The Future of Hospital Care is In the Home

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What is Mobile Inpatient Care (MIC)?
What are some challenges faced?
How does technology help?
How do we build technology?

Background

- **NUHS@Home provides Mobile Inpatient Care services across Western Singapore as a substitute for hospitalisation**

- **Established as NUHS Business Unit in October 2023**

- **Patients admitted are considered inpatients, subject to subsidies and Medisave/Medishield/insurance claims**

- **Bills are slightly lower in ward hospitalisation charges**

- **Medical team: Advanced Internal Medicine consultants**

- **Nursing team: Dedicated NUHS@Home nurses**

Why did we start NUHS@Home

Any patient that wants to be at home and can be at home should be at home.

Patient

- Comfort of home
- Familiarity of loved ones
- Reduced hospital acquired infections
- Reduced functional decline

System

- Limited hospital beds
- Potentially lower cost

NUHS@Home: Elements of care in the comfort of patient's home

Home visits by clinicians

Teleconsult

Scans in hospital

Intravenous therapy

Vital signs monitoring

Blood tests

Hospital at Home is an acute clinical service that takes staff, equipment, technologies, medication and skills usually provided in hospitals and delivers that hospital care to selected people in their homes or in nursing homes.

It substitutes for acute inpatient hospital care.

Consensus definition of Hospital at Home presented at the World Hospital at Home Congress in Barcelona on 30 Mar 2023

Patient Journey

Admission	Daily Treatment	Discharge
Counselling patient and family	Daily Virtual Ward Rounds	Patient Family Education
Doctor Assessment	Selected Doctor Home Visits	Discharge paperwork and billing
Nursing Assessment	Nursing visits for procedures	Delivery of medications
Pharmacy Review	Nurses to supervise remote vital submissions	
Transport of patient, devices, medication	Review and deliver new medications	

Current Clinical Capabilities

DAILY PHYSICIAN-LED VIRTUAL WARD ROUNDS + 24/7 ON-CALL, HOME VISITS SCHEDULED OR AS REQIURED

INTRAVENOUS THERAPY UP TO TDS

POCT AND LAB-BASED INVESTIGATIONS, MOBILE ECG

HOME-BASED ALLIED HEALTH SUPPORT (PT, OT, ST, DT, POD, MSW)

