Patient flow and cohorting in COVID-19 patients - A rapid review of the evidence

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COVID19 CHS – Patient Flow and Cohorting summary from pre-existing guidelines

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Acronyms:

- WHO: World Health Organization, CDNA: Communicable Diseases Network Australia, PPE: Personal protective equipment, HCW: Healthcare worker, NPIR: Negative pressure isolation room, AGP: Aerosol-generating procedure (including CPR, manual ventilation, intubation, bronchoscopy, suctioning)

Summary:

- External triage:
  - Pre-hospital phone or online: direct to external testing facility or hospital based testing as appropriate according to symptoms and epi history
  - **Hospital fever clinic: external to hospital entrance** → Can sort according to COVID19 risk (CDNA epi stratification) and clinical status
- Risk stratification of patients:
  - **WHO recommends ALL lab confirmed cases are cared for in a health facility**
  - Could they go home? → confirmed or unconfirmed *AND* mild or moderate disease without risk factors for severe disease (see WHO and CDNA)
    - OR to separate low acuity facility with easy access to health services (adjacent, telehealth, external service)
    - Must have suitable home setup, education and advice (see CDNA)
  - Are they too sick to go home? → confirmed or unconfirmed *AND* moderate disease with risk factors for severe disease, severe or critical
    - Unconfirmed cases to YELLOW ZONE → ideally isolated, but if not, grouped according to epi risk factors (see CDNA)
    - Confirmed cases to RED ZONE → ideally isolated, but lower priority compared to unconfirmed cases
  - Risk factors for severe COVID19: increasing age (>60), HTN, diabetes, cardiovascular disease, chronic respiratory disease, immunocompromise
- Isolation vs. cohorting:
  - Hierarchy of room use: **NPIR → single room → cohorting**
  - Isolation in single room is best practice (and air circulation if performing AGP)
  - If cohorting:
    - **Isolation of probable and suspected cases takes priority** over confirmed
    - Group patients according to epi and clinical risk factors
    - Ensure patients follow cough/sneeze etiquette and hand hygiene
    - ≥1m between beds
- Clear zoning:
  - Clean (GREEN) → PUT PPE on (transition) → Intermediate (YELLOW) → Hot zone (RED) → TAKE PPE off (transition)
    - Donning and doffing supervised
    - Can go from yellow to red, but not red to yellow
    - Clear hand hygiene checkpoints between zones and individual patients
  - Clear directional walkways for staff and patients

EVIDENCE BASE AND SOURCE	SUMMARY – RELATING TO PATIENT FLOW

Guideline: ***COVID-19 CDNA National Guidelines for Public Health Units***[2]
 	
Updated regularly: https://www1.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-novel-coronavirus.htm
	- Primarily for contact tracing and out-of-hospital management of individuals in isolation and details on PPE
	- Helpful in regard to clarifying **case definitions** – based on tests, clinical and epi criteria
	  o **Confirmed**: tests positive for SARS-CoV-2 using a validated test
	  o **Probable**: (Fever (≥38dC), or history of fever OR acute respiratory infection) AND **household** contact of confirmed case
	  o **Suspect case:** split into risk category based on clinical and epi features

Preprint: ***Hospital Emergency Management Plan During the COVID-19 Epidemic***[1] *Brief description of management plan from West China Hospital Emergency Department https://onlinelibrary.wiley.com/doi/epdf/10.1111/acem.13951*	- **Prehospital triage**: Triage via *free online clinic* – low-suspect patients were told to stay home and given instructions for self isolation, high-suspect patients were asked to attend a Fever Clinic (Fig. 1) - **ED triage**: Fever Clinic patients attended separate triage for brief examination – then split into low-suspect and high-suspect based on epi history, and signs and symptoms. (Fig. 2) - Low-suspect and high-suspect patients then had **separate entrances and observation areas within ED** - Patients transferred to Quarantine Ward following positive qRT-PCR and/or CT

