

Hospital Pricing Transparency Database Design & Analysis

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Group 11

Background

- Starting January 1st, 2021 Hospitals were required by Federal Law to publish on-line their negotiated rates with Managed Care Organizations (MCOs).
 - The files required to be machine-readable.
- The intent of the law was to allow consumers to understand (e.g. “shop around”) for the lowest cost hospital to provide their service. Other uses include competitive analysis (both insurers and hospitals) and regulators understanding pricing trends
- Our team limited this analysis to select Minnesota Hospitals, but this process can be easily scaled to include other hospitals and states.

Data Sources

1. Pricing Data
 - a. Mayo, Essentia, and Fairview websites
 - b. Limited review of other hospitals (e.g. Northfield, CentraCare)
2. Centers For Medicare and Medicaid Services
 - a. Hospital Identifier Mappings
 - b. Background Information

Price Estimate Tool

Please complete the form below. Choose the service category and follow the prompts stored in our vendor Trubridge's database.

Service Selection	
Service Category:	<input type="text"/>
Service:	<input type="text" value="Please choose a service category"/>
Service Description:	<input type="text"/>
Estimated Date of Service:	<input type="text" value="(MM/DD/YYYY)"/>
Insurance Type:	<input type="text" value="All Payers"/>

Patient Information	
Last Name:	<input type="text"/>
First Name:	<input type="text"/>
Date of Birth:	<input type="text" value="(MM/DD/YYYY)"/>
Gender:	<input type="text" value="Unspecified"/>
Address:	<input type="text"/>
City:	<input type="text"/>
State:	<input type="text"/>
ZIP Code:	<input type="text"/>
Phone Number:	<input type="text"/>

Insurance Information	
<input checked="" type="radio"/> I have insurance and I know my information	
<input type="radio"/> I don't have insurance	
Insurance Selection:	<input type="text" value="Other Insurance"/>
Insurance Company Name:	<input type="text"/>
Insurance Group Number:	<input type="text"/>
Insurance Member ID Code:	<input type="text"/>
Remaining Deductible Amount:	<input type="text" value="(ex: \$)"/>
Copayment Amount:	<input type="text" value="(ex: \$)"/>
Coinurance Percentage:	<input type="text" value="(ex: %)"/>
Remaining Out of Pocket Max:	<input type="text" value="(ex: \$)"/>

Example: Northfield Hospital Price Estimate Tool

Data Challenges

- Data Standardization
 - BCBS vs Blue Cross Blue Shield
- Data Format
 - Excel vs CSV
- Data Accessibility
 - Flat files vs manual inputs

Hospital	MCO	Product	drg_cd	drg_desc	Charge
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Schema / ER Diagram

Hospital(hid: integer, hname: string)

Service(drg_cd: string, drg_desc: string)

Product(pid: integer, pname: string)

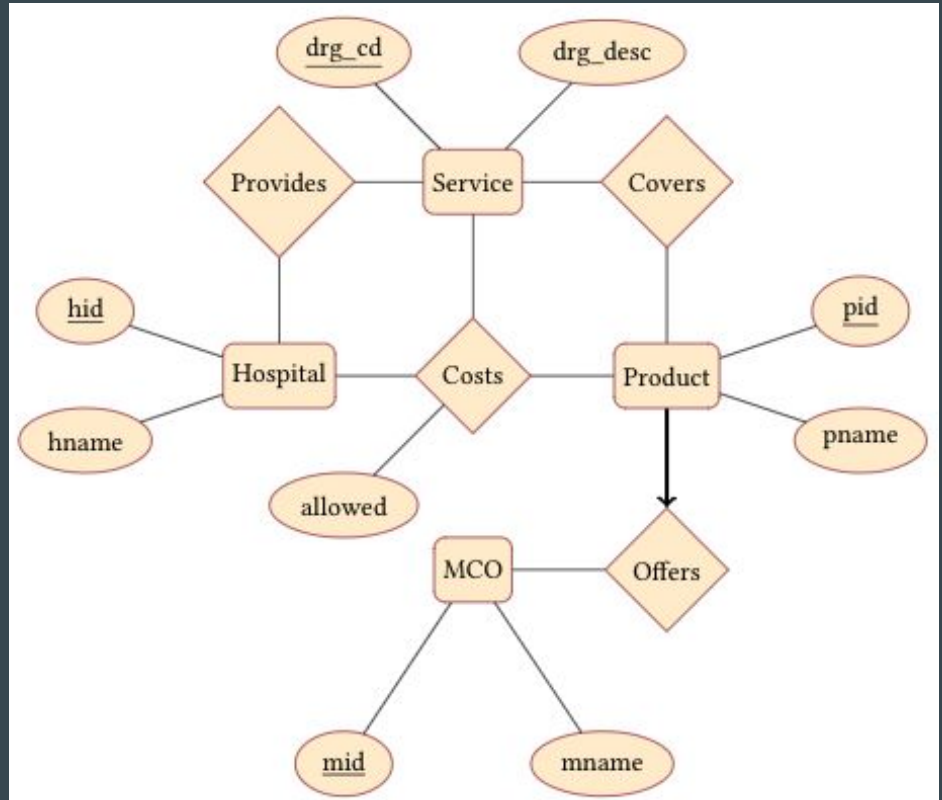
MCO(mid: integer, mname: string)