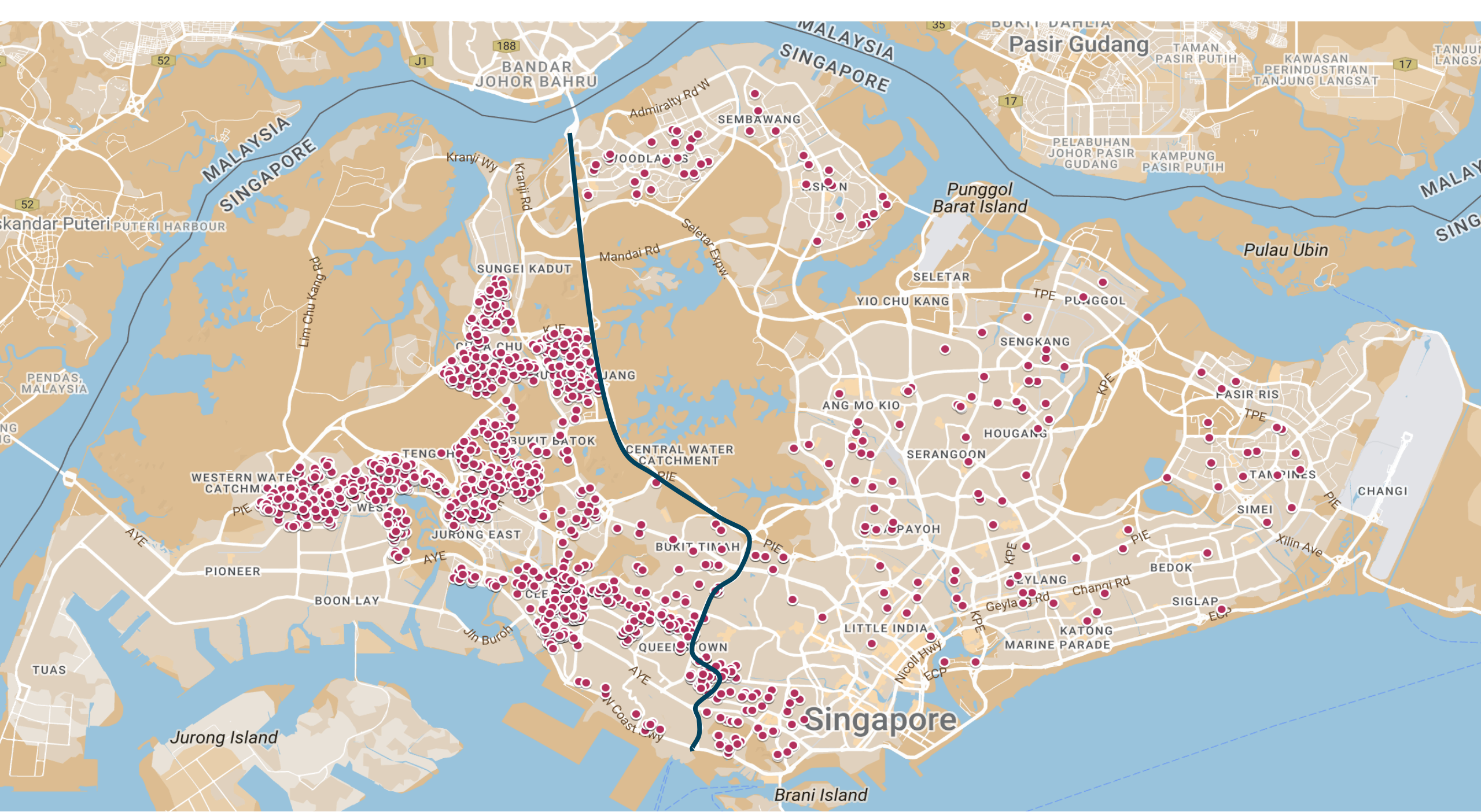**WOUND DRESSING AND WET WRAP THERAPY**

SUPPLEMENTAL OXYGEN

HOSPITAL-BASED DIAGNOSTIC AND INTERVENTIONAL RADIOLOGY, BLOOD TRANSFUSION AND HIGH-RISK INFUSION THERAPY

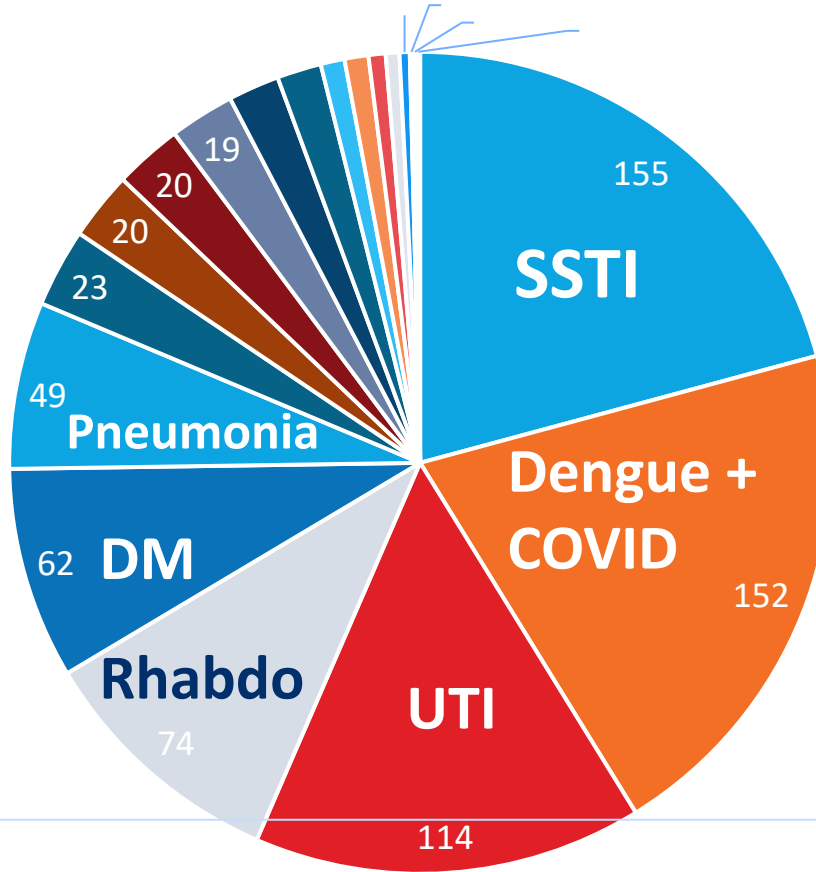**SUBSPECIALTY REVIEW (VIRTUAL OR HOSPITAL-BASED)**
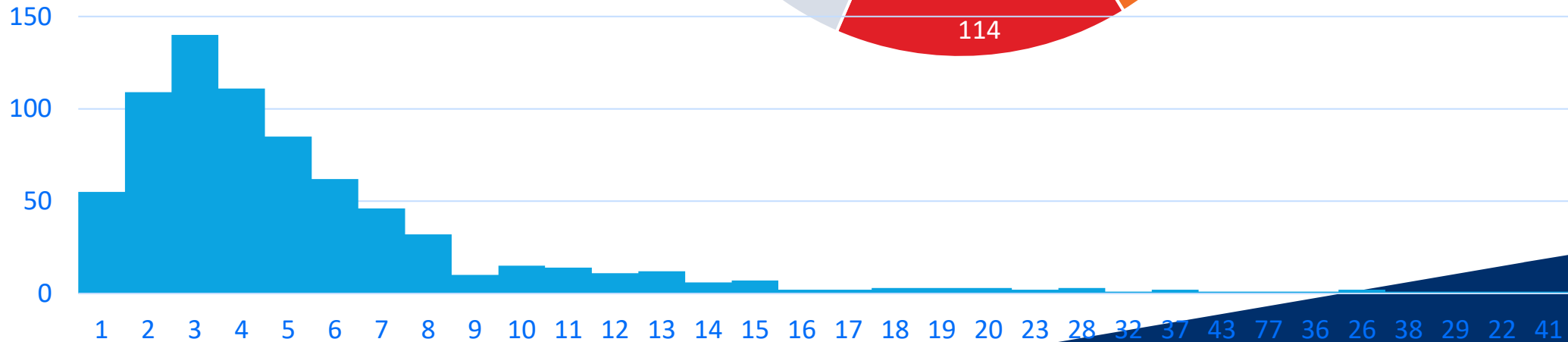
DIRECT ADMISSION TO HOSPITAL BED OR COMM HOSP

Top Diagnoses

SSTI 155
Dengue + COVID 152
UTI 114
Rhabdo 74
DM 62
Pneumonia 49
49
23
20
20
19

Length of Stay

150
100
50
0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 23 28 32 37 43 77 36 26 38 29 22 41

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Challenges Faced

Clinical Care

Home environment

Virtual care

Communications

Remote communication

Multiple stakeholders

Timely response

Operational

Logistics and vendor management

Inefficiencies

Documentation

Information retrieval

Patient identification

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Technological Solutions

Clinical Care

- Remote vital signs
- Smart medication pumps
- Point of care tests
- Mobile EMR

- Smart glasses
- Digital diagnostics (e.g. stethoscope)

Communications

- Video calls
- Instant messaging

- Chatbots
- Conversational agents
- Unified patient portal

Operational

- Coordinated across multiple platforms (MS teams, googlesheets, WhatsApp)

