HIMSS Davies Award
Nicholas E. Davies

King Faisal Specialist Hospital & Research Centre
Gen. Org.
SUMMARY

LOCAL PROBLEM
High rates of advanced stage cancer at presentation due to lack of early, preemptive & preventative screening & detection

DESIGN & IMPLEMENTATION
- Identify the best evidence based guidelines, in accordance with Government regulation, pertaining to Preventative care
- Identify a way to capture the preventative care workflow in the EMR

GOALS
- Identify the elements of preventative care that are evidence based & recommended based on age, gender, documented results and known chronic problems
- Utilize our EMR to help improve care
- Provide proactive and preventative health management services to our patients

VALUE DERIVED
- Enterprise wide standardization of preventative care and chronic disease screening
- 88% increased levels of chronic disease diagnosis entered in EHR
- Improved Patient Outcomes through early detection and treatment: 267% increase in Colorectal Cancer and 600% in Breast Cancer identification
- Ability to utilize captured data towards research, reporting and publications
Osama Al Swailem MD, MA
Chief Information Officer – Associate Professor

Salam Everyone, I am King Faisal Hospital & Research Center

Bachelor of Medicine & Surgery
King Saud University

Masters & Post Doctoral Fellowship
Columbia University

King Faisal Specialist Hospital & Research Center
2014 – Present Chief Information Officer
2008 – 2014 Director Medical Informatics
ABOUT SAUDI ARABIA

Population 29.897 Million

Language Arabic

King Salman bin Abdulaziz Al Saud

DID YOU KNOW

- Saudi Arabia is the 13th largest country in the world
- Saudi Arabia is the largest country in the world without a river
- Riyadh’s camel market is one of the largest in the world and sells about 100 camels per day
- Jeddah is a 3000+ year old city and houses the tomb of Eve (Arabic: حواء Hawa), the mother of mankind
Newspaper: Al Riyadh
Date: 10 November 1970
# KFSH&RC FACTS & FIGURES

**MISSION**  
Provide the highest level of specialized healthcare in an integrated educational and research setting

**VISION**  
To be a world-leading institution of excellence and innovation in healthcare

<table>
<thead>
<tr>
<th><strong>CY2018</strong></th>
<th><strong>Facts &amp; Figures</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1,846 Beds</td>
<td>31,741 Admissions</td>
</tr>
<tr>
<td>1,472 Transplants</td>
<td>56,932 OR Hours</td>
</tr>
<tr>
<td>95,382 ER Visits</td>
<td>1,297,497 OP Visits</td>
</tr>
<tr>
<td>13,687 Employees</td>
<td>68 Nationalities</td>
</tr>
<tr>
<td>31 Smart Centers</td>
<td>9.4M Population Served</td>
</tr>
</tbody>
</table>

**Established:** 1975  
**Location:** Kingdom of Saudi Arabia  
**Regions:** Riyadh, Jeddah & Madinah
#1 Out of 141 centers in the UK & USA in the volume of Pediatric living donor liver transplants

#1 Out of 257 centers in the UK & USA in the volume of Pediatric living kidney transplants

TOP 4% Out of 272 centers in the USA reporting to Center of International Blood & Marrow Transplant Research

56th Out of 71 centers in the USA in the volume of lung transplants

TOP 10% Of heart transplants worldwide

RESEARCH
17 Citation Average

EDUCATION
Graduate 1 out of 5 Consultants in the Region
Salam Everyone, I am King Faisal Hospital & Research Center

Bachelor of Science in Nursing
Master in Health Information System Management
George Mason University

King Faisal Specialist Hospital & Research Center
2018 – Present  Director Application & Health Informatics
2008 – 2018  Head of Health Informatics
KFSH&RC EMR JOURNEY