Provides(hid: integer, drg_cd: string)

Covers(pid: integer, drg_cd: string)

Offers(pid: integer, mid: integer)

Costs(hid: integer, drg_cd: string, pid: integer,
allowed: real)



Building Database

- Microsoft SQL Server on Azure
- Uploaded cleaned, standardized hospital tables
- Used SQL queries to create & add data to each table in schema
- Example: Provides

```
CREATE TABLE Provides (hid INTEGER,  
                        drg_cd CHAR(3),  
                        PRIMARY KEY (hid, drg_cd),  
                        FOREIGN KEY (hid) REFERENCES Hospital,  
                        FOREIGN KEY (drg_cd) REFERENCES Service)
```

```
INSERT INTO Provides  
select distinct H.[hid],  
                A.[drg_cd]  
FROM [BaseData] A  
left join [Hospital] H  
on A.[Hospital] = H.[hname]
```

Analysis w/ SQL queries (Gavin)

- Given I need to have {blank} procedure done, What is the cheapest option?
- If I can only go to one hospital for {blank} procedure, what's the best option for insurance?
- for a single hospital system - compare different locations
- What sorts of things can we learn about the American Healthcare System?

```
select top 100 hos.hname,  
    mco.mname,  
    pro.pname,  
    min(cost.allowed) as minCharge  
from dbo.Costs cost  
inner join dbo.Hospital as hos on hos.hid = cost.hid  
inner join dbo.Product as pro on cost.pid = pro.pid  
inner join dbo.Offers as ers on pro.pid = ers.pid  
inner join dbo.MCO as mco on ers.mid = mco.mid  
  
where drg_cd in (178)  
group by hos.hname,mco.mname,pro.pname  
order by minCharge
```

```
select top 100  
    mco.mname,  
    pro.pname,  
    min(cost.allowed) as minCharge  
from dbo.Costs cost  
inner join Hospital hos on hos.hid = cost.hid  
inner join Product pro on pro.pid = cost.pid  
inner join dbo.Offers as ers on pro.pid = ers.pid  
inner join dbo.MCO as mco on ers.mid = mco.mid  
where hos.hname = 'Fairview Lakes' and cost.drg_cd = 177  
group by mco.mname,pro.pname  
order by minCharge
```

```
select top 100 hos.hname,  
    mco.mname,  
    min(cost.allowed) as minAllowed  
from dbo.Costs as cost  
inner join dbo.Hospital hos on hos.hid = cost.hid  
inner join dbo.Product prod on prod.pid = cost.pid  
inner join dbo.Offers as ers on prod.pid = ers.pid  
inner join dbo.MCO as mco on ers.mid = mco.mid  
where drg_cd = 178 and hos.hname like '%Fairview%'  
group by hos.hname , mco.mname  
order by minAllowed
```

Market Differences.

