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Clinical Design & Innovation

Person-centred, co-ordinated care

CRITICAL CARE

.

NATIONAL ADULT CRITICAL CARE CAPACITY - CENSUS REPORT 2020

Acute Operations Division, HSE

National Clinical Programme for Critical Care, Clinical Design and Innovation, HSE

Contents

Summary

Between February 2020 and Jan 2021 over 1,100 critically ill adult COVID patients were admitted to ICUs and HDUs in Ireland. Of these critically ill patients, sadly, over 200 patients did not survive critical care stay.

National Clinical Programme for Critical Care joins clinical and administration colleagues and the people of Ireland to offer sympathy to the bereaved loved ones, families and friends of the over 200 deceased ICU patients and of the over 4,000 people in Ireland who died since COVID began.

In response to the increased numbers of critically ill COVID patients, in 2020, the annual Critical Care Bed Capacity Census finds between April 2020 and December 2020 the national adult critical care bed capacity increased from 255 to 280.

In COVID, in surge 1 and surge 3, following Hospital staff redeployment, an additional critical care surge capacity of 70 beds was provided in Hospitals increasing total capacity to 350. Owing to the redeployment of over 400 WTE Hospital Nurses, the clinical situation in the ICUs became manageable. However, redeployment of Hospital Nurses has had a negative impact on Scheduled Care activity with delayed patient diagnoses and outcome consequence.

Moving beyond a critical care occupancy figure of 350, however, normal Critical Care Nursing staff ratios are not available for additional critically ill patients, the care of critically ill patients is not assured and the clinical situation in the Hospitals quickly becomes overwhelming.

In January 2021, then, critical care occupancy peaked at 330. At that time additional critical care bed capacity availability across the Hospitals in Ireland was limited to 18 beds (total 348).

However, owing to local surges of critically ill COVID patients, many Hospitals experienced overwhelming clinical conditions in the ICUs relieved only by inter-hospital transport of the additional critically ill patients by the Mobile Intensive Care Ambulance Service MICAS.

CCP welcomes Minister Donnelly's announcement (18th Dec 2020) and HSE National Service Plan 2021 (both copied below) to increase the national adult critical care capacity baseline from 280 to 321 by year end this year 2021.

CCP recommends the capacity building measures announced by Minister Donnelly in multi-annual Critical Care Strategic Plan) – Nursing Outreach, Transport Medicine, Critical Care Nursing education and training resource, facility new build feasibility studies – are progressed now.

CCP also recommends increased isolation room capacity (new build / retrofit) with air ventilation and air filtration as identified in CCP 2018 isolation room survey (copied below) and as recommended by HSE / HPSC Infection Prevention Control guidance.

