# Technology In Disasters Proposal for COVID-19 & MDO Medical Support

## Area 0: Digital Health at Home

- **Personal Health Monitoring**
- *Possible Infection*

## Area 1: Virtual Clinic

- **Patient might be sick**
- *Engages VH*

## Area 2: Virtual Hospital Ward

- **Patient needs monitoring and is admitted**
- *Virtual ward, monitored using mobile device, wearables, and medical monitoring devices if available*

## Area 3: Virtual Intensive Care Unit

- **Patient needs resuscitation**
- *Supported by TCC using remote monitoring, remote control, and autonomous systems*

## Area 4: Virtual Operating Rooms

- **Patient needs a procedure**
- *Supported by TCC using AR, robotics, etc.*

### Technology Components

- **Health Sensors**
- **Mobile Device Decision Support**
- **Interventions and Procedures**
- **Heads-up Augmented Reality**
- **Mobile/Home Physical Exams (PE)**
- **PE with Movement/Manipulation**
- **Home Meds/Vaccination Admin**
- **Point of Care Testing**
- **Tele-Mentoring/Coaching**
- **Mobile Imaging & Diagnostics**
- **Home Acute Care Monitoring**
- **Virtualized Care Clinician Workflows**
- **IV Pump Management**
- **Mobile Oxygen Delivery**
- **Patient Positioning Equipment**
- **Continuous Patient Monitoring**
- **Ventilator Support (Mech Vent)**
- **Renal Support (CRRT)**
- **Cardio Pulmonary Support (ECMO)**
- **Clinical Nutrition Support**
- **Invasive Procedures (Airway, A-line)**
- **Blood Purification/Pathogen Reduce**
- **Sedation and Anesthesia**
- **Shock Resuscitation**
- **Surgical Support – Telementoring/CDSSDisplays**
- **Surgical Support - Robotics**
- **Blood Recovery**
- **Nanotech/Molecular Casualty Care**
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**A. Synchronization & Workflow**

- Virtual Workflows, Training, & Policy Dev
- Secure, Standards-Based IoT Framework
- Autonomous Data Entry
- Home Health Virtualization Online
- Clinic Virtualization Online
- Hospital Ward Virtualization Online
- Hospital ICU Virtualization Online
- Operating Room Virtualization Online
- Data Visualization - Predictive
- Data Visualization - Volume/Acuity
- Data Visualization - Resource Allocation
- Simulation/Scenario Based Staff Training

**B. Medical “Stuff” – Medication, Supply, Blood, Delivery & Fabrication**

- Patient Care-to-Patient Services
  - 3D Printing - Simple Devices
  - 3D Printing - Complicated Devices
  - 3D Printing – Bio-printing
  - 4D Printing - Simple Circuitry
  - 4D Printing - Complicated Circuitry
  - Artificial Fluids
  - Pharmacological Printing
  - Drone Delivery <10 lbs.
  - Drone Delivery >600 lbs. (CASEVAC)
  - Drone Delivery >600 lbs. (MEDEVAC)

**Technology Components**

**OPERATIONAL MEDICINE**

**A. Synchronization & Workflow**

**B. Medical “Stuff” – Medication, Supply, Blood, Delivery & Fabrication**

**NATIONAL EMERGENCY TELE-CRITICAL CARE NETWORK**

**Tiered Staffing & Remote TCC Support**

**Phase I: Local Support**

- Critical Care (C.C.) Team
- Emergency Physician
- Pharmacist, other specialists
- Ratio of Trained Clinicians to Patients

**Phase II: Wide-Local Support**

- C.C. Team
- Emergency Physician
- Pharmacist, other specialists
- Ratio of Trained Clinicians to Patients

**Phase III: Regional Support**

- C.C. Team
- Emergency Physician
- Pharmacist, other specialists
- Ratio of Trained Clinicians to Patients

**Phase IV: Inter-Regional Support**

- C.C. Team
- Emergency Physician
- Pharmacist, other specialists
- Ratio of Trained Clinicians to Patients

**Enabling Technologies:**
- Cellular network (Mobile Devices)
- Internet of Things
- Big Data and Artificial Intelligence
- Augmented Reality

**Complementary efforts:**
- Incorporate additional sensors (wearables)
- Remote control of devices (ventilators/IV Pumps)
- Automated logistics/supply
- Automating devices/systems
- Device interoperability [plug and play]
- EHR integration
- Robotic procedural support

**LEVELS OF EFFORT (LOE):**

1. Low
2. Medium
3. High

**Legend:**

- Level of Effort
- 1
- 2
- 3

For more information on the TATRC Virtualized Hospital Architecture Maturity Roadmap, please contact US Army Medical Research Development Command – Telemedicine and Advanced Technology Center marketingdirector@tatrc