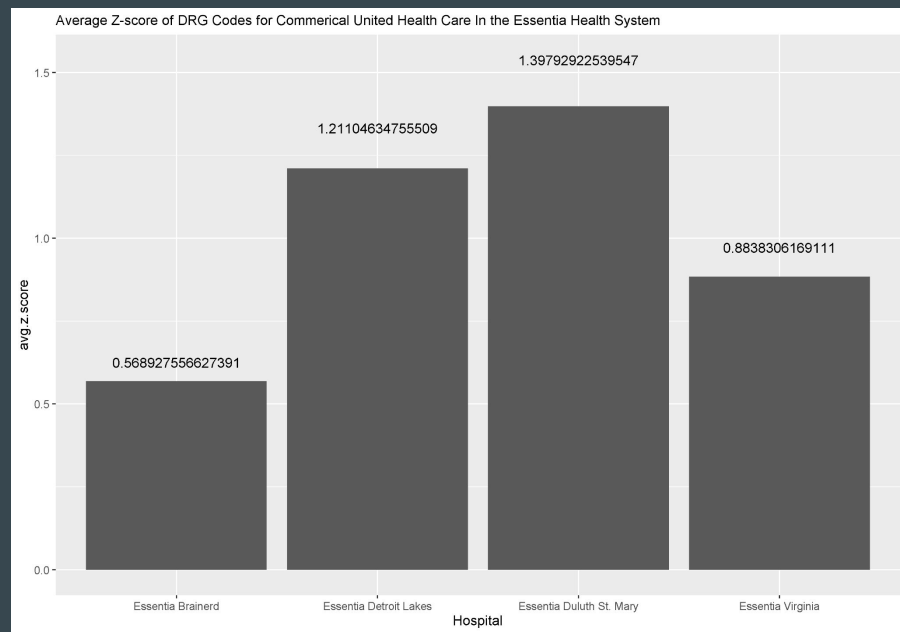
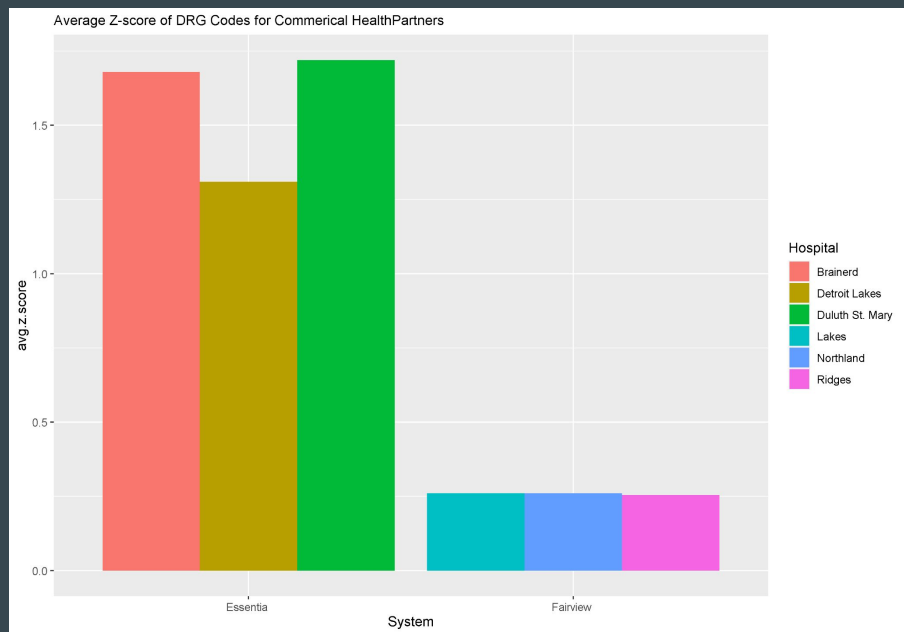
Top 10 lowest Average Z- Scores.

Provider <chr>	Product <chr>	Hospital <chr>	avg.z.score <dbl>	count.drg <int>
Medica	MEDICAID IP	Essentia Moose Lake	-1.3479011	759
Medica	SENIOR CARE PLUS	Essentia Brainerd	-1.2972904	759
Medica	Medica PMAP	Fairview Lakes	-1.2900908	746
Medica	Medica PMAP	Fairview Northland	-1.2900908	746
HealthPartners	HP PMAP	Fairview Lakes	-1.2114500	748
HealthPartners	HP PMAP	Fairview Ridges	-1.1819797	748
Medica	SENIOR CARE PLUS	Essentia Duluth St. Mary	-1.0773050	752
Medica	SENIOR CARE PLUS	Essentia Detroit Lakes	-1.0010548	759
Medica	SENIOR CARE PLUS	Essentia Virginia	-0.9527051	759
HealthPartners	HP PMAP	Fairview Northland	-0.9017692	748

Top 10 Highest Average Z- Scores.

