Case Presentation
Smart Technology to Smart Care
Osama Al Swailem MD, MA
Chief Information Officer – Associate Professor

Salam Everyone, I am King Faisal Specialist 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

Literacy 81%

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: Hawa), the mother of mankind
Newspaper: Al Riyadh
Date: 10 November 1970
**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

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**FACTS & FIGURES**

- **Est 1975**
- **Kingdom of Saudi Arabia**
- **9.4M Population Served**
- **Riyadh, Jeddah & Madinah**
- **31 Smart Centers**

**CY2018**

- **1,846 Beds**
- **31,741 Admissions**
- **1,297,497 OP Visits**
- **1,472 Transplants**
- **56,932 OR Hours**
- **13,687 Employees**
- **68 Nationalities**
- **95,382 ER Visits**
KFSH&RC RANKINGS

#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
KFSH&RC ACHIEVEMENTS

HIMSS EMRAM 7
Ambulatory
Riyadh & Jeddah

HIMSS EMRAM 6
Inpatient
Riyadh & Jeddah

CBAHI
Saudi Healthcare Accreditation
Riyadh & Jeddah

JCIA
Joint Commission
International Accreditation

MAGNET
American Nurses Credentialing Center

CAP
Laboratory Accreditation
College of American Pathologists

ISO 27001
Information Security
Fahad Bin Dayel, RN
Director Application & Health Informatics Services

Salam Everyone, I am King Faisal Specialist 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

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

Phase 1

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

Phase 2

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

Phase 3

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

Phase 4

CY2018
- Enterprise Business Process Management
- Zero Harm

= New Module Implementation
KFSH&RC EMR JOURNEY

= New Module Implementation

Phase 5

CY2019
HW Upgrade
SW Upgrade

CY2020
Oncology
Organ Transplant
Women’s Health
VNA Imaging
Revenue Cycle Management
KLAS EMR SATISFACTION

Overall EMR Satisfaction
All Clinicians (n=73,115)

- All Organizations (n=159)
- Cerner Deployments (n=29)
- Non-US Health Systems (n=11)

KLAS®
Accurate Honest Impartial
IMPLEMENTATION METHODOLOGY

Planning
- Support
- Go Live
- Training
- Validation
- Design
- Build
- Workflow Analysis
- Data Collection

- 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
ABSTRACT

LOCAL PROBLEM

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

DESIGN & IMPLEMENTATION

- Identify the best evidence based solutions and guidelines, in accordance with Government regulations
- Develop and implement clinical pathways to improve outcomes and communication
- Simulation and validation testing of complete solution
- Training Material pre and post go-live

HEALTHCARE IT

- Compliment current EMR
- Integration & Interoperability of full solution
- Development of clinical pathways
- Mock room design & solution testing
- Analytics

VALUE DERIVED

- Improved patient and staff safety & patient care
- Higher patient and staff satisfaction
- Improved staff efficiency
- Engaging leadership from the start, helped to drive accountability and utilization
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
CIO – Low Current Rooms

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
Salam Everyone, I am King Faisal Specialist Hospital & Research Center

Rawad Hassirah, RN
Application & Health Informatics Services – Senior Health Informatics Analyst

Bachelor of Nursing
Lebanese National Nursing Institute

King Faisal Specialist Hospital & Research Center – Riyadh
2011 – Present Sr Health Informatics Analyst
2007 – 2011 Staff Nurse
RTLS
Medical Device Connectivity
Nurse Mobility
Clinical Dashboard
Patient Status Display
Interactive Patient Care
Immediate Identification
Real Time Vitals Collection
Lab Integration
POINT OF CARE WORKFLOWS
OUTCOMES & ERROR MITIGATION
PATIENT & FAMILY EXPERIENCE
PATIENT ROOM SIGNAGE

- Immediately highlights if a patient is:
  o Nil per mouth
  o Falls risk
  o Isolation
  o Risk of a pressure injury, etc.