Guideline: ***WHO - Operational considerations for case management of COVID-19 in health facility and community***[3]
 	
https://apps.who.int/iris/bitstream/handle/10665/331492/WHO-2019-nCoV-HCF_operations-2020.1-eng.pdf
	- Always plan for the **assumption that case numbers will double every 3-7 days**
	- **Designated COVID19 treatment areas**
	- WHO recommends all lab confirmed cases be isolated and cared for in a health facility → if unable, prioritise those with likelihood of poorer outcomes
	- Care for suspected and confirmed patients in **isolation or cohorting**
	  o According to **disease severity and acute needs**
	- Cases division by case severity and risk factors for severe disease:
	  o A: Mild, moderate *without* risk factors → If possible, cohort and test in health facilities, or community facilities (stadiums, hotels) with adjacent services, or home if appropriate.
	  o B: Mod with risk factors, severe, critical→ hospitalise for isolation or cohorting
	- Can adopt "hub-and-spoke" model – **peripheral units referring to central COVID-19 referral facility**

Guideline: ***Handbook of COVID-19 Prevention and Treatment***[4]	- Fever clinic: **Independent fever clinic** with one-way passage near hospital entrance
	  o At triage, split into **suspected COVID-19 patient zone**, and **"regular" fever zone** (no epi Hx for COVID19)
	  o Patients must wear masks, minimised duration of patient visit
	- **Zoning**: Clean –(buffer zone)→ Potentially contaminated –(buffer zone)→ Contaminated
	- Isolation ward - general ward and ICU wards with similar layout to fever clinic → strictly limited access
	  o Suspected cases: individual rooms
	  o Confirmed cases: can share rooms, but with ≥1.2m between beds

Preprint: ***Protecting Health Care Workers During the COVID-19 Coronavirus Outbreak – Lessons from Taiwan's SARS response***[5]
 	
https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa255/5804239
	- **Traffic control bundling (TCB):** System used in Taiwan for SARS outbreak and adapted for Ebola and COVID-19[5-8]
	- Aims to break community-hospital-community cycle using **external triage and dedicated patient zones**
	- **Triage outside of hospital** (tents or shelter), with patient **direction to correct zone**
	  o Confirmed case → isolation (**hot zone**) in isolation rooms
	  o Awaiting diagnosis, inconclusive or atypical case → quarantine ward (**intermediate zone**)
	- Patients travel along **designated pathways** to avoid contact with the clean zone
	- When moving from the clean zone, HCWs must put on PPE
	- When returning to the clean zone, HCWs remove PPE in a transition zone
	- Zones are demarcated by signage and lines painted on the floor, hand hygiene is used between zones (Fig. 3)

Guideline: ***COVID-19 – Infection Prevention and Control in the Hospital Setting (WA Health)***[9]
 	
https://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/Infectious%20diseases/PDF/Coronavirus/Infection%20Prevention%20and%20Control%20in%20Hospitals.pdf
	- Recommends NPIR for patients under investigation for COVID19
	- If a NPIR not available, use a single room with the door closed
	- If single rooms or NPIRs are not available, patients should be grouped according to clinical and epi risk factors (cohorting)
	  o There should be ≥1m between beds, it should be separate from other patient groups, and should not be a thoroughfare
	  o Patients in these zones should use cough/sneeze etiquette and perform appropriate hand hygiene
	  o "*In cohorted units, gowns, masks and eye/face protection may remain insitu between patients providing they are not soiled. Gloves must be changed between patients and adherence to the 5 Moments of Hand Hygiene is essential."*[9]
	  o During transfers the patient must wear a surgical mask, and HCWs must put on new PPE

Article: ***Diagnosis and clinical management of severe acute respiratory syndrome Coronavirus 2 (SARS- CoV-2) infection: an operational recommendation of Peking Union Medical College Hospital (V2.0)***[10] *https://www.tandfonline.com/doi/pdf/10.1080/22221751.2020.1735265?needAccess=true*	- Nice succinct summary of pre-COVID19 staff testing and exclusion criteria, investigations that should be performed on presentation and when diagnosis confirmed. - Patients **tested for COVID19 – single room isolation** - Confirmed diagnosis – transfer to **designated COVID19 hospital**
Guideline: ***The Australian and New Zealand Intensive Care Society (ANZICS) – COVID19 Guidelines (Version 1)***[11] *https://www.anzics.com.au/wp-content/uploads/2020/03/ANZICS-COVID-19-Guidelines-Version-1.pdf*	- Simple and clear operational guidelines for ICUs, including: reducing ICU demand, increasing ICU capacity, decision making, infection control, and treatment of COVID19 patients - Hierarchy of room preference for COVID19**: NPIR → single isolation → cohort**