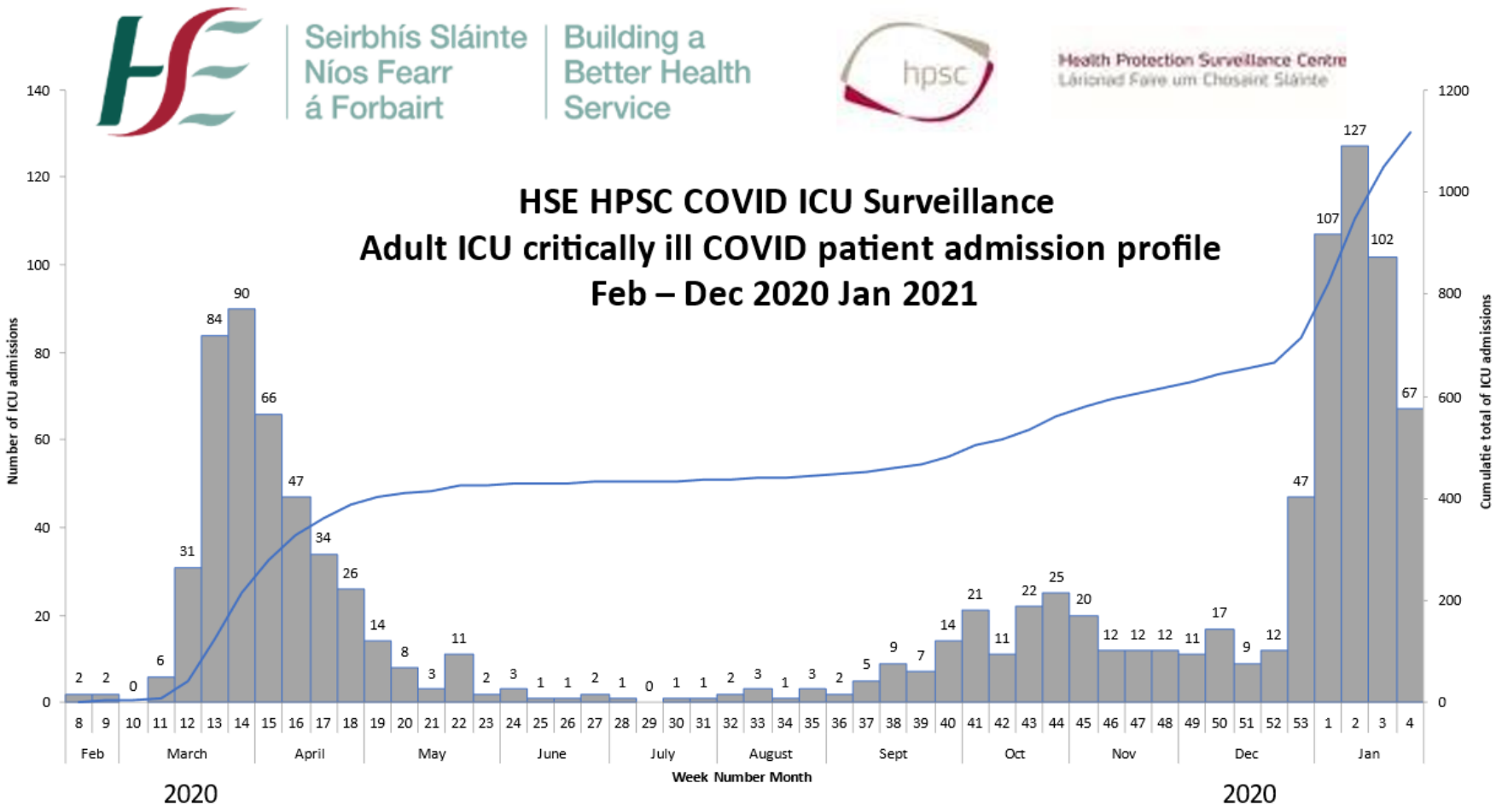
The cohort of critically ill adult COVID patients presenting to the ICUs in Ireland from Feb 2020 to Jan 2021

Between February 2020 and January 2021, in the three surges, over 1,100 adult critically ill COVID patients were admitted to the ICU setting in Ireland.

Sadly, up until 1st Aug 2020, 88 patients did not survive ICU stay. Between 1st Aug 2020 and 5th Dec 2020, sadly, a further 53 patients did not survive ICU stay. And between 22nd Nov 2020 and 23rd Jan 2021, sadly, a further 82 patients did not survive ICU stay. Between Feb 2020 and Jan 2021 over 220 critically ill adult COVID patients did not survive ICU stay in Ireland.

The Irish National ICU Audit (INICUA), National Office of Clinical Audit (NOCA) will complete a risk-adjusted survival analysis and will publish in due course for all adult patients COVID and nonCOVID admitted to ICUs in 2020.

The HSE staff of Acute Operations, National Critical Care Programme for Critical Care and Health Protection and Surveillance Centre (HPSC) offer sympathy to the bereaved partners, families and friends at the passing of their loved ones in the ICU setting in 2020 and 2021. Further, HSE staff join the people of Ireland to offer sympathy to bereaved families at the passing of over 4,000 people in Ireland from COVID in 2020 and 2021.



Graph. Admissions of adult critically ill COVID patients to ICUs from Feb 2020 to Jan 2021 (Courtesy of HSE HPSC COVID ICU Surveillance)

Critical care capacity availability and clinical risk stratification

Critical care bed capacity is described in terms of clinical staff, clinical space, clinical equipment, oxygen supply and Hospital / Hospital Group / HSE system support. Critical Care clinical staff comprise the Establishment of Critical Care Nursing staff, Intensive Care Medicine staff, Health Social Care Professionals. Critical Care clinical staff depend on and collaborate closely with Hospital Clinical Specialty staff, Hospital / Hospital Group / HSE Administration staff and support system staff.