- Reflected immediately on patient door versus up to 2 hours previously
PATIENT ROOM SIGNAGE

MALE

MODERATE RISK TO FALL

LATEX ALLERGY

NPO

SEIZURE PRECAUTION

CHEMOTHERAPY PRECAUTIONS

FEMALE

HIGH RISK TO FALL

CODE STATUS

PATIENT FOR DISCHARGE

COLLECT BY NURSE

ISOLATION STATUS
STAFF ASSIGNMENT WORKFLOW

- Charge Nurse Assign Staff
- Assignment Reflects
- Interactive Patient Care
- Request to Assigned Staff
- Nurse Call System
- Received Call Assigned Patients
- Nurse Station Dashboard
- View Assignment Per Room
- Mobile

RTLS
SOLUTION 2: Care Communication
COMMUNICATION

- Improved Communication
- Patient Focused Delivery
- Saving Time
- Cross Departmental Communication
- Analytics

Patient to Staff
- Pillow Speaker
- Patient Station

Staff to Staff
- Console
- Mobile
- Staff Terminal
- Hospital Staff
- Corridor Light
- Nurse Station

Hospital Staff
COMMUNICATION TO MEDICAL TEAM
Nurse to Ancillary Communication

- **CODE GREEN**: 1 Workflow
- **ENVIRONMENTAL**: 10 Workflows
- **MAINTENANCE**: 5 Workflows
- **PATIENT CARE**: 10 Workflows
- **TRANSPORT**: 7 Workflows
- **NURSE WITNESS**: 1 Workflow
- **REGISTER IN**: 9 Workflows
- **RE ASSESS**: 4 Workflows
- **RRT**: 1 Workflow
SOLUTION 3: Interactive Patient Care
INTERACTIVE PATIENT CARE

- Educate patient on standard safety precautions
- Provide patient personalized education materials
- Provide another venue for patient to communicate with staff

DEFINED PATHWAYS

- Education
- Fall Risk
- Pain
- Food
- Medication
- Discharge
PATIENT EDUCATION PATHWAY

Patient X Diagnosis → Education Careset Ordered → Education Order Related to Diagnosis → Interactive Patient Care TV → Patient Watch Material → Order Complete → Discharged Patient

Inpatient

SEHATY

Outpatient
Patient C/O Pain

Nurse Administer Rx

30 or 60min Reminder Set

Interactive Patient Care TV Notification

Patient Reassess Pain

Score Stored In EMR

Mobile Notification
FALL RISK PATHWAY

- Fall Risk Shift Assessment
- EMR Auto Alerts
- Interactive Patient Care TV Education
- Corridor Light
- Patient Status Display Alert
- Fall Risk Reassessment
- Patient Watch Material
- Patient Back to Low Risk
- Order Complete
- EMR Auto Cancel Risk Fall
Interactive Patient Care TV Food Menu

Food Services Notified

Food Delivery

Patient Rates Food

Food Services Notified

Diet Order / Food Allergy Placed EMR

Order a meal

Choose a meal to get started

Lunch

PM Snack

Dinner

Order a meal

Choose meal items for Lunch:
IPC ENTERTAINMENT FEATURES

- Watch Movie
- Play Games
- Check Email
- Browse Internet
- Patient Bill of Rights
- Patient Responsibilities
- Food Order
- Visiting Hours
- My Care Team
- My Schedule
SOLUTION 4: Hand Hygiene Monitoring
HAND HYGIENE

Staff
Enter Patient Room

Hand Wash Event

Dispenser Triggers Event

Exit Hand Wash Event

Staff Exit Patient Room

Compliance Reports

Staff Award Program

Staff Awareness Campaigns

RTLS
Abdullah Al Turki MD, FAAP

Pediatric Intensivist – Medical Informatics Officer

Salam Everyone, I am King Faisal Specialist Hospital & Research Center

Bachelor of Medicine & Surgery
King Saud University

King Faisal Specialist Hospital & Research Center
2015 – Present Medical Informatics Officer
PATIENT SATISFACTION: PAIN MANAGEMENT

Q1 2018: 89% satisfaction
Q2 2018: 83% satisfaction
Q3 2018: 87% satisfaction
Q4 2018: 86% satisfaction

