient's condition
  - The code that's currently in use in the United States is the tenth revision of ICD, also called as ICD-10, in short
  - A clinical modifier is also attached sometimes which describes the diagnosis in more detail. For example, E11.21 is the ICD-10 code for diabetes type 2 with an early kidney problem. Here, 21 is the clinical modifier. Both the parts of an ICD code are alphanumeric.

- **Current Procedural Terminology (CPT)**
  - These codes are used to document the medical services or procedures performed by the provider on the member
  - A CPT code is a five-digit code. A CPT code for a general physician checkup is 99396.

- **Healthcare Common Procedure Coding System (HCPCS)**
  - These are codes that extend the CPT codes. HCPCS has two parts. Part 1 is the CPT code, and part 2 provides details of the procedure or services that are not included in the CPT coding system
  - For example, CPT code for a mammogram is 77057. But there are various ways in which a mammogram can be done. One of those ways is using a computer-aided detection (CAD) system. "G0202" is the HCPCS part 2 code that tells us that the mammogram is done using a CAD system.

The following figure shows an **HCFA-1500 claim form** which gives an idea of what data goes into filing a claim.


1500

HEALTH INSURANCE CLAIM FORM

APPROVED BY NATIONAL UNIFORM CLAIM COMMITTEE 08/05

PICA

1. MEDICARE (Medicare #) MEDICAID (Medicaid #) TRICARE CHAMPUS (Sponsor's SSN) CHAMPVA (Member ID#) GROUP HEALTH PLAN (SSN or ID) FECA BLK LUNG (SSN) OTHER (ID)

1a. INSURED'S I.D. NUMBER (For Program in Item 1)

2. PATIENT'S NAME (Last Name, First Name, Middle Initial)

3. PATIENT'S BIRTH DATE MM DD YY SEX M F

4. INSURED'S NAME (Last Name, First Name, Middle Initial)

5. PATIENT'S ADDRESS (No, Street)

6. PATIENT RELATIONSHIP TO INSURED Self Spouse Child Other

7. INSURED'S ADDRESS (No, Street)

CITY STATE

8. PATIENT STATUS Single Married Other

CITY STATE

ZIP CODE TELEPHONE (Include Area Code)

Employed Full-Time Student Part-Time Student

ZIP CODE TELEPHONE (Include Area Code)

9. OTHER INSURED'S NAME (Last Name, First Name, Middle Initial)

10. IS PATIENT'S CONDITION RELATED TO:

11. INSURED'S POLICY GROUP OR FECA NUMBER

a. OTHER INSURED'S POLICY OR GROUP NUMBER

a. EMPLOYMENT? (Current or Previous) YES NO

a. INSURED'S DATE OF BIRTH MM DD YY SEX M F

b. OTHER INSURED'S DATE OF BIRTH MM DD YY SEX M F

b. AUTO ACCIDENT? YES NO PLACE (State)

b. EMPLOYER'S NAME OR SCHOOL NAME

c. EMPLOYER'S NAME OR SCHOOL NAME

c. OTHER ACCIDENT? YES NO

c. INSURANCE PLAN NAME OR PROGRAM NAME

d. INSURANCE PLAN NAME OR PROGRAM NAME

10d. RESERVED FOR LOCAL USE

d. IS THERE ANOTHER HEALTH BENEFIT PLAN? YES NO If yes, return to and complete item 9 a-d.

READ BACK OF FORM BEFORE COMPLETING & SIGNING THIS FORM.

12. PATIENT'S OR AUTHORIZED PERSON'S SIGNATURE I authorize the release of any medical or other information necessary to process this claim. I also request payment of government benefits either to myself or to the party who accepts assignment below.

SIGNED DATE

13. INSURED OR AUTHORIZED PERSON'S SIGNATURE I authorize payment of medical benefits to the undersigned physician or supplier for services described below.