Critical care capacity availability

Periodically, ICU Bed Information System (ICU-BIS), National Office of Clinical Audit (NOCA) completes a count of available ICU / HDU adult critical care bed capacity. The most recent ICU-BIS capacity count was completed and furnished 1st Dec 2020 - below.

NOCA / ICU-BIS adult critical care bed capacity count	**ICU / HDU bed capacity count 1st Dec 2020**
Baseline capacity	**280**
Additional surge capacity- redeployed staff – clinical scenario manageable	**+ 70 = 350**
Capacity unavailable	**>350**

Table. ICU / HDU bed capacity count, ICU- BIS, NOCA, 1st Dec 2020

The count shows the baseline ICU / HDU capacity increased up to 280 up from 255 in March / April 2020 at the start of COVID. The resource allocation to add 25 permanent critical care beds to the national capacity complement since March / April 2020 is very welcome.

The count also shows that owing to ICU experience Hospital Nursing staff redeployment, an additional critical care bed capacity, a surge capacity equivalent of 70 critical care beds, provided an ICU / HDU bed capacity up to 350 beds on 1st Dec 2020. Figures provided by Hospital Groups CDoNs corroborated this and showed that 406 WTE ICU experience Hospital Nursing staff were redeployed in the Hospitals from existing Hospital services to the ICU / HDU settings to meet the needs of the critically ill COVID and nonCOVID patients. Redeployment of Hospital Nurses has had a negative impact on Scheduled Care activity with delayed patient diagnoses and outcome consequences.

Lastly, the count shows that critical care capacity is unavailable in the Hospitals where ICU / HDU occupancy exceeds 350.

Critical Care Capacity Clinical Risk Stratification

The clinical risk of Critical Care Capacity is graded into three strata (see clinical risk table below)–
– baseline capacity, day-to-day variance, normal clinical risk – ‘green’ risk stratum
– additional surge capacity scenario, the clinical needs of additional critically ill patients met with additional redeployed Nursing staff, clinical risk manageable – ‘amber’ risk stratum
– capacity unavailable, critically ill patient needs unmet, overwhelming clinical risk scenario – ‘red’ risk stratum

Critical Care Capacity Clinical Risk Stratification Table

Hospital critical care clinical risk profile	Adult critical care capacity (21st Jan 2021)	Clinical activity	Hospital clinical risk profile
Green = 280	Baseline adult critical care bed capacity (established, funded, operational) = 280 in Ireland	Normal day-to-day variances	Normal critical care clinical risk profile
Amber = 350	Additional critical care contingency surge capacity – staff redeployment = 350 in Ireland	Clinical activity surge – clinically manageable	Clinical risk of additional surge of critically ill patients managed with redeployed Hospital clinical staff Considerable impact on and curtailment of Hospital Scheduled Care clinical activity (redeployed staff missing) with negative impact – delayed patient diagnoses and outcome consequences)
Red > 350	Additional staff not available	Overwhelming clinical activity surge - clinically unmanageable	Unsafe clinical risk scenario Evacuate patients – inter-ICU transfer/transport with MICAS

Table. Critical Care Capacity - Clinical Risk Stratification Table (ICU-BIS NOCA critical care bed capacity count 21st Jan 2021)

Normal clinical risk

Where the needs of the cohorts or volumes of critically ill patients presenting are met by baseline critical care capacity, the experienced critical care clinical professional staff (the Establishment) manage the normal day-to-day clinical and patient variances. This scenario is the normal day-to-day critical care clinical risk profile. (See ‘green’ stratum in clinical risk table above).

Clinical risk manageable

However, in COVID in 2020 and in Jan 2021, in surges 1 and 3, the volumes of critically ill patients exceeded the normal variance of baseline critical care activity by a distance. In response, ICU experience Hospital Nursing redeployment was required to meet the need. With redeployment the clinical needs of the increased volume of critically ill patients were met. (See ‘amber’ stratum in clinical risk table above).