Risk factors for severe disease and poor prognosis

SOURCE	SUMMARY
Letter/comment: ***Characteristics of and important lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China***[12]	- Descriptive study of 72 314 COVID19 patients from mainland China - Severity: 81% mild, 14% severe, 5% critical - Case fatality rate (CFR): 2.2% overall, 14.8% of those ≥80yrs, 49.0% in critical - Healthcare personnel infection rate: 3.8% - Risk factors for severe disease: o Increasing age (70-79yrs CFR 8.0%) o Cardiovascular disease CFR 10.5% o Diabetes CFR 7.3% o Chronic respiratory disease CFR 6.3% o HTN 6.0% o Cancer 5.6%
Article: ***Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China***[13] *https://www.thelancet.com/journals/lancet/article/piis0140-6736(20)30183-5/fulltext*	- Descriptive study of 41 confirmed cases of COVID19 in Wuhan - six deaths (15%) - Sx at onset: fever 98%, cough 76%, myalgia or fatigue 44%, sputum 28%, headache 8%, haemoptysis 5% - 55% developed dyspnoea, median duration from illness onset to dyspnoea of 8.0 days - Median time from onset to admission of 7.0 days, 9.0 days to ARDS, 10.5 days for ICU admission and mechanical ventilation - All had CT abnormalities on admission (commonly bilateral ground-glass opacities and subsegmental consolidation) - Complications: all had pneumonia, 29% ARDS, 12% acute cardiac injury, 10% secondary infection - 5% refractory hypoxaemia with ECMO salvage
Article: ***Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study***[14] *https://doi.org/10.1016/s0140-6736(20)30566-3*	- Descriptive study of 191 confirmed cases of COVID19 in Wuhan – 54 deaths (2.8%) - Factors associated with increased risk of mortality: o Age, HTN, diabetes, coronary artery disease, chronic obstructive lung disease, chronic kidney disease o On admission: D-dimer >1ug/mL, higher SOFA, elevated cardiac troponins, elevated LDH, lymphopaenia - Sx on admission: fever 94%, cough 79%, sputum 23%, myalgia 15%, fatigue 23% - Disease severity: 35% severe, 11% critical - Median time from onset to admission of 11.0 days, med. time to ventilation 14.5, med to death 18.5 days o ECMO used in three – none survived - Imaging features: consolidation 59%, ground-glass opacities 71%, bilateral infiltrating pneumonia 75% - Complications: sepsis 59%, resp failure 54%, ARDS 31%, heart failure 23%, septic shock 20%, coagulopathy 19%, AKI 15%

Figures

Figure 1. Online pre-triage system[1]

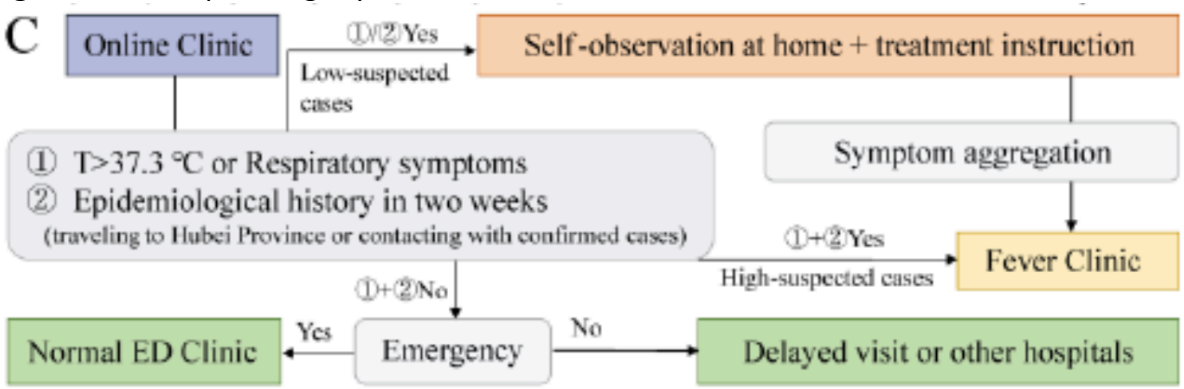


Figure 2. ED triage and risk stratification[1]