- Consolidated CRM platform
- RPA/agentic workflows

Inefficiencies

- Ambient scribe
- LLM Chatbot

- AI patient selector

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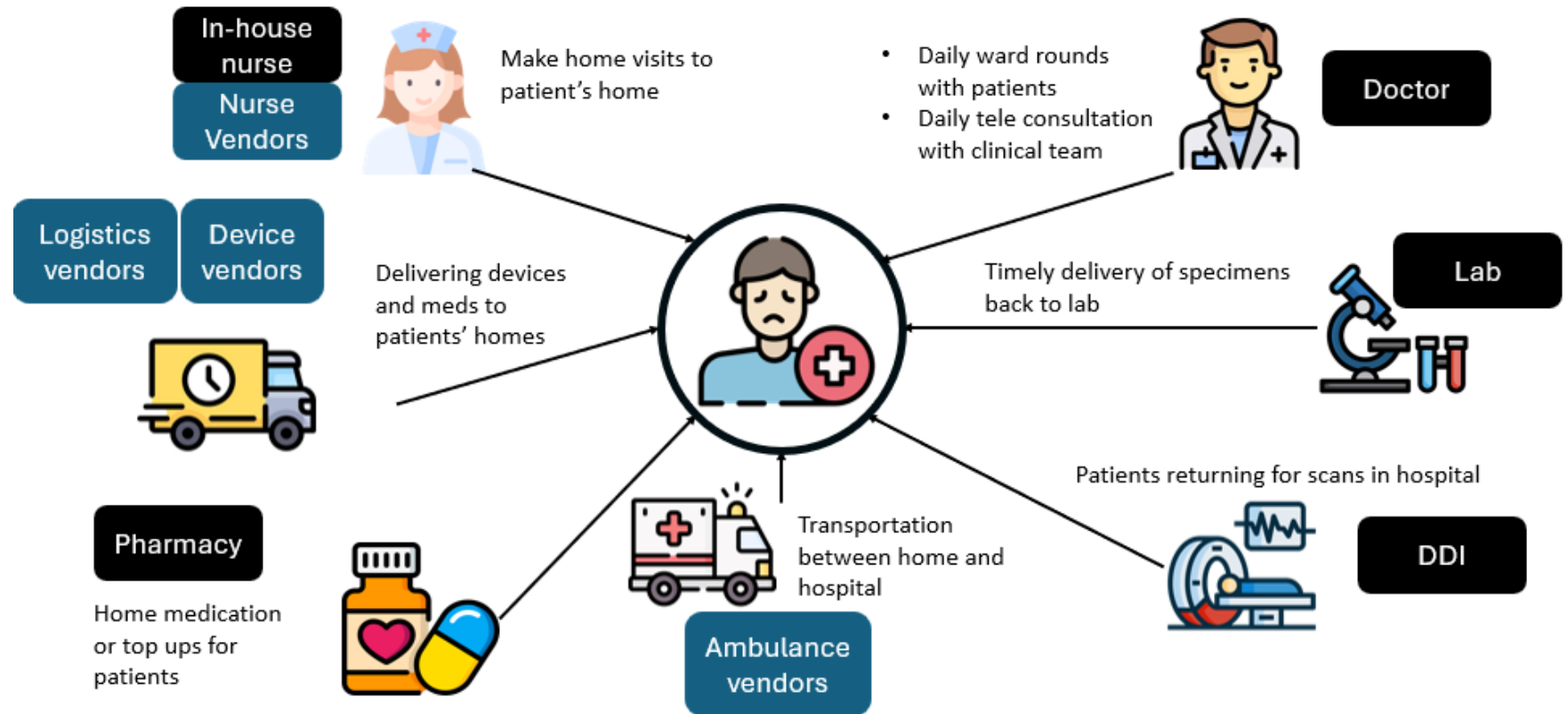
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In-house nurse
Nurse Vendors
Make home visits to patient's home

Logistics vendors
Device vendors
Delivering devices and meds to patients' homes

Pharmacy
Home medication or top ups for patients

Ambulance vendors
Transportation between home and hospital

Doctor
- Daily ward rounds with patients
- Daily tele consultation with clinical team