Increased clinical risk associated with curtailed Scheduled Care

The consequence of redeployment of ICU experience Hospital Nursing staff is considerable impact on and curtailment of Scheduled Care activity in Operating Theatres, Endoscopy and Cardiology across the Hospitals. It is known curtailment of Scheduled Care activity is associated with delays in cancer diagnosis which in COVID context have been associated with

increased mortality (Maringe C et al; *The impact of the COVID-19 pandemic on cancer deaths due to delays in diagnosis in England, UK: a national, population-based, modelling study*; Lancet Oncol 2020; 21: 1023–34).

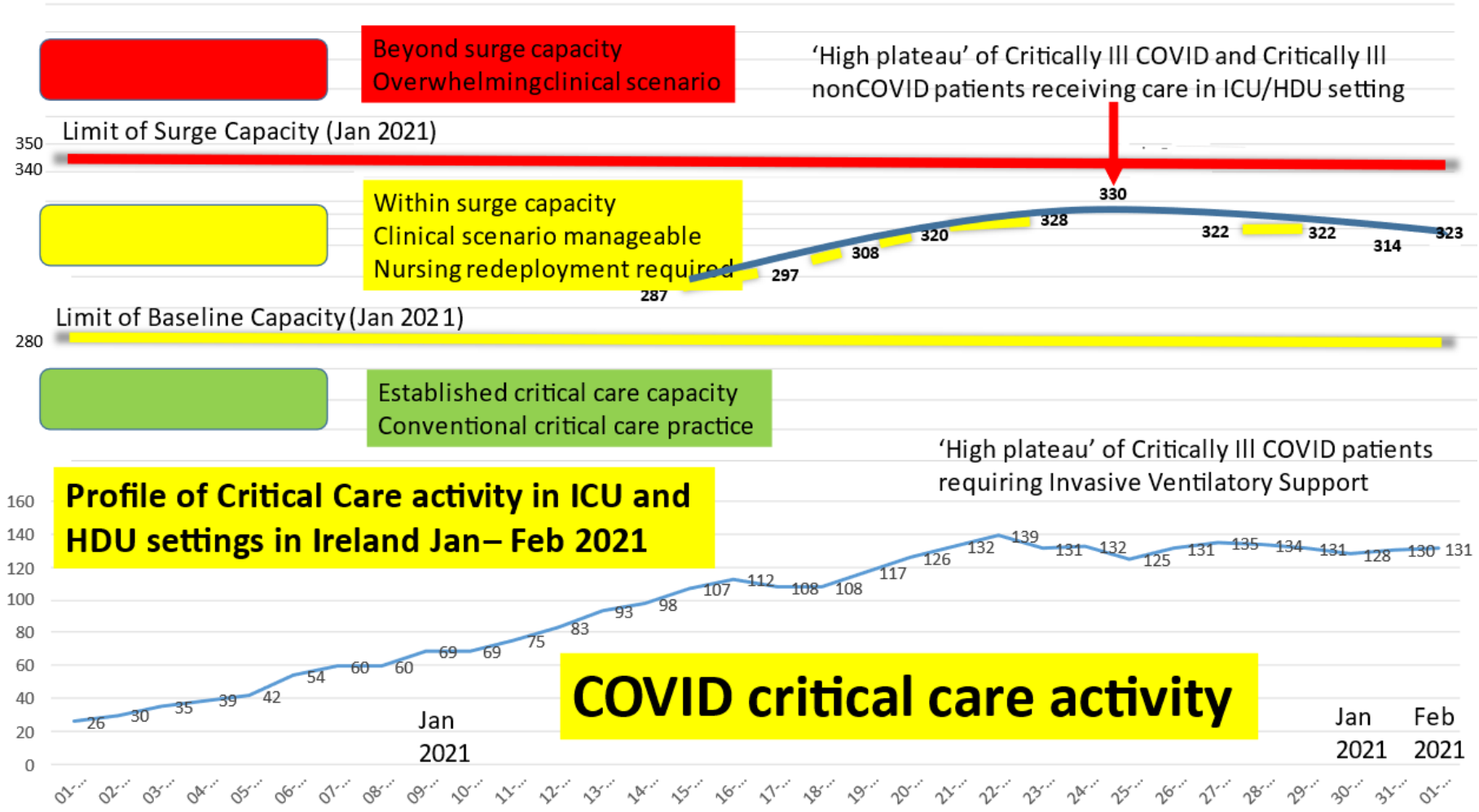
Overwhelming clinical risk scenario

The ICU-BIS critical care capacity count on 1st Dec 2020 found critical care capacity was unavailable above a bed capacity of 350.