US AVG: 70% satisfaction

Main Hospital: 67%, 70%, 67%, 72%
KACOLD: 89%, 83%, 87%, 86%
PATIENT SATISFACTION: ENVIRONMENTAL CLEANLINESS

<table>
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<tr>
<th>Quarter</th>
<th>Main Hospital</th>
<th>KACOLD</th>
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<tbody>
<tr>
<td>Q1 2018</td>
<td>75</td>
<td>94</td>
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<tr>
<td>Q2 2018</td>
<td>76</td>
<td>95</td>
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<td>Q3 2018</td>
<td>73</td>
<td>90</td>
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<tr>
<td>Q4 2018</td>
<td>69</td>
<td>97</td>
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PATIENT EXPERIENCE PERCEPTION – NURSE COMMUNICATION

% Satisfaction

Q1 2018  Q2 2018  Q3 2018  Q4 2018

Main Hospital

KACOLD

US AVG
PATIENT EXPERIENCE PERCEPTION – STAFF RESPONSIVENESS

% Satisfaction

Q1 2018 | Q2 2018 | Q3 2018 | Q4 2018

Main Hospital: 70, 68, 67, 69

KACOLD: 98, 97, 97, 94

US AVG: 65, 65, 65, 65
INFECTION RATES
HOSPITAL ACQUIRED METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS – MRSA

PRE KACOLD
CY2015 – 2017

POST KACOLD
CY2017 – 2019

80% DECREASE
LENGTH OF STAY REDUCTION

- **CY2016**: 33 Days
- **JFMAM 2017**: 31.5 Days
- **JJASOND 2017**: 29.5 Days
- **CY2018**: 30 Days

**9% DECREASE**

- **KACOLD SHIFT**
SMART TECHNOLOGY ADOPTION

<table>
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<tr>
<th>Category</th>
<th>Q3 2017</th>
<th>Q3 2018</th>
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<tbody>
<tr>
<td>Physician Communication</td>
<td>86</td>
<td>91</td>
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<tr>
<td>Nurse Communication</td>
<td>87</td>
<td>92</td>
</tr>
<tr>
<td>Staff Responsiveness</td>
<td>93</td>
<td>98</td>
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**BEDSIDE MEDICAL DEVICE INTEGRATION**

**TAT**
Automated processes reduced TAT by **74%**

**DATA ENTRY**
Reduced entry errors by **99%**
Time saved **97%**

**EFFICIENCY**
- Critical care time saved per Staff: **70min**
- Critical care time saved per Day: **140min**
- General Ward saved per Staff: **29min**
- General Ward time saved per Day: **58min**

**OPERATIONS**
Average operating costs saved per year **SAR8.51M**
ENGINEERING LESSONS LEARNED

**Design**
- No barriers facing Patient
- Easy access for Nurses to Medication Rooms
- Ineffective design workarounds not accepted
- Radiology location
- Minimize interruption points for Nurses
- Circulation space around the patient bed
- Atmosphere toward positive Patient outcomes
- Design for Patient, Family Members and Clinicians
- Mock Room concept

**Technology**
- Computers inside Patient Room
- Mobile Communication w/ Nursing
- RTLS Exciter location
- Dashboard backup
LEARNINGS

SUCCESS

– Improved patient experience – evident by patient surveys
– Improved clinician experience
– Improved clinical outcome – evident by length of stay reduction
– Improved patient and staff safety & efficiency
– Eliminated data latency and transcription errors
– Decreased cost

CHALLENGE

– Change management & adoption
– Cutting edge integration technology
– Staff turnover
– Continuous training
KEY TAKEAWAYS

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

Surah Al Ma‘idah 5:32

- Aligns with KSA Vision 2030
- Aligns KFSH&RC Mission & Vision
- Ability to benchmark KFSH&RC healthcare delivery model
- International & National brand recognition
- Strengthen relationship with Partners
- Staff development & growth
King Faisal Specialist Hospital & Research Centre
Gen. Org.