SIGNED

14. DATE OF CURRENT: MM DD YY ILLNESS (First symptom) OR INJURY (Accident) OR PREGNANCY (LMP)

15. IF PATIENT HAS HAD SAME OR SIMILAR ILLNESS, GIVE FIRST DATE MM DD YY

16. DATES PATIENT UNABLE TO WORK IN CURRENT OCCUPATION MM DD YY FROM TO MM DD YY

17. NAME OF REFERRING PROVIDER OR OTHER SOURCE

17a.

17b. NPI

18. HOSPITALIZATION DATES RELATED TO CURRENT SERVICES MM DD YY FROM TO MM DD YY

19. RESERVED FOR LOCAL USE

20. OUTSIDE LAB? YES NO $ CHARGES

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1,2,3 or 4 to Item 24E by Line)

1. 2.

3. 4.

22. MEDICAID RESUBMISSION CODE ORIGINAL REF. NO.

23. PRIOR AUTHORIZATION NUMBER

24. A. DATE(S) OF SERVICE From MM DD YY	To MM DD YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT / HCPCS	MODIFIER	E. DIAGNOSIS POINTER	F. $ CHARGES	G. DAYS OR UNITS	H. EPSDT Family Plan	I. ID. QUAL.	J. RENDERING PROVIDER ID.
1										NPI	
2										NPI	
3										NPI	
4										NPI	
5										NPI	
6										NPI	

25. FEDERAL TAX I.D. NUMBER SSN EIN

26. PATIENT'S ACCOUNT NO.

27. ACCEPT ASSIGNMENT? (For govt. claims, see back) YES NO

28. TOTAL CHARGE $

29. AMOUNT PAID $

30. BALANCE DUE $

31. SIGNATURE OF PHYSICIAN OR SUPPLIER INCLUDING DEGREES OR CREDENTIALS (I certify that the statements on the reverse apply to the bill and are made a part thereof.)

32. SERVICE FACILITY LOCATION INFORMATION

33. BILLING PROVIDER INFO & PH. ( )

SIGNED DATE

a. b.

a. b.

NUCC Instruction Manual available at: www.nucc.org PLEASE PRINT OR TYPE APPROVED OMB-0938-0999 FORM CMS-1500 (08-05)

Figure 9: Sample claim form

After a provider makes a claim, they send it to **clearing house** which is a company whose sole work is to perform a basic check on the claims that a provider submits to the payer. The work of a clearing house is similar to **data cleaning**.

Claims Adjudication

When a provider sends the claims to a payer, payer checks the claims thoroughly. This is called as **claims adjudication**, and this is done by a claims adjudication system. The steps are shown in the following figure.

