Improving Operational Efficiency & Performance in Public Hospitals

TEAM AMA

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Background in Qatar

2,100 Beds

Over 1m Patient Admissions/Year

12 Beds for every **10,000** population

Table 34: Average Length of Stay by Public Hospital (2010)

Hospital	Average Length of Stay (days)
Hamad General Hospital	9.3
Rumailah Hospital (includes Rehab &Geriatrics)	29.5
Women's Hospital	2.9
Al Amal Hospital	9
Al Khor Hospital	4.6
Average	11.1
OECD	8.8

Source: HMC 2011, Table 3; OECD 2012.

Problem Statement

Public hospitals are operationally inefficient in treating patients & thus unable to accommodate patients accordingly.

Qatar & GCC in the Context

90% of Qatar is dependent on Public Healthcare.

Qatar has the 3rd highest number of hospital visits in the GCC.

Has the highest rate of patient admissions & it is increasing by 12.5% per year.

Table 37: Visits by Treatment Type in Public Primary Health Care Centres (2010)

Treatment	Number of visits ('000)	Annual Growth Rate (%)	Total Share (%)
General Visits			
General	2,677	3.7	78.6
Well Baby	267	4.8	7.8
Antenatal	29	33.4	0.9
Subtotal	**2,974**	**4**	**87.3**
Specialised Visits			
Dental	291	21.9	8.6
Diabetic	79	1	2.3
Eye	39	7.3	1.1
Ear Nose and Throat	16	23.4	0.5
Cardiology	9	12.5	0.3
Subtotal	**434**	**16.3**	**12.7**
Total	3,408	5.5	100

Source: SCH 2012, Table 4-26.

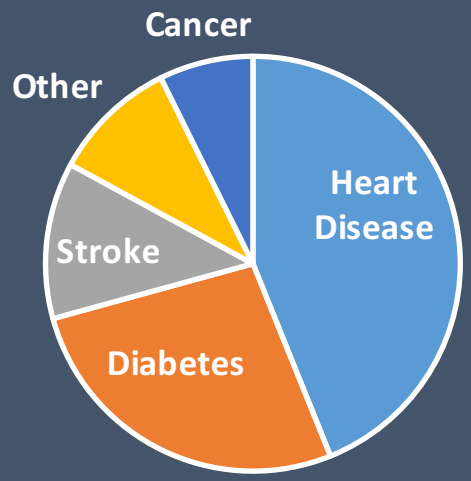
Table 33: Bed Occupancy Rate by Public Hospital (2010)

Hospital	Bed Occupancy (%)
Hamad General Hospital	92
Rumailah Hospital (includes Rehab& Geriatrics)	86.2
Women's Hospital	75
Al Amal Hospital	81
Al Khor Hospital	66.6
Average	80.2
OECD	75.2

Source: HMC 2011, Table 24.

