

## En3 #qfen3





# Unlocking the Challenges to Patient Safety through Digitization

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#### **Learning Outcomes:**

- 1. To understand and appreciate digital revolution in healthcare
- 2. Crafting a digital vision for patient care
- 3. To adopt and develop integrated safe care through seamless transfer of clinical information, PROJECTS



Age of Digital Transformation

Age of digital patient

Age of Technology

Patient Self-care

NextGen hospitals

Patient Avatar





### EHRs

- Large billing platforms
- make healthcare less efficient from the clinical perspective
- burnout
- harm clinician-patient interactions
- barriers to implementing other digital health technologies

#### Adoption of digital health

Use of advanced electronic medical record and monitoring technologies to exchange, integrate healthcare information

### **Digitization Vision**





## **BESTCare Current Status at MNGHA**

- Enterprise Patient Record
  - Continuity of documentation
  - Seamless workflow
- Standardized clinical documentation





## BLOOD TRANSFUSION AUTOMATION CLOSED-LOOP WORKFLOW

- Assure **right blood** to the **right patient**
- Assure the **accuracy** of transfusion equipment (Infusion Pump)
- Automate the **warning notification** to related departments
- **ZERO-incident** of incorrect Blood Transfusion.

#### CHALLENGES

#### Processes





**Tools** 

## Forms, systems and devices NOT integrated





#### WORKFLOW







#### **TARGETS:**

- ✓ Outcome measure: 100% accuracy
- ✓ Balancing measure: reduce unnecessary steps
- ✓ Compliance: >98% utilization of the automated blood product verification for inpatient clinical areas.

 Process measure: >70% reduction of consumed time for blood product verification at bedside.











## Pediatric Early Warning Score (PEWS) Implementation



 Lack of standardized alert tool and approach to identify, assess and escalate concern about deteriorating patients among nurses as front-line health care providers.

#### **PEWS Framework**

#### a system based on 7 vital signs parameters

- heart rate
- systolic BP

Outcome

- capillary refill time
- respiratory rate
- respiratory effort
- oxygen saturation
- oxygen therapy (oxygen flowrate)

Item	– 🕂 * Async.	07 11:00	07 12:00
<ul> <li>Vital Sign</li> </ul>			
SBP (mmHg)			
DBP (mmHg)			
Mean BP (mmHg			
HR (Freq./min)			
RR (Freq./min)			
T (°C)			
SpO2 (%)			
EKG			
Flow rate (L/min)			
Capillary Refill Tir	ne		
Respiratoy Effort			
PEWS Score			
PEWS Action			

Solution Challenge

#### **PEWS Framework**

- Based on vital signs score = calculated automatically in BestCare
- Early HDU referrals and reduce ICU admissions
- Scoring provides a standardized framework

**Challenge** 



\*Initial:

\*Subsequent:

SCORE	Initial*	Reviewing and monitoring	Subsequent*
0-2	Routine	Re-assessment and re-score Charge Nurse Notification Junior /Senior resident Review MRP Designee / MRP	Routine
3-4	2-4 hours	Re-assessment and re-score	2-4 hours
	Within 8 hours	Charge Nurse Notification	Within 8- 12 hours
	Within 8 hours	Junior /Senior resident Review	Within 8 -12 hours
	Routine	MRP Designee / MRP	Routine
5-6	Within 1-2 hours	Re-assessment and re-score	1-2 hours
	Within 4 hours	Charge Nurse Notification	Within 8 hours
	Within 4 hours	Junior /senior resident Review	Within 8 hours
	Within 4 hours	MRP Designee / MRP	Within 8 hours
	Consider	Continuous monitoring SpO <sub>2</sub> & HR	Consider
	Consider 1:3 Nurse patient ratio	For any 1 or 2 patient with this score	1:3
7-8	Within 15-60 minutes	Re-assessment and re-score	15-60 minutes
	Within 2 hours	Charge Nurse Notification	Within 4 hours
	Within 2 hours	Junior /Senior resident Review	Within 4 hours
	Within 4 hours	MRP Designee / MRP	Within 8 hours
	Consider	continuous monitoring SpO <sub>2</sub> & HR	Consider
	Consider	PRRT Review	Reconsider
	consider 1:2 Nurse patient ratio	For any 1 or 2 patient with this score	1:2
9 & above	Within 15 minutes	Re-assessment and re-score	15-60 minutes
	Within 15 minutes	Charge Nurse Notification	Within 2 hours
	Within 15 minutes	Junior /Senior resident Review	Within 2 hours
	Within 15 minutes	MRP Designee / MRP	Within 4 hours
	Continuous monitoring	Continuous monitoring SpO <sub>2</sub> & HR	Continue monitoring
	Consider	PRRT Review	Reconsider
	Consider 1:1 Nurse patient ratio	All patients with this score	1:1