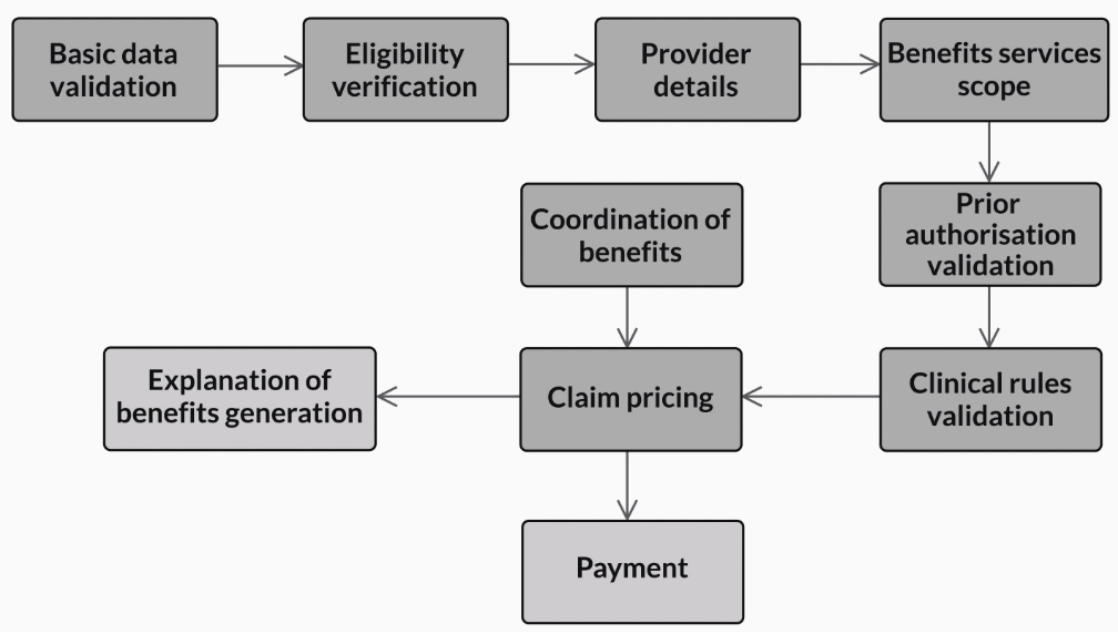


Figure 10: Claims adjudication system

The steps that a claim goes through are:

1. **Basic data validation**: This is the first thing that is done by the payer. Here, claims are checked for any technical errors or any incomplete data. This is something that the clearing house should have taken care of.
2. **Eligibility verification**: Here, the payer checks the patient details and check if the patient is a member of their health insurance plan or not.
3. **Provider details**: Here, the payer checks if the provider has a contract with the payer or not, i.e., whether it is an in-network provider or an out-of-network provider.
4. **Benefits services scope**: In this step, the payer looks at the services that the member has availed and matches it with the services that he/she is allowed to avail as per his/her plan. If any services are mentioned in the claim, but the member doesn't have it in his/her benefits, then the payer will not pay for those.
5. **Prior authorisation validation**: In case a member went through a major surgery, the payer validates if the provider had taken a prior authorisation for it or not.
6. **Clinical rules validation**: The payer checks whether the provider followed the standard set of procedures to treat the illness or condition that the patient was suffering from. If the provider has

mentioned any extra line items which were not required for the condition, then the payer will not pay for those line items.

7. **Claim pricing**: The payer calculates the final amount that has to be paid to the provider. This amount less than the submitted amount because providers submit the extra amount of the services to make more profit. The payer calculates this amount by referring the compensation type that is mentioned in the contract between the payer and the provider. Recall that compensation can be either of these - capitation, fee-for-service, or bundled payment.
8. **Coordination of benefits**: In case the patient had more than one payer, the payer that has received the submission will calculate the amount that he is eligible to pay.
9. **Payment**: The payer makes the payment to the provider.
10. **Explanation of benefits generation**: The explanation of benefits is generated for the patient, so that they know for what services the payer paid on their behalf, to the provider.

When an adjudication system can't adjudicate a claim, it marks those parts of the claim with **edits**. Each edit has a code associated with it. The claim form is then assigned to a manual claim adjudicator. This process is shown in the following figure.