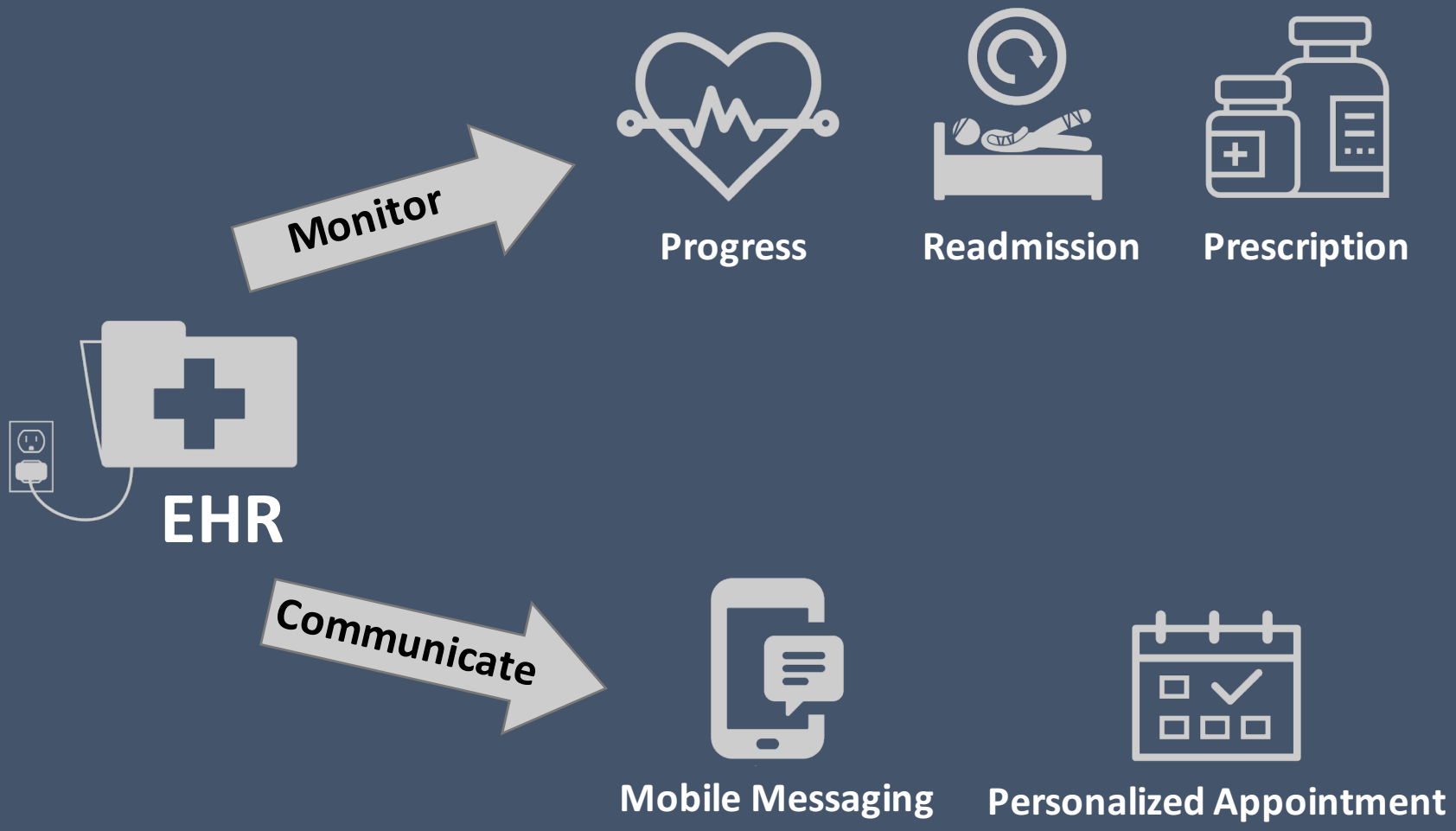
Qatar & GCC in the Context

- 92% of beds at public hospitals are occupied per month
- Optimum bed occupancy is 75%
- Coronary **heart diseases** & **diabetes** constitutes of the highest visits per year (>30%)
- **Prevention** will be more effective than treatment.



Literature Review

Literature Review

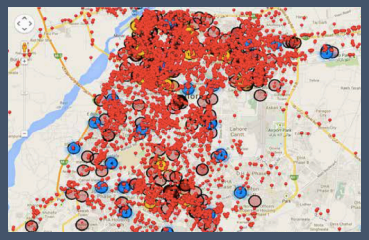


Pentland, A., Reid, T. G., & Heibeck, T. (2013). Big Data and Health: Revolutionizing Medicine and Public Health. *WISH Big Data and Health Report*.

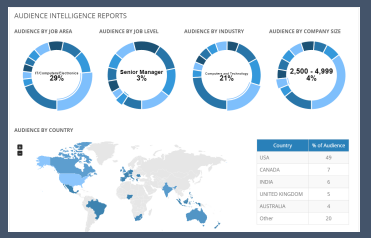
What Qatar is Missing in Efficiency?

