

2019 International Forum on Quality and Safety in Healthcare

SHOWCASE

The ABC in TMUH

AI and BlockChain

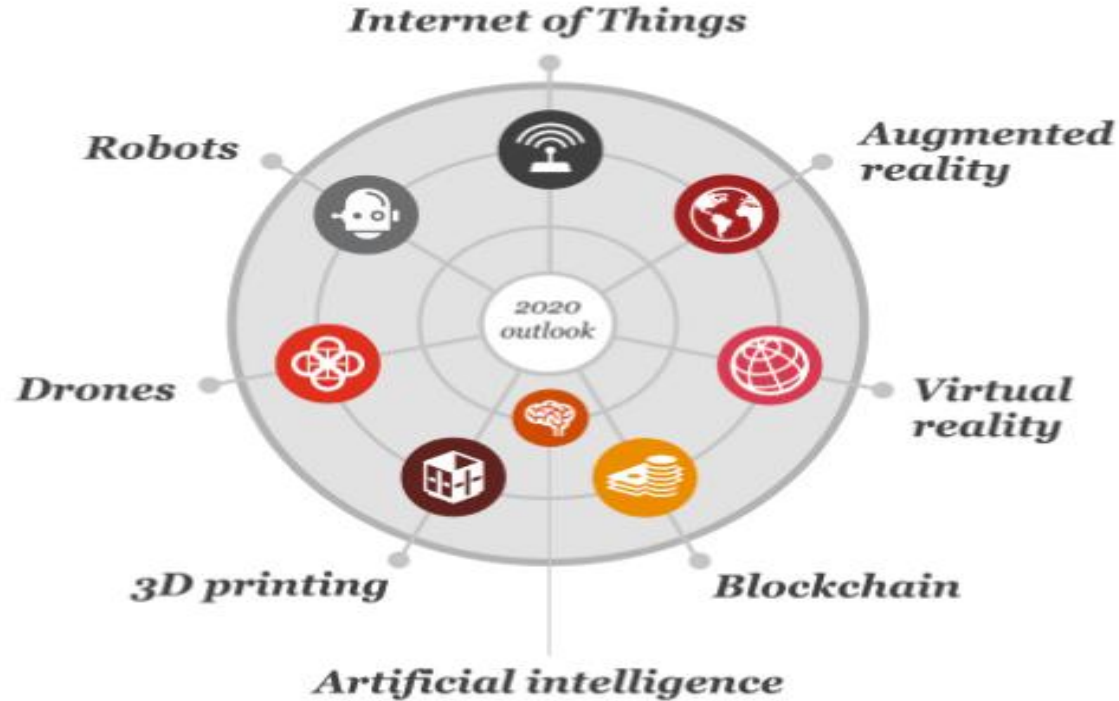
Taipei Medical University Hospital

Dr. Po-Li Wei , Deputy Superintendent

20 SEP. 2019

Tech breakthroughs megatrend

The essential eight technologies



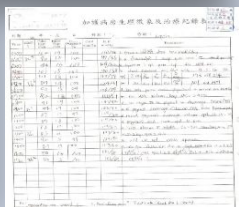
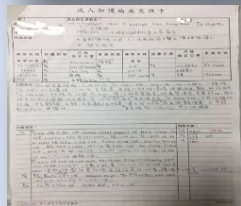
Artificial Intelligence in Healthcare



Traditional ICU (before 2017.03)



Electronic ICU(2017.03-2018)



Paper record



Vital signs



Respiratory



IV Pump



physiological data



Medication record



image data



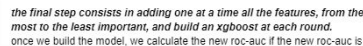
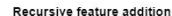
Patient-Centric Dashboard



Patient EMRs Viewer

Scattered information

Standardization & Automation



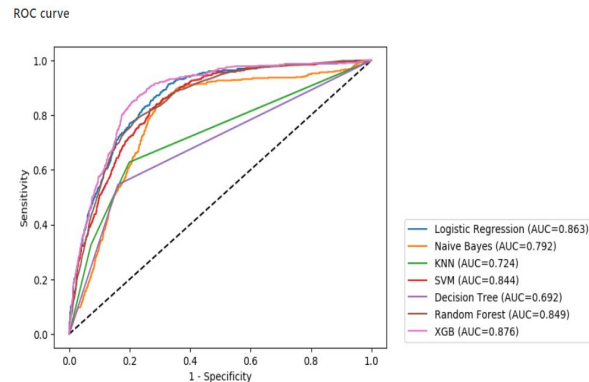
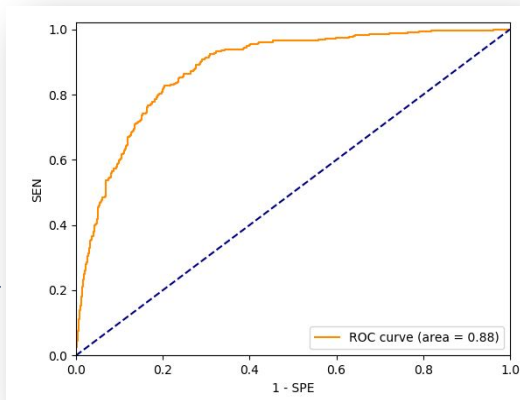
Example-Septicemia