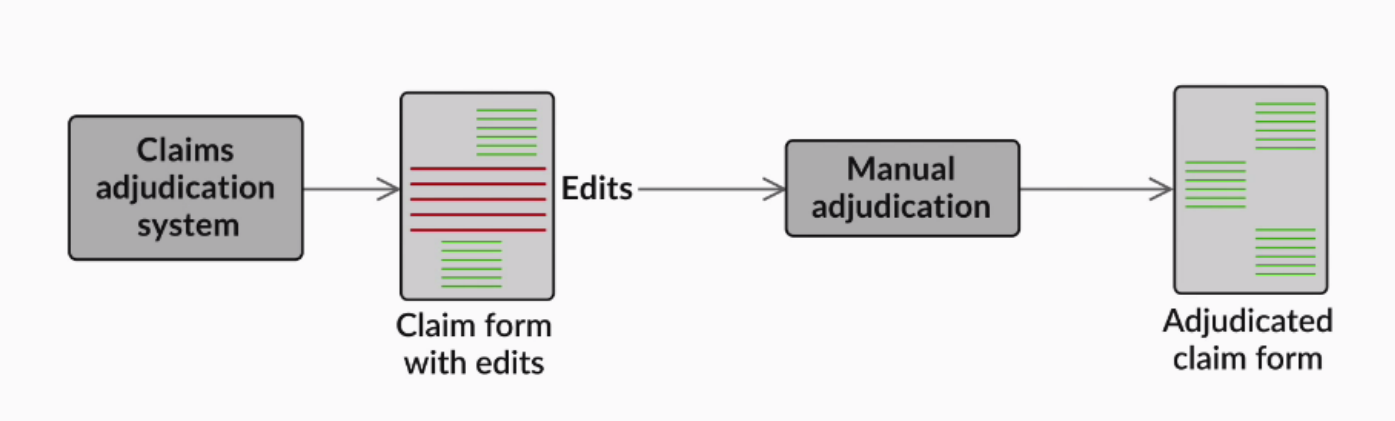


Figure 11: Manual claims adjudication

Analytics Opportunities in Claims Management

Claims management gives a vast number of opportunities. The following figure summarises all the areas of claims analytics.

Figure 12: Analytics opportunities in claims management

Analytics to Detect Fraudulent Claims

A key area of claims management is the detection of fraudulent claims. Providers are very cunning, and they try to swindle the payers at every opportunity that is provided. There are three very common cases of fraud that payers encounter:

1. In **case one**, you saw that the providers provide multiple claims where each detail is the same except the provider name and the charges.
2. In **case two**, you saw that there are multiple claims submitted where every entry is the same except the charges. The provider tries to dupe the payer by submitting.
3. In **case three**, the providers break down all the services of a particular episode of care. Recall that, all services provided to a patient with a medical problem within a specific period is called an episode of care. Each episode of care has a DRG code associated with it so that payer can pay the bundled amount for the whole episode at once. Now, if a provider breaks down the services into individual services, they make more money because the bundled amount is less than the total amount of the individual services that the episode of care has. You need to identify this fraud where providers break down all the individual services instead of submitting the episode of care.

Care Management

The ultimate goal of a health insurance company is to ensure that their members are healthy. This also helps them save money on health expenditures of its members and make a profit. A payer can save up to 80% costs by focussing on 20% of its members. Payers have a dedicated organisation which helps patient to stay healthy. This organisation is called **care management**.

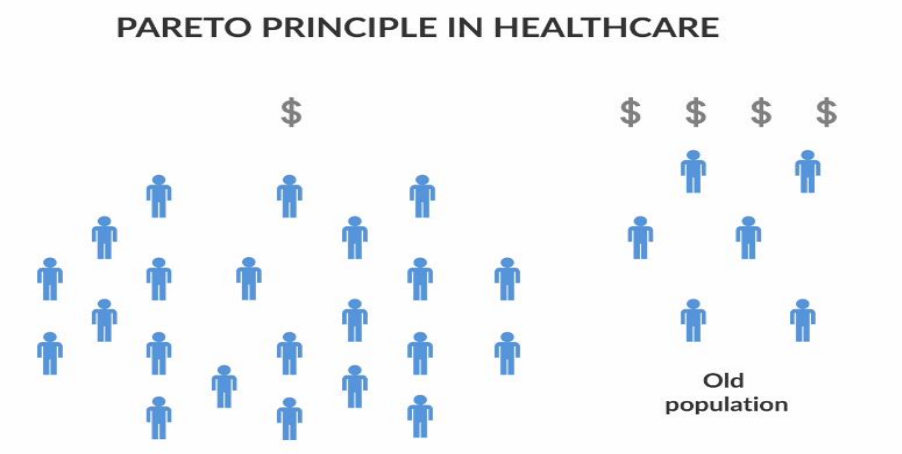


Figure 13: Pareto principle in healthcare

There are three levels of care management:

1. **Disease management**: This department focuses on improving the overall health of a population with a certain disease.
2. **Case management**: There are some severe cases which lead to lots of expenses for the payer. The case management team manages such patients. They follow the lifestyle of such patients very closely and help them to recover from their condition.
3. **Utilisation management**: All these patients with high risk use a lot of resources. The utilisation management team looks at all the resources used by the high-risk patients. They use a lot of analytics to help reduce the risk of unhealthy patients.

Care Management Framework

Care management is provided using a framework. There are four steps as depicted in the figure present below.