On Jan 24th 2021, ICU occupancy peaked with 330 patients critically ill patients in the ICUs. The additional ICU bed capacity availability on that day was 18 (data courtesy of ICU-BIS NOCA).

Although peak occupancy did not 'breach' the 350 figure at a national level, nevertheless, many Hospitals experienced overwhelming surges of critically ill COVID patients exceeding Critical Care Nursing staff availability. Surges of critically ill patients occurred locally following geographic clusters of COVID patients. In these hospitals appropriate Critical Care Nursing staff ratios were unavailable, the care of critically ill patients was not assured and the clinical situation in these Hospitals quickly became overwhelming. In rapid response, the Mobile Intensive Care Ambulance Service MICAS transported 100 critically ill adult patients in January 2021, triple MICAS expected month-on-month activity. If MICAS was unavailable, an overwhelming clinical scenario would persist at these Hospitals. (See 'red' risk stratum in clinical risk table above).

On 24th Jan national ICU occupancy peaked at 330 on a day where additional ICU bed availability was 18



Graph. ICU occupancy peaked at 330 on Jan 24th

National Clinical Programme for Critical Care inputs to National Critical Care Capacity development planning

CCP welcomes Minister Donnelly's announcement and HSE National Service Plan 2021 (both copied below) to increase the national adult critical care capacity baseline from 280 to 321 by year end this year 2021.

Increase in baseline critical care capacity to 321 in 2021 now decreases or removes reliance on redeployed Hospital Nurses and consequent negative impact on Scheduled Care activity with diagnosis delay and outcome consequence.

CCP recommends the capacity building measures announced by Minister Donnelly in multi-annual Critical Care Strategic Plan) – Nursing Outreach, Transport Medicine, Critical Care Nursing education and training resource, facility new build feasibility studies – are progressed now.

CCP further recommends increased isolation room capacity (new build / retrofit) with air ventilation and air filtration as identified in CCP 2018 isolation room survey (copied below) and as recommended by HSE / HPSC Infection Prevention Control guidance.

National Adult Critical Care Bed Capacity Census 30th September 2020

On 30th September 2020, following funding allocation in March 2020, the National Adult Critical Care Capacity Census identified the operational adult critical care bed capacity stood at 280 - 215 x Level3 ICU bed capacity and 65 x Level2 HDU bed capacity – ration of 3 x ICU to 1 x HDU bed capacity.

CRITICAL CARE BED CAPACITY CENSUS SEPTEMBER 30th Sept 2020

CRITICAL CARE BED CAPACITY CENSUS SEPTEMBER 30th Sept 2020	**CRITICAL CARE SERVICE** **(following *National Standards 2019*, Joint Faculty of Intensive Care Medicine of Ireland, CAI)**					**CRITICAL CARE NURSING WTE 2020 funded and approved (CCN WTE in-post)**	
	Level 3s ICU Bed Capacity	**Level 3 ICU Bed Capacity**	**Level 2 HDU Bed Capacity**	**Critical Care Bed Capacity 2020**	**JFICMI *National Standard* outlier**		**Critical Care Bed Capacity 2019**
RCSI Hospital Group						284.42 (266.34)	
Cavan ICU		2	2	4		24.94 (19.66)	4
Drogheda ICU		6	3	9		57.3 (62.96)	8
Beaumont General ICU		10		10		162.5 (146.5)	9
Beaumont HDU		4	4	8		0	8
Beaumont Neuro-	9			9		0	8

specialty ICU							
Connolly Hospital ICU		6		6		39.68 (37.22)	4
Dublin Midlands Hospital Group						377.56 (357.55)	
Naas ICU		4		4		24.9 (22.91)	4
Portlaoise ICU		2		2	JFICMI National Standard outlier	13.16 (13.16)	2
Tullamore ICU		5	2	7			4
Tallaght ICU		8		8		66 (57.98)	11
Tallaght PACU		5		5		29.5 (28.5)	3
St James' Burns ICU	2			2		19.0 (17.0)	2
St James' ICU/HDU		21	0	21		157.0 (151.0)	20
St James' CT KS ICU	8			8		68.0 (67.0)	7
Ireland East Hospital Group						405.09 (358.42)	
Mater ICU/HDU	17		16	33		191.0 (177.1)	32