Lab
Timely delivery of specimens back to lab

DDI
Patients returning for scans in hospital

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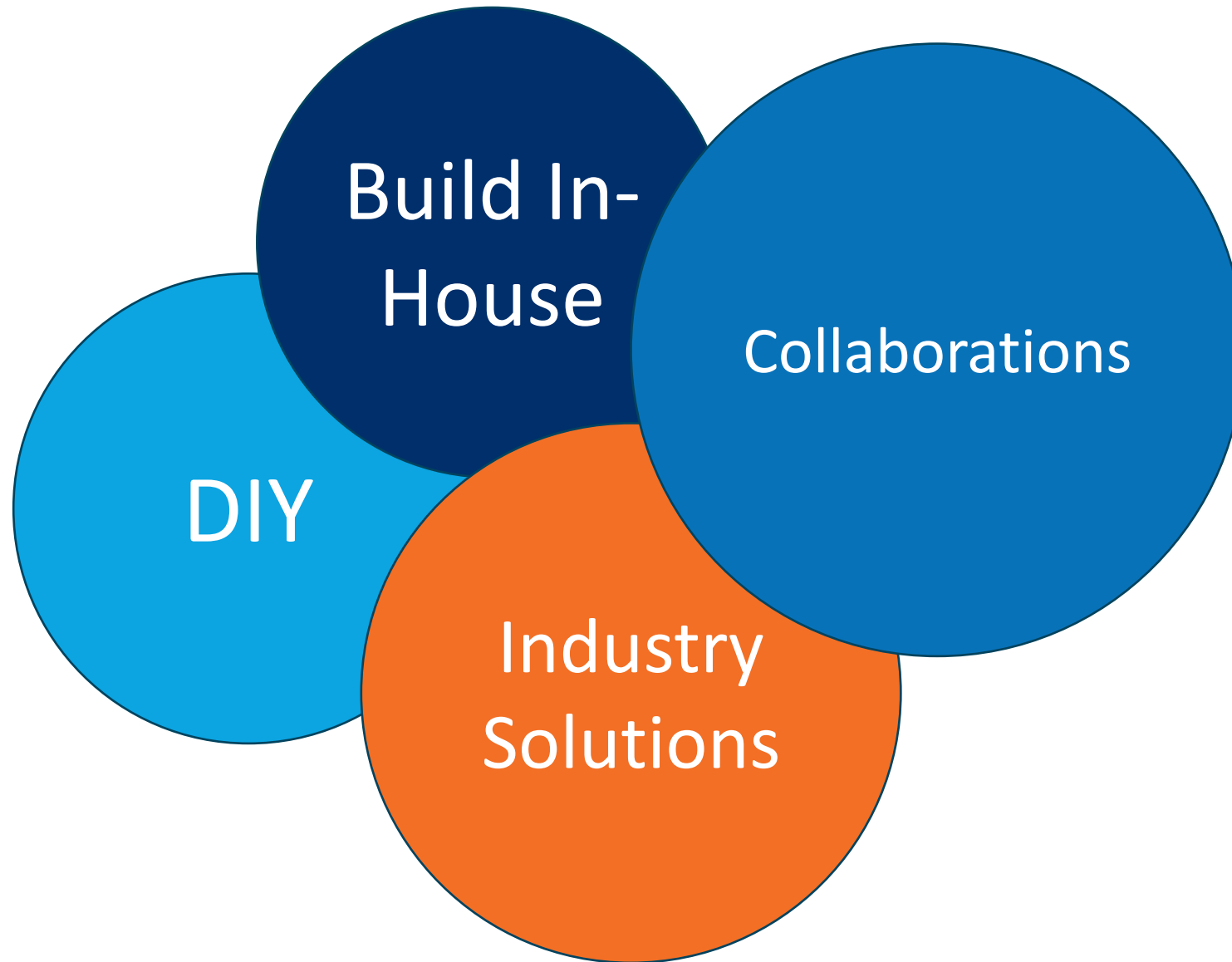
Counseling and Onboarding　　　　Ward Rounds　　　　Remote Clinical Monitoring　　　　Treatment Delivery
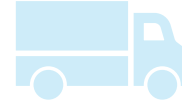
Autonomous patient identification
Conversational agentic counselling, consenting, onboarding

Counseling and Onboarding

Ward Rounds

Remote Clinical Monitoring

Treatment Delivery

Conversational agent assistance
Extended and augmented reality for physical reviews

Counseling and Onboarding

Ward Rounds

Remote Clinical Monitoring

Treatment Delivery

Ambient, high fidelity remote monitoring
Smart dashboards with predictive analytics

Counseling and Onboarding

Ward Rounds

Remote Clinical Monitoring

Treatment Delivery

Robotic process automation
Enhanced bedside diagnostics
Telerehab

Conclusion

- **MIC@Home represents a care model that allows acutely unwell patients to be treated at home**

- **Decentralised operations and care delivery in the home environment present unique challenges**

- **Technology plays a key role in helping to overcome some of these challenges and limitations especially at scale**

- **How and where technology is used is key**

NUHS@HOME

National University Health System

Questions

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