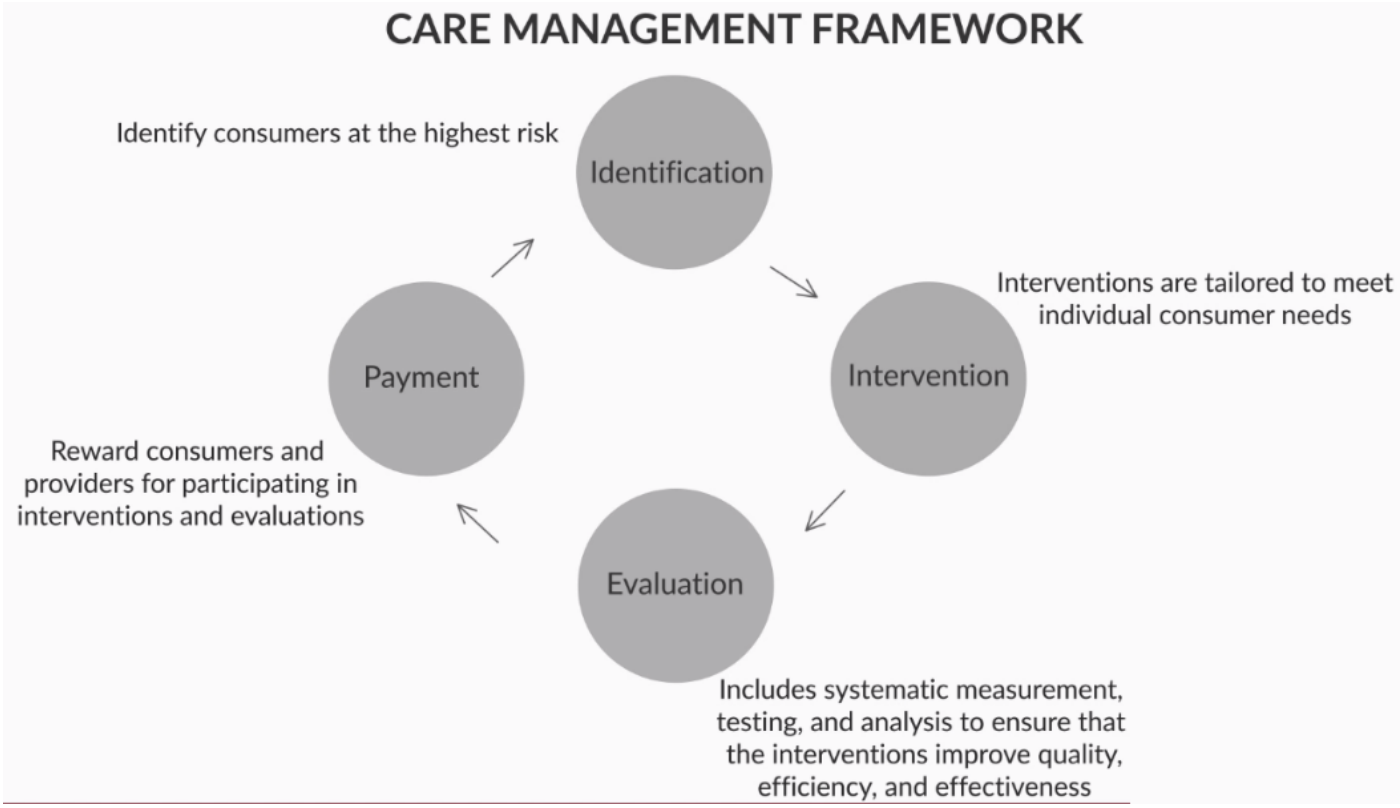


Figure 14: Care management framework

In the given framework, identification and evaluation have a lot of analytics scope. To identify high-risk patients, care management organisations have to stratify the risk. The process of stratifying risk is called **risk stratification**.