Mullingar ICU		2 (minus 3 ICU beds since 2019)	4	6		42.16 (29.0)	6
Navan ICU		2		2	JFICMI National Standard outlier	12.37 (11.6)	2
St Vincents ICU/HDU		10	6	16		114.86 (96.12)	16
Kilkenny ICU		4		4		18.7 (18.6)	4
Wexford ICU		5		5		26.0 (26.0)	5
South-South West Hospital Group						284.93 (276.41)	
STGHClonmelICU		4		4		36.65 (29.27)	4
UHWaterford ICU		6	4	10		52.35 (48.25)	9
Cork CUH General ICU Cardiac ICU	19			19		128.57 (131.47)	19
MercyUH ICU		5		5		36.86 (TBC)	5
UHKTralee ICU		5		9		30.5 (30.56)	5

			4				
Saolta Hospital Group						268.64 (238.23)	
Letterkenny ICU		5		5		29.36 (28.36)	5
Ballinasloe ICU		4	3	7		40.85 (34.15)	6
Castlebar ICU		3		3		43.0 (31.84)	3
Sligo ICU		5		5		38.0 (26.45)	5
Galway UHG CT ICU	3			3		0	4
Galway UHG General ICU/HDU		12	7	19		117.43 (117.43)	15
UL Hosp Group							
UHLimerick ICU/HDU		12	10	22		139.5 (133.88)	18
TOTAL	**Level 3s = 58**	**Level 3 = 157**	**Level 2 = 65**	**Total Level 3s + Level 3 + Level 2 = 280**		**1,760.14 (1,630.83 = 92.6%) = 129.31 WTE unfilled posts**	**257**

Table. Adult Critical Care Bed Capacity as at 30th Sept 2020

Census Table Legend

National Standards JFICMI - in scope

National Standards JFICMI - outlier

Critical Care Capacity Census 2020- methodology note

On the behalf of HSE Acute Operations, Critical Care Programme completes an annual critical care bed capacity Census and collates each Hospital's critical care (ICU and HDU) bed capacity and staffing (medical and nursing) Establishment as well as critical care activity profile measurement. Thus, the Census reports critical care bed capacity (see table above) and critical care activity profile (see figure below), both as at 30th September 2020.

As part of Census procedure, each hospital's Census return is verified locally and countersigned by the Hospital CEO, Hospital Clinical Director, Hospital Director of Nursing, Hospital ICU Director, Hospital ICU CNMIII, Hospital Group CEO, Hospital Group Chief Clinical Director and Hospital Group CDoN- eight signature verifications. This co-signed individual Hospital critical care capacity and activity profile report is thus collated, reconciled and validated centrally on behalf of Acute Operations by CCP Census Working Group and subsequently approved by Acute Operations for circulation.

Thus, the annual adult national critical care (ICU and HDU) commissioned bed capacity and activity profile is ascertained by the Critical Care Census process.

The *National Standards for Adult Critical Care Services 2019*, Joint Faculty of Intensive Care Medicine of Ireland (JFICMI), the Office of Nursing and Midwifery Services Directorate (ONMSD), HSE and the HPSC, HSE, respectively, define the medical, nursing and HPSC staff requirements to commission a Critical Care Service. Accordingly, for Critical Care Nursing professional staff nurse requirements ONMSD has advised the critical care nursing staff workforce requirement to commission a Level 3 ICU bed and a Level 2 HDU bed.

Critical Care Nursing WTE requirements for an 8-10 bed ICU

When calculating WTE requirements for a Critical Care Unit, each role requirement must be calculated separately

Nurses required to provide direct 1:1 nursing care 24/7/365 = 5.6 WTEs (bedside nurses)

Separately, the same WTE allocation is required for any nursing staff member (e.g. Clinical Nurse Managers) who are required to provide 24/7/365-unit cover.