Provider <chr>	Product <chr>	Hospital <chr>	avg.z.score <dbl>	count.drg <int>
DakotaCare	DakotaCare Commercial	Fairview Lakes	1.992411	746
DakotaCare	DakotaCare Commercial	Fairview Northland	1.992411	746
DakotaCare	DakotaCare Commercial	Fairview Ridges	1.992411	746
HealthPartners	COMMERCIAL	Essentia Duluth St. Mary	1.719560	759
HealthPartners	COMMERCIAL	Essentia Brainerd	1.679163	759
Medica	Medica Commercial	Fairview Lakes	1.487259	746
Medica	Medica Commercial	Fairview Northland	1.487259	746
United Health Care	Insurance	Essentia Duluth St. Mary	1.397929	752
HealthPartners	COMMERCIAL	Essentia Detroit Lakes	1.309635	759
URN Oncology	URN Oncology Commercial	Fairview Lakes	1.244700	746

Zscore results By Health Care System.



Use Case - Rshiny App

DRG Look up

Enter DRG code Here:

Choose a Hospital:

Fairview Lakes ▼

Choose a Provider:

Click Here For Any Provider ▼

Best Product for a given Provider at a given Hospital

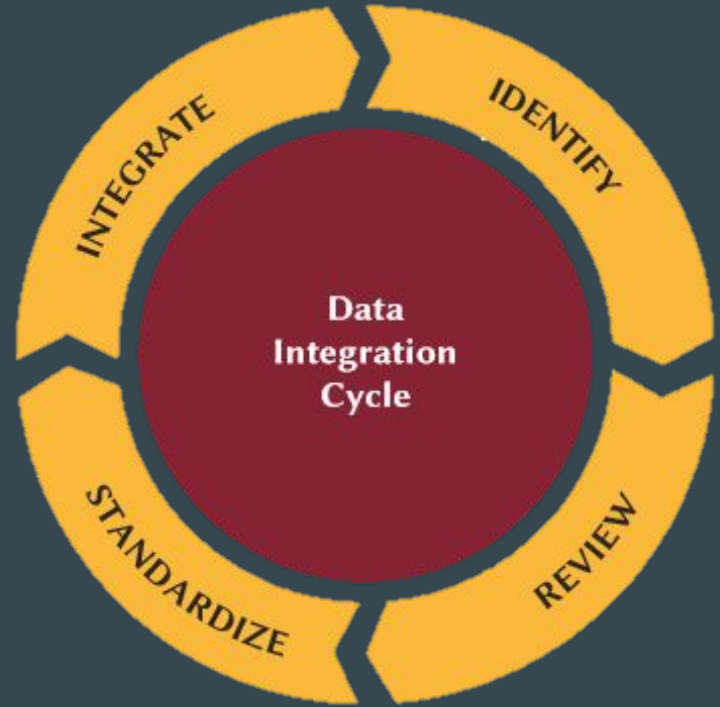
mname	pname	minCharge
Medica	Medica PMAP	5780.00
HealthPartners	HP PMAP	6041.09
South Country Health Alliance	SCHA Medicare	9668.99
Ucare	UCare Medicare	9821.18
Blue Cross	BC Medicare	9862.37
Medica	Medica Medicare	10046.00
HealthPartners	HP Medicare	10055.75
United Health Care	UHC Medicare	10055.75
Preferred One	PreferredOne PPO	11045.67
URN Oncology	URN Oncology Commercial	13593.47
Americas PPO	Americas Commercial	14315.00
HealthPartners	HP Commercial	14696.40
Preferred One	PreferredOne Commercial	15390.00
DakotaCare	DakotaCare Commercial	16506.36
Ucare	UCare Commercial	17506.87
United Health Care	UHC Commercial	20054.00
Medica	Medica Commercial	21093.00

Limitations

- Data types unique to single hospital systems could not be fit into our schema. Only MS DRG (Multiple Severity-Diagnostic Related Groups) codes were used in our database. Per Diem rates, CPT and HCPCS codes, if present, were not added.
- Our database does not cover medication/drug costs, or any taxes that may be passed on to patient bills. As such pricing information does not fully reflect potential bills incurred.
- Due to dramatic differences in data formatting between hospital systems, extensive and customized data cleaning must be employed for every new hospital added to the database.
- Questions about compliance can lead to questions about conclusions.
- DRG Codes have limited relevance to the patient experience.

Possible Extensions

- Additional hospital systems may be added by hand (at least at first)
- Automated updating for existing hospitals utilizing web scraping and semi-automated data cleaning.
- Additional tables for insurance mapping
- User interface and website



References

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