* = New Module Implementation

**CY2002**
- Laboratory
- Radiology
- Registration
- Scheduling
- Nursing Documentation

**CY2010**
- OR Surgical
- Pharmacy
- Medical Records
- Emergency
- Physician Documentation
- Clinical Pathways

**CY2013**
- Infection Control
- Document Imaging
- Mobile Solution
- Outreach
- Web Connect
- Synoptic Reporting

**CY2017**
- Critical Care
- Anesthesia
- Staff Scheduling
- Smart Rooms
  - Infotainment
  - Dashboard
  - Patient Room Link
  - RTLS
  - IP Telephony
  - Nurse Call
  - Hand Hygiene
  - ID Access
  - BMDI
  - Capacity Management

**CY2018**
- Enterprise Business
- Process Management
- Zero Harm

**Phase 1**

**Phase 2**

**Phase 3**

**Phase 4**
KFSH&RC EMR JOURNEY

= New Module Implementation

Phase 5

CY2020
- Oncology
- Organ Transplant
- Women’s Health
- VNA Imaging
- Revenue Cycle Management

CY2019
- HW Upgrade
- SW Upgrade
Overall EMR Satisfaction
All Clinicians (n=73,115)

- All Organizations (n=159)
- Cerner Deployments (n=29)
- Non-US Health Systems (n=11)
KFSH&RC EMR GOVERNANCE

Acquisition → Project Mode → Maintenance Mode

Health Informatics Committee – HIC → Project Administrative Committee – PAC → Clinical Advisory Group – CAG

Medical Advisory Committee

Patient Safety Committee

Patient Health Information Management Committee

Physician Informatics Governance Committee

Clinical Decision Support Committee

Medication Process Taskforce

Nursing Informatics Council
IMPLEMENTATION METHODOLOGY

Planning

Support

Go Live

Data Collection

Workflow Analysis

Training

Design

Validation

Build

- Enhancement / Optimization
- Change Management
- Benefit Realization
- Policies & Procedures
- Downtime Process/Forms
CHANGE CONTROL – PROCESS WORKFLOW

New Request
- Department Identify Care Need
- Send Requesting Memo to HITA
- Assign to Build Team
- Analyze Requirements & Current Workflow
- Build Application in Build Domain

Align/Map to Existing Orders
- Build New Orders in Build Domain, if Required
- Send to Requester for Review
- Make Required Changes
- Approved
  - Yes

Create Change Order in ServicesHub
- Send to Requester for Review
- Make Required Changes
- HITA Approval?
  - Yes

Change Moved to CERT Domain
- Validated in CERT Domain
- Education and/or Training Material Developed
- End User Training
- Change Moved to PROD
- Request Implemented
Case Presentation

**Smart Technology to Smart Care**
LOCAL PROBLEM

ISSUE

Transform the lingering delivery of care issues that existed prior to opening of King Abdullah Center of Oncology & Liver Disease (KACOLD): communication, person centric experience & education

GOALS

Improve overall healthcare experience and outcomes through:
- Timely patient care
- Care team communication and responsiveness to patient needs
- Clinical decision support
- Interoperability
- Safety
- Continuum of Care
- Digital Transformation in Healthcare
WHY KFSH&RC PRIORITIZED THIS ISSUE

One of KFSH&RC strategic priorities is focused on providing excellent patient and staff experience.

KFSH&RC wanted to leverage technology and information in smarter, more meaningful ways to better engage patients and transform their expectations when it comes to their care experience.

Opportunity to enhance continuum of care beyond the borders of KFSH&RC.

Data Latency was having a negative impact on Patient outcomes:
- A delay in patient care can result in complications which in return will result in a longer hospitalization; increased cost and an increased risk for mortality.
- A delay in communication can result in patient harm or injury as well as patient dissatisfaction.
- Clinical decision support.
IMPLEMENTATION METHODOLOGY

Formation of multidisciplinary team: Physicians & Nurses, Health Informatics, Information Technology, Application Development, Integration & External Partners/Vendors

CEO – Mega Project
CEO – Low Current Rooms

Director A&HI – Smart Room Project

Simulation to capture both clinical and patient experience

Validation testing to ensure interoperability

Divide roll-out into phases

Command Center

Inauguration
INTENDED OUTCOMES

- Improve Patient & Staff Safety as well as Experience
- Improve Patient/Staff Communication
- Interoperability of clinical devices toward accuracy & efficiency
- Reduce Length of Stay (LOS)
- Digital Transformation in Healthcare
- Improve Pain Management Scores
King Abdullah Center of Oncology & Liver Disease