Every shift must have a designated team leader per 8-10 beds

ACCESS (Assistance, Coordination, Contingency, Education, Supervision and Support) nurses are in addition to bedside nurses, unit managers, team leaders, clinical facilitators and nonnursing support staff. Previously referred to as 'Floating' Nurses. 5.6 WTE are required per identified ACCESS Nurse in order to staff a Unit 24/7/365

Ratio based on qualifications of current staff: < 50% qualified staff = 1 ACCESS nurse per 4 beds; 50-75% qualified staff = 1 ACCESS nurse per 6 beds; > 75% qualified staff = 1 access nurse per 8 beds ACCESS nurse requirements for single-room Level 3 units. Ratio 1:4 rooms or 1:8 open beds

Each unit should have a dedicated clinical facilitator/nurse educator, not included within the working numbers of the unit. The recommended ratio is 1 WTE: 50 staff in Level 3(s) or Level 3 units.

Additional educators/coordinators are required to run and manage tertiary based Critical Care Nursing courses.
All Level 3(s) and Level 3 units should have a nurse in an audit role for NOCA ICU data collection

A designated Clinical Nurse Manager, one post, with a specialist qualification in Intensive Care Nursing, as well as relevant skills and competencies pertaining to the clinical specialty of the Unit, is required on site for Unit Nursing management. This person is formally recognised as the overall Unit Clinical Nurse Manager (CNM 3).

D Cribbin, U Quill, M Power, Critical Care Programme Dec 2019.

Critical Care Nursing Grades

Critical Care Nursing has the following Grades linked to Critical Care

- Assistant Directors of Nursing,
- Advanced Nurse Practitioners & Candidate Advanced Nurse Practitioners,
- Clinical Nurse Managers 1,2,& 3
- Clinical Nurse Educators/ Facilitators
- Critical Care Audit Nurses
- Staff Nurses

- Health Care Assistants

The Critical Care Nursing Establishment of Critical Care Nursing is the totality of Nurses with Critical Care clinical governance as recorded by Census returns September 2020

Minister Donnelly announces Critical Care Strategic Plan Dec 18th 2020 and HSE National Service Plan 2021

Press release

Minister for Health announces plan to expand critical care capacity to 446 beds

From Department of Health

An Roinn Sláinte
Department of Health

Published on 18 December 2020

The Minister for Health, Stephen Donnelly TD, has today announced a strategic multi-year plan to expand adult critical care capacity from 255 beds to 446 beds.

Work on Phase One of the plan has already begun and will see 321 adult critical care beds in place by the end of 2021, compared to 255 at the start of this year. This will be funded by €52 million allocated in Budget 2021. This funding will also

allow for education and training initiatives to increase the critical care workforce and for investment in critical care retrieval services. Under Phase One, an additional 8 beds will be created in St. Vincent's University Hospital in 2022, subject to completion of the necessary infrastructural development and planning processes, and with funding to be sought within the 2022 estimates process.

Completion of Phase Two will see a further 117 beds added through the development of new build capacity at five prioritised sites, subject to necessary approval processes. These sites include Beaumont Hospital, St James's Hospital, the Mater Misericordiae University Hospital, St Vincent's University Hospital and Cork University Hospital.

The multi-year plan was noted by Government this week. As well as addressing historical under-capacity, the plan supports wider strategic reform and service improvement. When implemented, it will fully address the recommendations of the 2018 Health Service Capacity Review.

Minister Donnelly said:

"Ensuring the right resources are in place for our most critically ill patients is a priority for me and for this government. This plan is a major milestone in the expansion of our critical care capacity. At the start of this year, there were 255 adult critical care beds in the country. We are increasing this number to 321 by end of 2021 – a 25 per cent increase. To put this in context, the 2019 National Adult Critical Care Bed Capacity Census reported an additional 21 beds opened over the three-year period from 2017 to 2019, an average of seven per year. The plan will ultimately bring us to 446 critical care beds, not only addressing but exceeding the 2018 Health Service Capacity Review recommendation of 430 beds."