6

• Collecting features: 106

Feature ID	Feature Name	Feature Type	Feature Unit	Feature Description
100	AMED Antibiotics	int	藥物	10.00 1.00
101	AMED Organisms	int	藥物	10.00 1.00
102	AMED Dofutamine	int	藥物	10.00 1.00
103	AMED Normal saline	int	藥物	10.00 1.00
104	AMED Adrenalin	int	藥物	10.00 1.00
105	COGN VV ECMO	int	維生儀器	10.00 1.00
106	COGN VV ECMO	int	維生儀器	10.00 1.00
107	COGN Ventilator	int	維生儀器	10.00 1.00
108	COGN CVP	int	維生儀器	10.00 1.00
109	COGN FLOWTRAC	int	維生儀器	10.00 1.00
110	INUT TPN SMOKE	int	營養儀器	10.00 1.00
111	INUT TPN SMOKE	int	營養儀器	10.00 1.00
112	INUT DIET NPO	int	營養儀器	10.00 1.00
113	ORG Infection Focus	int	感染源	1.00 1.00
114	TENDL_LABEL	mvarchar(20)	標記類別	1.00 1.00
115	TENDL_LABEL_TIME	int	標記時間	1.00 1.00
116	TENDL_LABEL_RESULT	int	標記結果	1.00 1.00
117	TENDL_LABEL_OPER_ID	mvarchar(20)	標記人ID	1.00 1.00
118	TENDL_LABEL_DATE	datetime	標記時間	1.00 1.00

• Preliminary result (1,588 instance)



According the latest medical definition of sepsis, We selected 106 feature

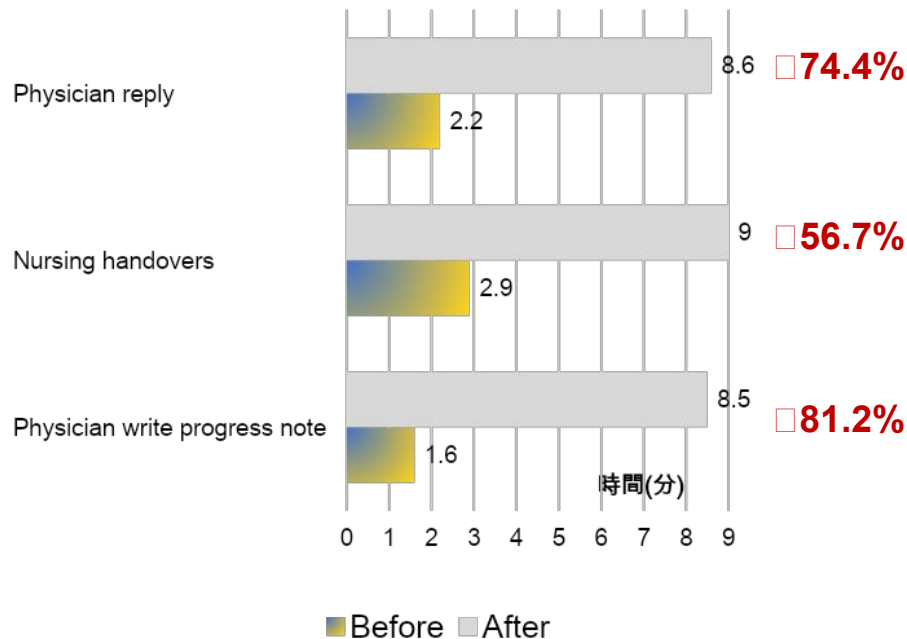
- using DNN,
 - accuracy = 82+-1%;
 - SEN = 65+-5%;
 - SPE = 88+-2%;
 - precision = 67+-3%;
 - F1 = 0.66+-0.02
- AUROC = 0.88

- Data number=2381,until 2019/9/23
- 12-hour vital sign
- Feature : No.2(all features without hourly vital sign data)
- Accuracy:
 - traditional sofa score : 56%
 - AI Diagnosis : 85%