- Optimizing healthcare planning through analytics to create:

Heat Map for Diseases



Disease Occurrence Data



Demographics Data

- Integration of EHR with social media to create:

Personalized Risk Profiles

Suggest Prevention Tips

Role of Analytics

The Value of Analytics for Diseases & Hospitals

- Allows patterns of diseases to be recorded & correlations to be found
- Allows information regarding diseases to be analyzed thus capable of making predictions
- Shows effectiveness/efficiency within processes
- Gives a positive future impact

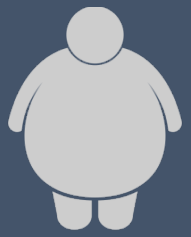
Top Causes of Hospital Visits

- Analysis of most frequent patient diseases in hospitals to use predictive/prescriptive analytics to better the experience and prepare the hospitals accordingly.

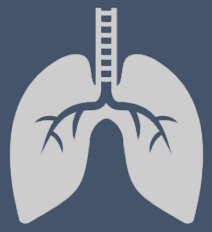
Top Internal Causes for visits:


Circulatory


Neoplasm


Obesity


Endocrine


Respiratory

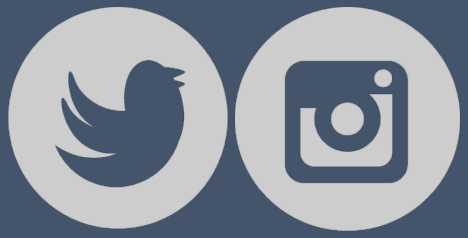
Top External Causes for visits:


Accidents


Burns

Potential Methodologies of Data Analysis

Patterns in Healthcare Reports



Twitter & Instagram Sentiment Analysis

Google Trend Analysis

Surveys

Analyzing Hospital Records

Possible areas of improvement in Hospitals

- Are the hospitals aware of when flu season is approaching? Are they prepared?
- Why are patients being readmitted?
- Are there enough supplies(beds, medicines, staff..etc) in hospitals to accommodate to its patients?

The Potential of Analytics

Ease patients' experience

Detecting diseases before symptoms are even shown

Have a "**better safe then sorry**" approach

<u>Example</u>

Preventing **obesity** in patients by tracking information on:

Food Habits

Sleeping Patterns

Daily Work Routine

Exercise Habits

Case Studies

Case Study #1

Social Media in Ebola Outbreak

 **: Global**

 : **6 months**

Method:

- Infoveillance
  - ✓ Google Trends
  - ✓ ProMed Emailing System
  - ✓ Online news databases

Results:

- Ebola spread in early April 2014
- No international health emergency until late August.

Discussion:

- Gaps in responses to potential global health threats.
- Media reports issued medical evaluation differently.

Case Study #2

Infodemiology and Infoveillance of Multiple Sclerosis in Italy

 **: Italy**

 : **8 years**

Method:

- Large Scale Monitoring
- Data Mining
- Infoveillance using Google Trends

Analysis:

- Multiple Linear Regression
- Correlation Coefficient
- P-Values
- Cross Validation

Results:

Multiple Sclerosis therapy & symptoms most searched terms by users

Discussion:

Google Trend queries shows users trying to understand the disease & treatments

Case Study #3

Internet Search Patterns of HIV and Digital Divide in the Russian Federation: Infoveillance Study

 **: Russia**

 **: 1 year**

Goals:

1) Validate Internet search patterns against national HIV prevalence data
2) Investigate relationship between search patterns & determinants of Internet access

Method:

- Infoveillance using Google Trends & Yandex
- Surveys
- Digital Divide exists
- Obtained HIV prevalence data from Russian AIDS Centre

Case Study #3

Data matching the determinants of Internet access with search patterns through multivariate analysis.