Opening: June 2017
Inpatient: 210 Beds
Infusion Bays: 96
Outpatient Clinics: 30+

ICU: 65 Beds
Operating Rooms: 13
DSU: 28
Adele Sandeman, RN
Application & Health Informatics Services – Senior Health Informatics Analyst

Salam Everyone, I am King Faisal Hospital & Research Center

Diploma in Nursing, ITIL Certified

King Faisal Specialist Hospital & Research Center
2002 – Present Sr Health Informatics Analyst
Preventative Care is a Pillar of Family Medicine

- Use the EMR to help us provide preventative care
- Multi disciplinary team used to implement evidence based expectations
**DESIGN STRATEGY**

**CORE FACTORS**
- Ease of Use
- Integration with our EHR
- Analytics to Measure Success & Opportunities
- Multi-Disciplinary Involvement

**RULES**
Does patient qualify for expectation?
- Gender
- Age
- Documented Problems
- Documented Procedures
- Documented Diagnosis
- Documented Results
- Orders

**EXPECTATION**
Addressed during Patient Visit
- System Generated
- Added Manually

**SATISIFIER**
Expectation Completion
Satisfaction Periods:
- Orders = 14 days
- Results = defined period

Manual satisfiers:
- Done Elsewhere = satisfied
- Postponed = not satisfied
- Refused = not satisfied
- Cancelled = removed
IMPLEMENTATION METHODOLOGY

Formation of multidisciplinary team: Family Medicine Department Physicians & Nurses, Health Informatics, Information Technology, User Support, Training, Application Development & External Partners/Vendors

Developed the Health Maintenance Tab (HMT) within the EMR to incorporate government regulations & Family Medicine Department best practice and evidence based guidelines

Avoid Alert Fatigue by utilizing real time ‘static’ notifications: upon opening of patient chart, based on patient age, gender, documented results or known chronic problem/diseases

Interoperability with the current EMR utilizing existing solutions

Training & awareness campaigns targeting Clinicians on the importance of Preventive Medicine

Frequent reporting to ensure utilization and adoption
INTENDED OUTCOMES

- Promote preventative healthcare outcomes
- Standardization through the creation of preventive workflows within the EMR for targeted patients
- Utilization of best practice guidelines supported by Government Regulations
- Streamline the identification of patients who require screening
- Develop a clinician friendly solution
- Improve awareness of the importance of preventive medicine
- Advanced analytics
ADOPTION

- Buy-in from management through reinforced compliance
- Awareness campaign and training of physician and nurses in groups and individual sessions
- Training materials and pocket reference cards
- Moved the Health Maintenance Tab as the first view in the EMR
- Running quarterly reports to check compliance & utilization
- Having super users in the department for encouragement and support
HEALTH MAINTENANCE EXPERIENCE

SEHATY Notification → Appointment w/ FMD → MD Checks HMT → Expectation Alert

OPTION 1: MD Orders Test / Vaccine
OPTION 2: Test / Vaccine Done Elsewhere
OPTION 3: Postpone Test / Vaccine
OPTION 4: Cancel Test / Vaccine Permanently
Disease related decision support is built into the HMT around age; gender and documentation for:
- Screening for Preventative & Chronic Diseases
- Vaccination
- Recontracting

Future Development
- Chronic Disease Management
- Pediatric Clinic
- Well Baby Clinic
SEHATY PATIENT PORTAL

- Patient able to view targeted screening based on age, gender, documented results or known chronic problem/diseases
- When last screening was performed
- Recommended frequency of screenings
- Active status of received Vaccines
- Immunization Chart
  - Immunizations given by KFSH&RC
  - Historical Vaccines given outside of KFSH&RC
Abdullah Al Khenizan, MD
Chairman Family Medicine – Riyadh