Result of Ted-ICU AI Platform

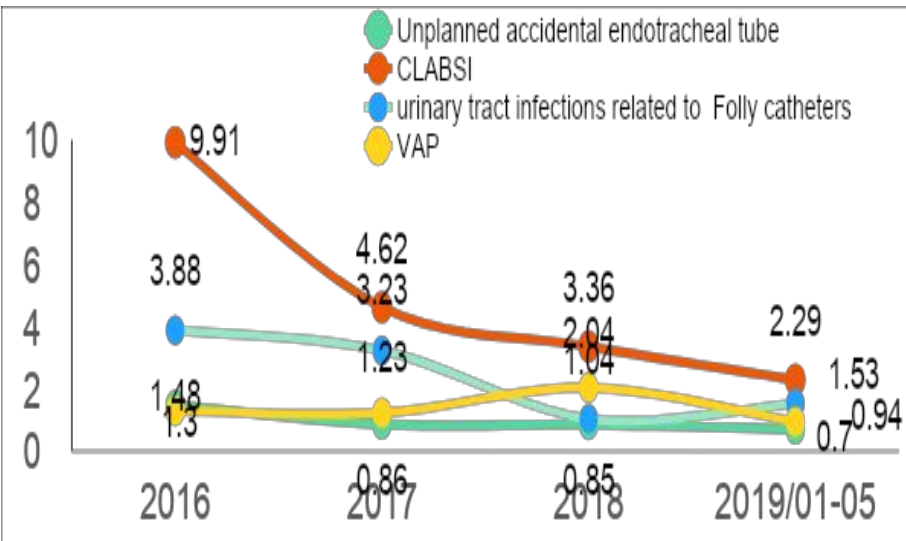
Medical administration

Reduce the workload

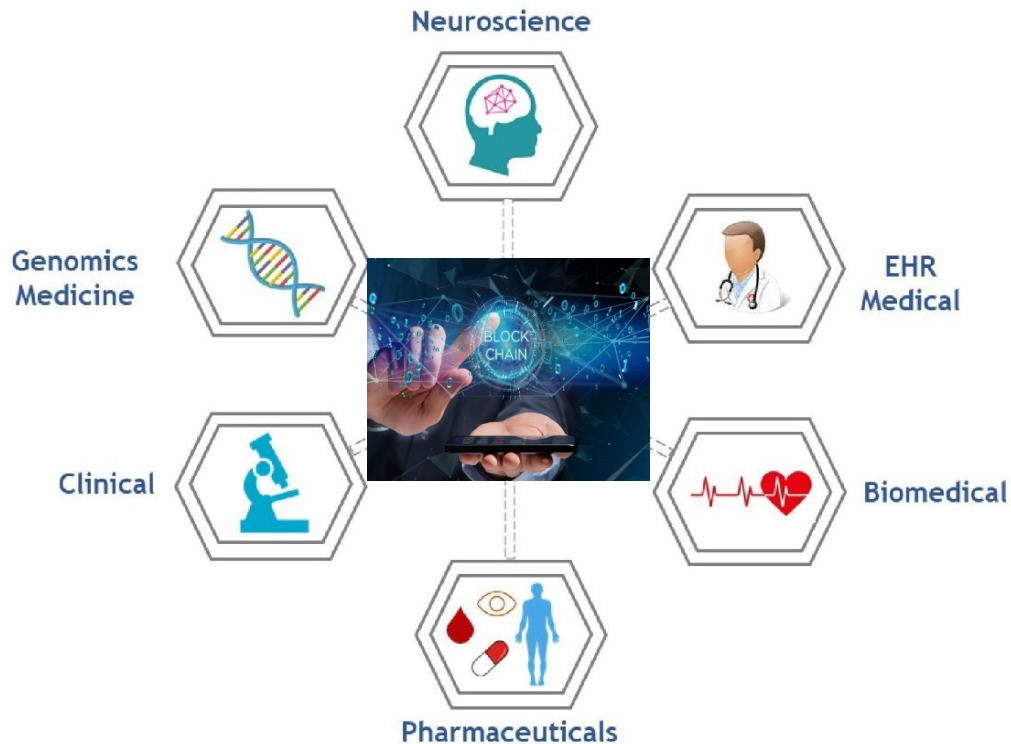
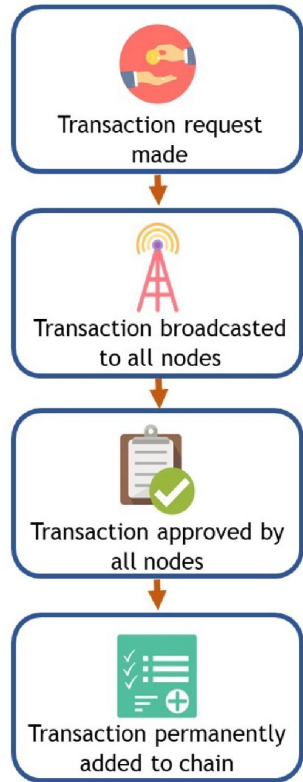