- Age
- Education
- Income
- Broadband price
- Urbanization

Principal component analysis (PCA)

Analysis:

- Multivariate Analysis
- Spearman Rank Correlation
- Cross Validation

Case Study #3

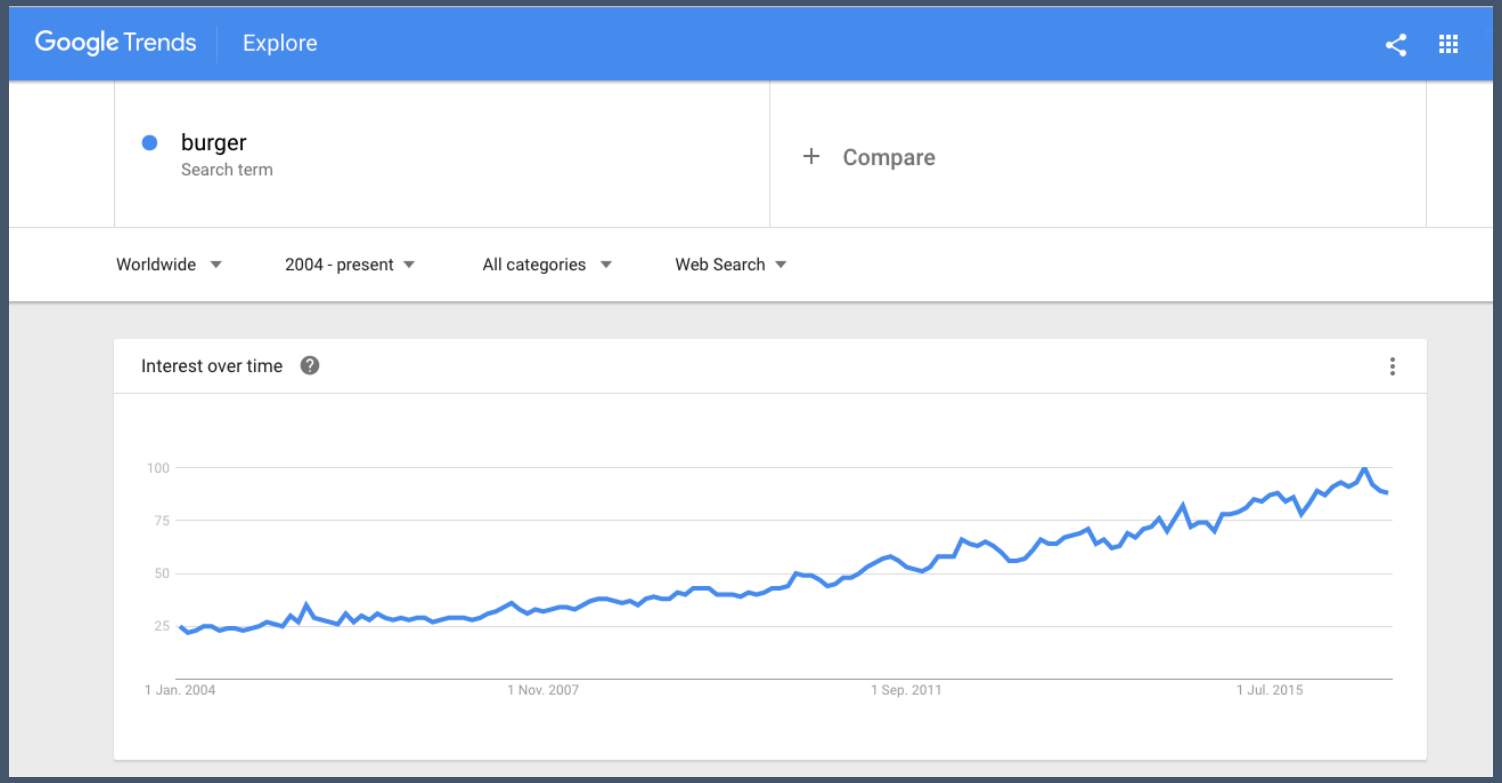
Discussion:

- Google data not adequate for subnational HIV surveillance in Russia.
- Found strong spatial correlations between official HIV rates & searches for HIV.
- Internet being used effectively by PLHIV because of strong correlations between search patterns & disease prevalence.