After identification, the care management organisation spends its energy on intervention programs which help patients to stay healthy. After a program ends, it is evaluated to see what went wrong, and what went right. While evaluating a care management program, two measures are used: The measures are:

1. **HEDIS measures**
    a. Effectiveness of care
    b. Access/availability of care
    c. Experience of care
    d. Risk-adjusted utilisation
    e. Relative resource use

2. **AQA measures**
    a. Preventive care
    b. Acute care
    c. Chronic care

Accountable Care Organisations (ACOs)

Accountable care organisations are patient-centric organisations who work with providers to help the patients stay healthy. They have the same goals as a care management organisation, i.e., to improve the health of the patients. These are independent organisations, i.e., they don't work for a payer or a provider, they work with them.

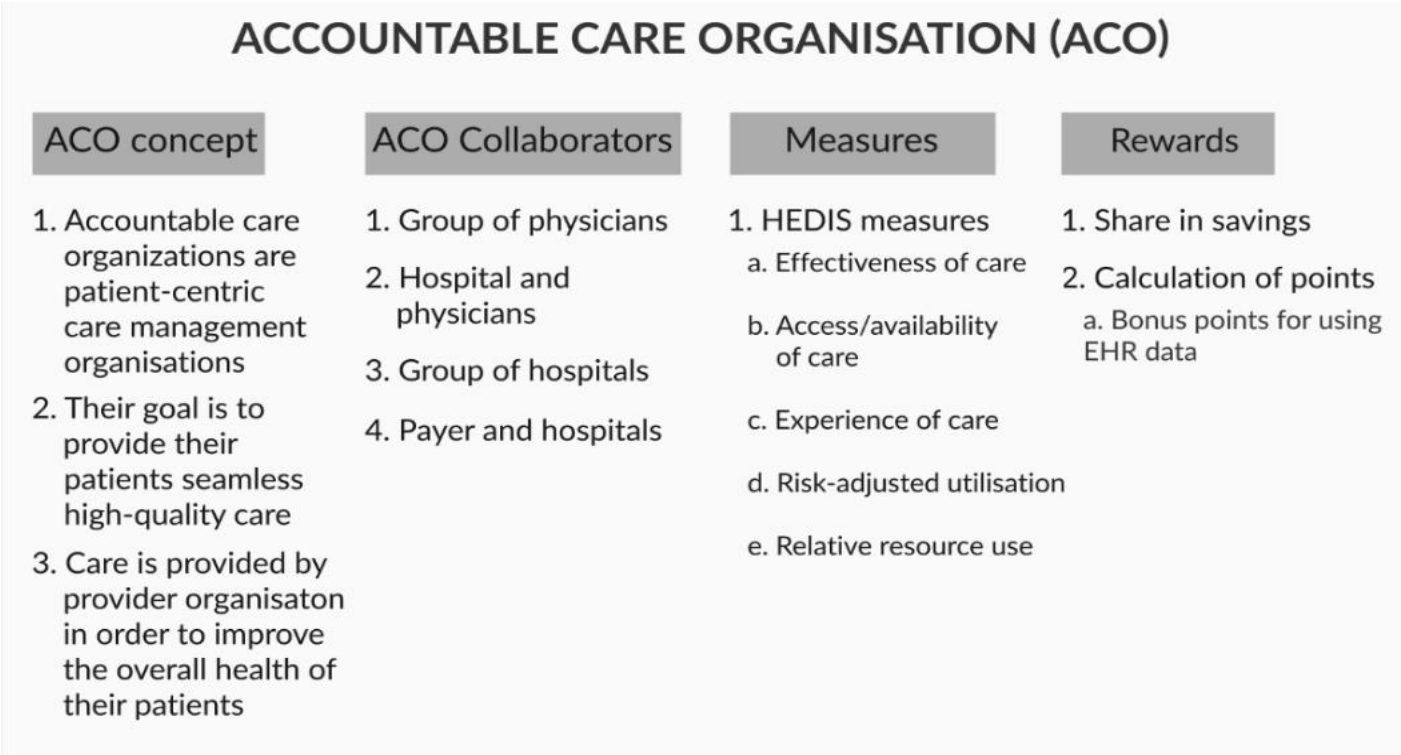


Figure 15: Accountable care organisation

Accountable Care Organisations (ACOs)

Various analytics opportunities are present for you in the domain of care management. The analytics opportunities present here are also called **clinical analytics**. The following figure summarises all these analytics opportunities and the data that is used to do the analysis.