<ul> <li>Airway threat or Apnea.</li> <li>New or uncontrolled seizure.</li> <li>Decrease level of consciousness by 2 from the base line .</li> <li>Uncontrolled pain or ag</li> <li>Acute, unexplained cha</li> </ul>	itation nge in vital signs
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Vital signs monitoring  $\rightarrow$  PEWS automatically calculated  $\rightarrow$ identifying sick child  $\rightarrow$  clear action plan and escalation process $\rightarrow$ early intervention



Solution Challenge

Outcome

#### **PEWS Approach**





#### Mortality after unplanned PICU admission



#### Length of stay of unplanned PICU admissions



## Length of stay in the HDU



#### Prevs. Post Implementation staff survey analysis

#### **Empowered** nurses

Have you experienced a negative response when you have escalated your concerns to a physician?

Did you feel that escalating your concerns to a physician after working hours was more challenging than during working hours?



#### Admissions





## Lab Critical Result Notification (L-CRN)





- Lack of notification system for critical or unexpected laboratory results.
- Communication
- Large volume
   Average per day
   Annual
   28,673,526
- Morbidity & Mortality



Outcome



#### **Critical Lab Result**

Critical Flag from LIS is generated by the CRN



#### **Respond to Notification**

Care provider logs into the CRN anywhere to acknowledge the case



Pager/SMS/ Email Alert

Alert is sent to physician pager and email immediately



#### **E**scalation

If no response to the Critical flagged case with defined time. Escalation /reminder is sent to care department head















## Radiology Critical Result Notification (R-CRN)



- Lack of notification system for critical or unexpected radiology results.
- Communication
- Large volume

Region	Per Day	Annual
CR	1,223	446,331
WR	667	243,440
Dammam	120	43,788
Al Hassa	216	79,012
Total	2,226	812,571

• Mortality/Morbidity



Outcome Solution

#### Framework



Outcome

**Critical Finding Closed Loop Communication** 



Outcome Solution Challenge



**Critical Finding Closed Loop Communication** 



## **Suspected Cancer Program**





Early referral of suspected cancer from primary to tertiary care



#### Framework



**PHC Physician** 

flag immediately suspected cancer program

**Command Center** 

appointment within 1 week

**Oncology Center** Oncologist's care

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Outcome Solution Challenge

## Sepsis Alert Application (In-house)

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Sepsis is a life-threatening condition

> 40% of patients with severe sepsis/septic shock may die\*



\* Phua, J et al. "Management of severe sepsis in patients admitted to Asian intensive care units: prospective cohort study." *BMJ* 342 (2011).

#### **SEPSIS CRITERIA**





#### **INITIATE THERAPY**

Outcome



Challenge

Variable	Pre-intervention	Intervention phase l	Intervention phase II	
All patients	N =436	N =195	N =699	P value C vs. A
Compliance with the 4 elements bundle	84 (19.3)	87 (44.6)	485 (69.4)	<0.0001
Hospital mortality, no. (%)	208 (47.7)	60 (30.8)	118 (16.9)	0.003
ICULOS (days), mean ± SD	13.3±17.4	8.6±8.3	5.1±11.4	<0.0001



## Closed-Loop Medication Administration



Innovation only takes place in an environment that key staff can connect, contribute and share resources



We need to keep up or risk being left behind

Clinicians need to be a lot more than just a medical practitioner

47% of early career doctors and pharmacists are interested in tech careers

Are we prepared to ensure the next generation of medical students are equipped to deal with change most specifically with the technological disruptions that will revolutionize way traditional medicine has historically been taught and practiced?

 Mobile health applications usage has also increased substantially

• 100,000 mobile apps in the Apple apps store

• digital health applications are expected to promote health, awareness and empowering patients for self-management

Medicine is high tech in many ways, with continued advances in medical device and imaging technologies.

MEDICINE IS ALL ABOUT INNOVATION: TECHNOLOGY UNLIMITED

# THANK YOU