Data Sets

Google Search Trends

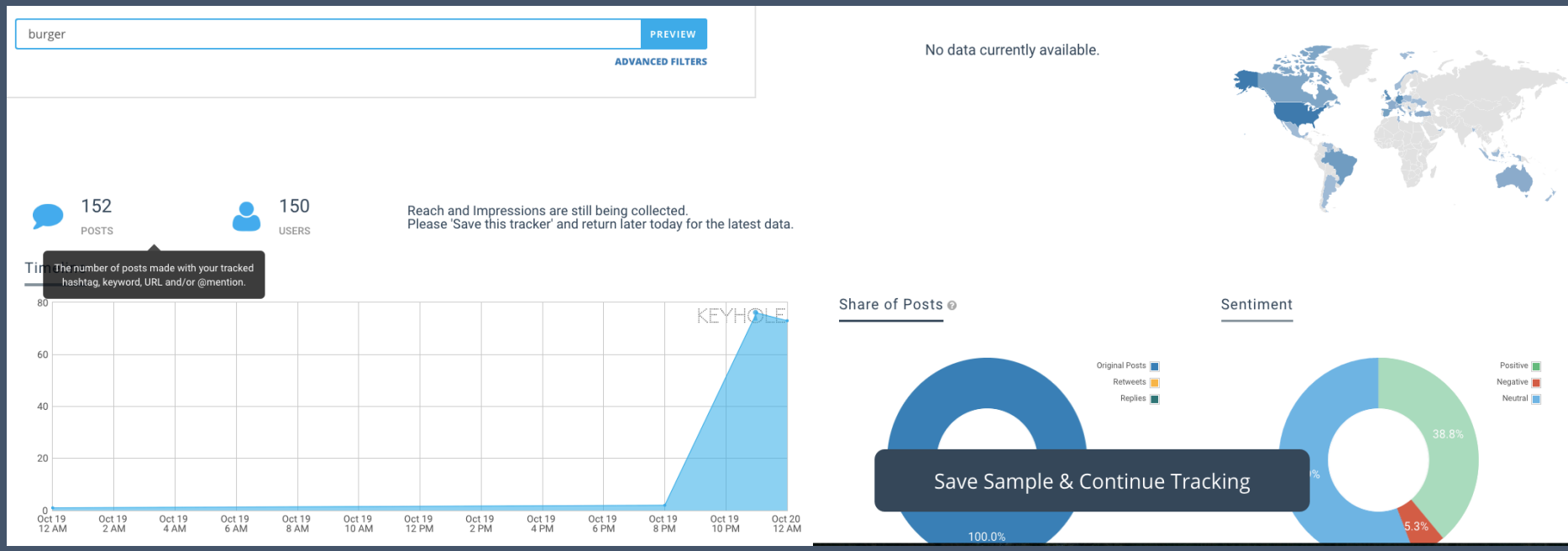
An example of correlations is shown below between burger searches in relation to cholesterol rates at a specific geographical location.



https://www.google.ie/trends/

Instagram & Twitter Trends

- Instagram and Twitter sentiments can be used to determine patient satisfaction in accordance to healthcare management.
- Relationship of certain lifestyle and diseases.



http://keyhole.co/ (Twitter & Instagram)

Future Developments

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- Adopting more **prescriptive** analytics over predictive analytics to

Reduce Re-admission (Increase Quality)

Lower Costs Incurred (Decrease Price)

- Transforming from fee-for-service to a **value-based** system
- Implement **Telehealth** services for cardiac & diabetic patients to

Monitor Lifestyle Through App

Look at Food Intake & Habits

Reduce Cost of Medicine & Treatment

Discussion Questions

- How sharing data through **EHR** will **affect** hospitals? Will they lose their **competitive advantage**?

- Will a hospitals **prescriptive** system from given data sets (google, social media trends) be **adaptive/reliable** to be introduced at **different locations** and demographics?

Thank you

References

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