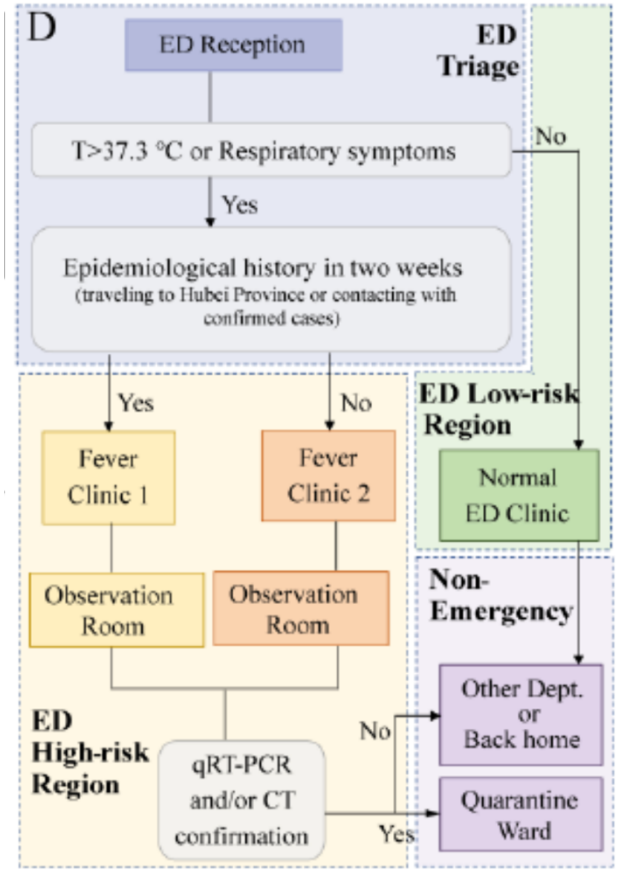
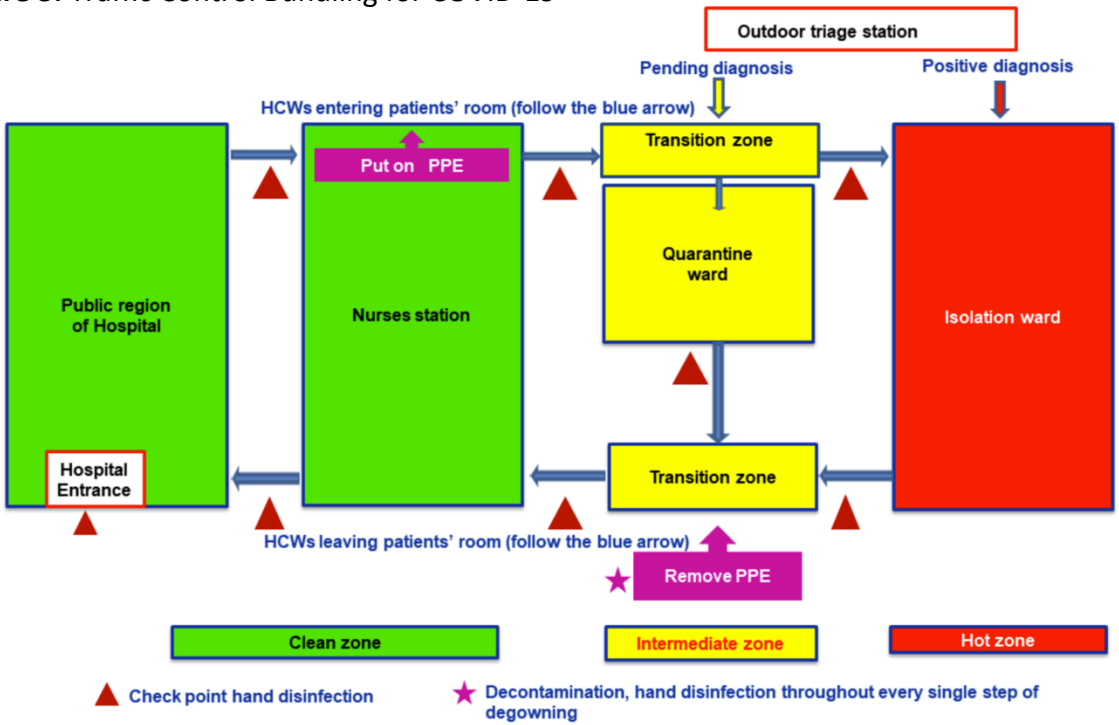


Figure 3. Traffic Control Bundling for COVID-19[5]



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