Salam Everyone, I am King Faisal Hospital & Research Center

Bachelor of Medicine & Surgery – King Saud University
Master in Health Systems & Quality Management – Liverpool University
Master in Medical Law – Edinburgh University

King Faisal Specialist Hospital & Research Center – Riyadh
2010 – Present Chairman & Consultant Family Medicine
Case Presentation

Population Health Using Clinical Decision Support to Improve Cancer Screening
FAMILY MEDICINE

- 55,000+ Employees & Eligible Dependents
- Primary & Secondary Health Care Services
  - Scheduled Clinic
  - Walk-In Clinic
- Tertiary Care Patients with Chronic Diseases
- Pre Marital Screening
- Pediatrics Care
- Occupational Health Services
- Support Service & Follow-up Treatment for ER

- Nursing Clinic
  - Pre Employment Screening
  - Annual Re-Contract – All Employees
  - Travel Medicine Clinic
  - Well Baby Clinic
  - Diabetic Clinic
  - OB Screening Clinic
  - Driver Assessment Clinic
  - Nutrition Clinic

- Occupational Health
  - Food Handlers
  - Needle Stick Injuries
  - Tuberculosis Contacts & Converters
  - Fit Testing
  - Ergonomic Assessment of Workplace
LOCAL PROBLEM

ISSUE

High rates of advanced stage cancer at presentation due to lack of early, preemptive & preventative screening

GOALS

– Identify the elements of preventative care that are evidence based & recommended based on age, gender, documented results and known chronic problems
– Utilize our EMR to help improve care
– Provide proactive and preventative health management services to our patients
WHY KFSH&RC PRIORITIZED THIS ISSUE

Colon cancer is the #1 malignancy for males in Saudi Arabia with lower survival rates compared to Western countries

Breast cancer is the #1 malignancy for females in Saudi Arabia

Cervical cancer screening is an international standard of care for any cancer prevention program

SAUDI CANCER REGISTRY

Breast: 30.1
Thyroid: 12.0
Colorectal: 9.9
Corpus Uteri: 6.1
NHL: 5.0
Leukaemia: 4.5
Ovary: 3.3
Hodgkin’s lymphoma: 2.6
Stomach: 2.0
Brain, CNS: 1.9
Other Sites: 22.6

Colorectal: 14.9
NHL: 7.5
Leukaemia: 6.2
Prostate: 5.9
Lung: 5.0
Liver: 4.9
Hodgkin’s lymphoma: 4.2
Thyroid: 3.6
Kidney: 3.6
Brain, CNS: 35.0
Other Sites: 35.0
— Departmental awareness campaigns
— Continuous training
— Moved the HM to the first tab in EMR
— Monthly audits
FOB TESTS ORDERED

2,992 – Avg Before HMT
4,743 – Avg After HMT

59% INCREASE
MAMMOGRAM TESTS ORDERED

After HMT

1,579 – Avg Before HMT
2,056 – Avg After HMT

30% INCREASE
+ CANCER RESULTS MAMMOGRAM TEST

BEFORE HMT
CY2012 – 2015

2

AFTER HMT
CY2015 – 2018

14

600% INCREASE
PAP SMEAR TESTS ORDERED

After HMT

8% INCREASE

1,000 – Avg Before HMT
1,079 – Avg After HMT
FOLLOW UP + CANCER RESULTS

Fecal Occult Blood
- Screening Done
  - 1 Year
  - Positive
    - 2nd Positive
    - Refer to Specialist
  - Negative
- Re Screen
  - Positive
    - 2nd Positive
    - Refer to Specialist
  - Negative

Pap Smear
- Screening Done
  - 3 Years
  - Positive
    - Repeat with Ultrasound
    - 2nd Positive
    - Refer to Specialist
  - Negative
- Repeat 6 months
  - Positive
    - Refer to Specialist
  - Negative

Mammogram
- Screening Done
  - 2 Years
  - Positive
    - Repeat with Ultrasound
    - 2nd Positive
    - Refer to Specialist
  - Negative
World Health Organization
- In order to improve breast cancer outcomes and survival, early detection is critical. There are two early detection strategies for breast cancer: early diagnosis and screening.
- Annual, but not biennial, FOBTs reduce mortality from colorectal cancer after about a ten year period.