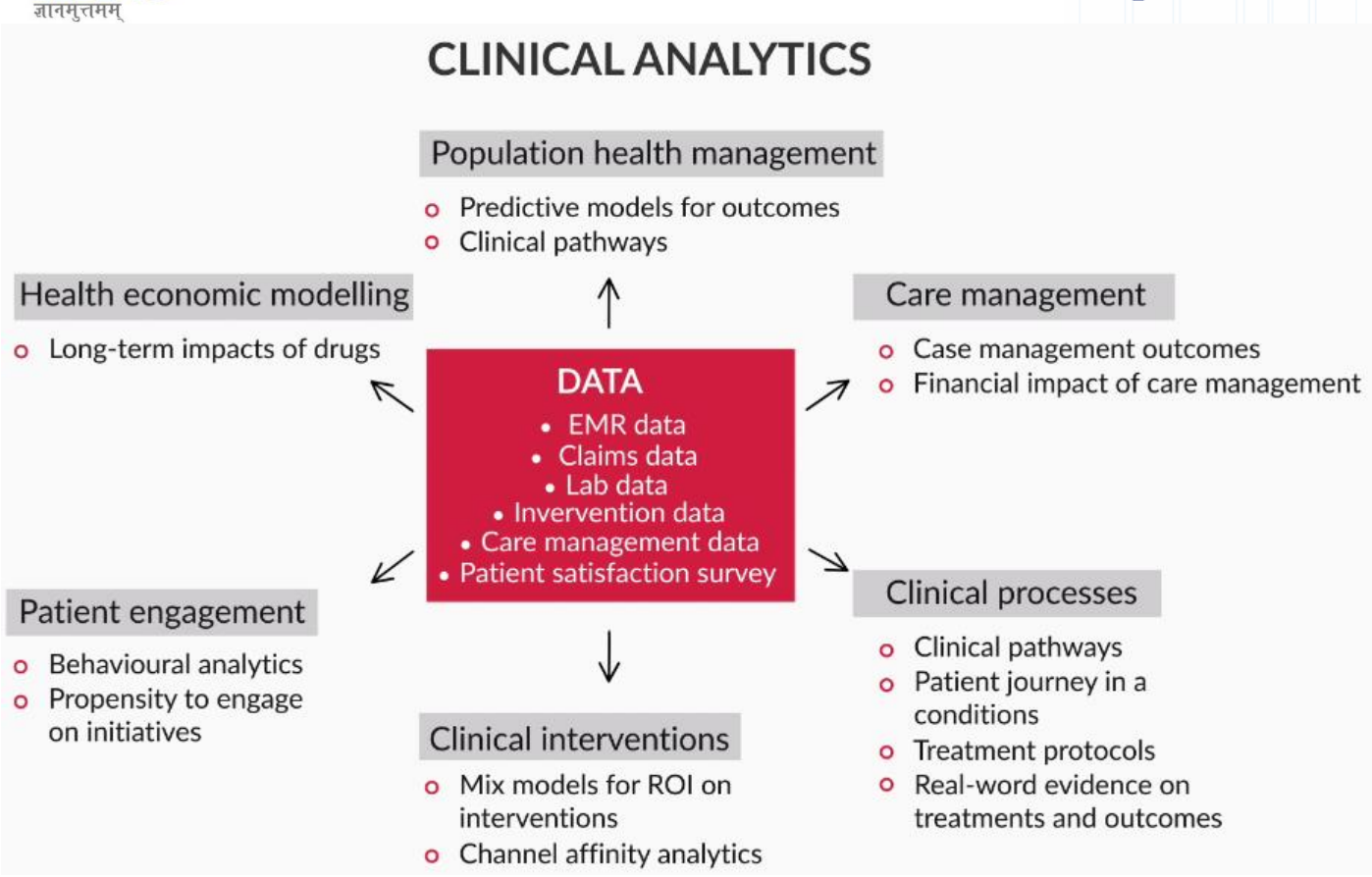


Figure 16: Clinical analytics