Healthcare Quality

There was a marked improvement in ICU infection Indicators



BlockChain in Healthcare



Decentralized

Transparent

Immutable

Autonomy

Open Source

Anonymity

Global PHR App Solution

EMR

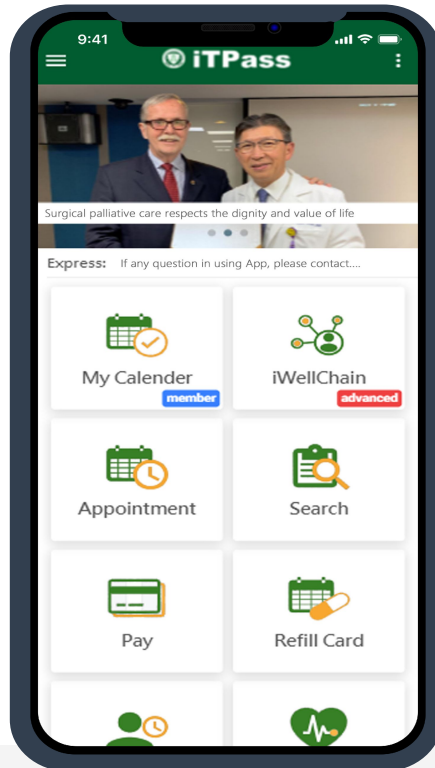
Privacy and Data Security

- Global medical records standard (HL7)
- Blockchain-based apps for EMR

EHR

Standardized & Interoperability

- Medical devices / IOT data
- Health examination/ Exercise reports



PHR

Authorization & Smart Contract

- EMR/EHR data exchange
- Universal patient identifier
- Clinical accountability
- Healthcare supply chain
- Revenue cycle management
- Value based payment
- Healthcoin for patient compliance

TMUH BlockChain Applications



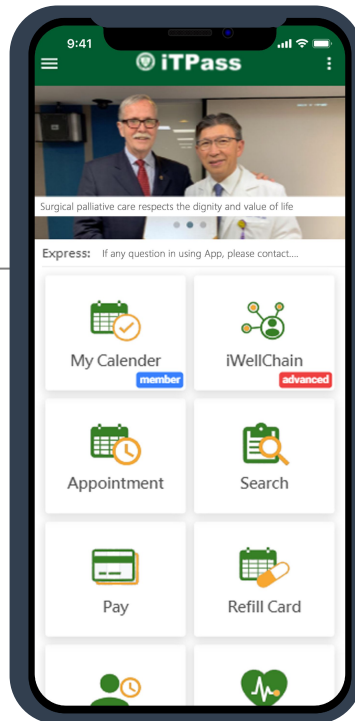
Digital Identify (2017.11)

Creating a patient's digital
identity



Smart Contracts (2018)

E-informed consent



Applications (~2019.07)

Health exam reports
Medical referral services
Clinical trials
Smart insurance claims



@iTPass (2019.10)

Coming soon

My Calendar



身分識別碼



iWellChain



Conclusion

- 1 Our goal is to provide good quality and safe healthcare by Intelligent and efficient way.
- 2 AI and Blockchain are methods to reach our goal.



◆ Intelligent ◆ Efficient ◆ Quality ◆ Value



Thank you.



Decentralization



Institution



individual





privacy protection

TMUH BlockChain Applications

Medical Documents & Images (Health Exam Reports)



How long does it take before a report is ready?

		Before* (Paper-based or CD)	iWellChain (Network-based)
	Medical Documents (2~3 MB / per document)	2-3 day →	< 1 sec
	Images (0.3-0.5 GB)	1 day →	CT, MRI, Pathology 2- 3 mins (5~10 MB / per sec)



TMUH Blockchain Applications

Smart Medical Insurance Claims



This involves many hospitals & insurance employees during the process.

Using our solution, the process is expedited to...

Before

A typical insurance claim takes **1-3 months** to be submitted, verified, and processed before the recipient can be reimbursed.

After

Before you leave the hospital

PSP (Patient Supporting Programs)

Smart-Contract



Registration &
Patient
Authorization

Events from EMR



Data Feed &
Evaluation

Fulfilment



Smart-contract
Triggers Free Goods
Flow

Monitoring



Analysis(i.e.During
Of Treatment,
Adherence)

iWellChain DApp provided.....

Trust & Easy sign-off
Process automation



Reduce errors & admin.
Real-time notification



Automated free goods
Trusted analysis



[illegible]