Key Points for Practice (AFP Editors)
- Routine screening with mammography should be initiated at 45 years of age in women at average risk.
- For women 55 years and older, biennial screening is the preferred approach, with the option to screen each year.
- Annual screening mammography should be offered to patients between 40 and 44 years of age.
- Clinical breast examination is not recommended as an approach to screening for breast cancer.

US Preventive Services Taskforce
- Breast cancer screening recommendations include a mammogram every two years for women from the ages of 50 to 74 years.
- Annual FOB testing from the age of 50 or completing a colonoscopy every 10 years as part of colorectal cancer screening.

KFSH&RC Standards
- Mammogram Screening done every 2 years for all females between the ages of 45 and 75 years. (Based on evidence, starting age for Breast Cancer Screening should be at 45 years as indicated by local population studies.)
- Annual screening is done for any female with a family history of Breast cancer
- Referral done if there is a second positive Mammogram and Ultrasound
- FOB Screening done every year for all patients above the age of 50
- FOB Test will be repeated if there is a positive result
- Colonoscopy & Gastroenterology referrals done if there is a second positive FOBT
LEARNINGS

SUCCESS

- Enterprise wide standardization of preventative care towards cancer screening
- Improved alert monitoring to minimize alert fatigue
- Inclusion of clinicians in the build and design decisions optimized the workflow and improved adoption
- Engaging leadership from the start, helped to drive accountability and utilization

CHALLENGE

- Change management
- Expansion to other cancer preventive services
- Facility specific workflows while using the same tools
Utilization of Outcomes in Clinical Research

Investigating the Epidemiology of Medication Errors in Adults in Community Care Settings

A retrospective cohort study in Jeddah, Saudi Arabia

Abstract

Background: Medication errors have been linked to increased hospital costs and patient outcomes. The aim of this study was to investigate the prevalence of medication errors in a Saudi adult population in a Community-Based Setting.

Methods: A retrospective cohort study was conducted in a community-based setting in Jeddah, Saudi Arabia. All patients aged 18 years and above who were prescribed medication for at least 30 days were included. Medication errors were identified using the World Health Organization's definition of a medication error.

Results: A total of 1,230 patients were included in the study. Of these, 1,023 (83.9%) were prescribed medication for at least 30 days. The prevalence of medication errors was 23.1% (231/1,023). The most common types of errors were dosage errors (41.8%), wrong medication (31.2%), and wrong route of administration (24.7%).

Conclusion: Medication errors are common in a Saudi adult population. Efforts should be made to reduce these errors to improve patient outcomes and reduce healthcare costs.

Yield of Prostate Cancer Screening at a Community-Based Clinic in Saudi Arabia

Abstract

Background: Prostate cancer is a leading cause of cancer-related mortality in men. Early detection using prostate-specific antigen (PSA) testing is crucial for reducing mortality rates. The aim of this study was to evaluate the yield of prostate cancer screening at a community-based clinic in Saudi Arabia.

Methods: A retrospective cohort study was conducted in a community-based clinic in Jeddah, Saudi Arabia. All men aged 50 years and above who underwent PSA testing were included in the study. Prostate cancer was diagnosed using biopsy and clinical examination.

Results: A total of 1,070 men were included in the study. Of these, 230 (21.4%) were found to have elevated PSA levels. Prostate cancer was diagnosed in 15 (6.5%) of these men. The yield of prostate cancer detection was 6.5% (15/230).

Conclusion: Prostate cancer screening at a community-based clinic in Saudi Arabia is an effective way to detect prostate cancer. Further studies are needed to evaluate the cost-effectiveness of this approach.
KEY TAKEAWAYS

Whoever saves one life - it is as if he had saved mankind entirely

Surah Al Ma‘idth 5:32

Aligns with KSA Vision 2030
Aligns KFSH&RC Mission & Vision

Ability to benchmark KFSH&RC healthcare delivery model

Strengthen relationship with Partners

Staff development & growth

International & National brand recognition