Minister Donnelly added:

"This investment will help our health service to deliver the right care in the right place at the right time. This plan will also support strategic reform and service improvement in areas including trauma and transplant where we know that access to adequate critical care capacity is core to delivering best outcomes. I also want to take this opportunity to thank our frontline workers who have cared for patients in our critical care units, and indeed across our health system, throughout the pandemic. Their commitment and dedication during this enormously challenging time has been remarkable."

Dr Michael Power, National Clinical Lead for the Critical Care Programme, said:

"Thousands of critically ill people are cared for in our critical care units every year across Ireland. The clinicians in the critical care community delivered top class critical care to critically ill COVID and non-COVID patients in very challenging circumstances over recent months. The significant investment provided now in Budget 2021 and the plan to address the overall adult critical care capacity deficit are vital to enable access and the best outcomes for our critically ill patients. The focus on critical care workforce, education and training is a key part of the critical care plan."

ENDS

Notes

Detail of the Critical Care Capacity Expansion Plan

A strategic multi-year plan for additional critical care capacity has been developed to ensure readiness of the health system for response to the ongoing COVID-19 pandemic and to support a long-term strategic goal of increasing overall critical care capacity to 446, slightly in excess of the pre-pandemic recommendation of 430 beds in the Health Service Capacity Review.

The plan is clinically led and aligns with the hub-and-spoke model of care set out by the National Clinical Programme in Critical Care. It addresses the recommendations of the Health Service Capacity Review in respect of critical care, is in line with the vision set out in Sláintecare of "right care, right place, right time", and will also support strategic and service reform over time. Critical care is a key component in the implementation of key strategies including trauma, cancer and maternity care, and in the provision of specialist care including organ transplant. The strategic development of critical care capacity aligns with the strategic direction envisaged in these strategies and with the delivery of highly complex specialist care.

This sets out two phases of capacity expansion to address the immediate and long term needs in our public hospital system, as follows:

Phase 1 2021

-retain permanently the 40 adult critical care beds put in place as part of the response to COVID-19

-provide an additional 26 beds in the Mater Misericordiae University Hospital (8), Tallaght University Hospital (12) and University Hospital Limerick (6)

-develop the critical care workforce by increasing the numbers of onsite critical care nurse educators and by increasing access to critical care nurse education at foundation and post-graduate levels

-increase the number of hospitals with critical care outreach teams to improve patient care and reduce re-admissions to critical care units

-increase the capacity of the National Ambulance Service's critical care retrieval services

-overall, funding of €52m has been provided in Budget 2021 to deliver the additional 66 beds in 2020 and 2021, a key step to ensuring the readiness of the health system for provision of critical care to COVID and non-COVID patients as part of the continued response to the COVID-19 pandemic

-Phase 1 also envisages the provision of an additional 8 beds in St. Vincent's University Hospital in 2022, subject to completion of the necessary infrastructural development and planning processes, and with funding to be sought within the 2022 estimates process

Phase 2

-development of new build capacity at five prioritised sites (Beaumont Hospital, St James's Hospital, the Mater Misericordiae University Hospital, St Vincent's University Hospital and Cork University Hospital) to support the delivery of an additional 117 beds

-the second phase supports the ambitious long-term strategic goal of increasing overall critical care capacity to 446 beds, fully addressing the critical care recommendations of the Health Service Capacity Review

-these developments are subject to completion of the necessary capital strategic assessments and preliminary business cases, in line with the Public Spending Code. The Capital Plan for 2021 allocates €5m to allow for the commencement in 2021 of the strategic appraisals and business cases

-it is intended that these capital developments will substantially increase the overall complement of critical care beds in hub hospitals to meet the needs of national specialties. These national specialties including the solid organ transplant programmes (kidney, liver, and heart and lung), the national burns service, neurosurgery, interventional neuroradiology (thrombectomy), ECMO and major trauma services

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HSE National Service Plan 2021 – extract (p73-74)

Acute Hospital Care

National Strategies

Critical Care

The development of critical care bed capacity is a key priority in order to strengthen the immediate response to the challenges posed by COVID-19, and to progress the initial phase of the strategic multiannual plan to address long standing deficits in critical care capacity. Critical care expansion will also support wider strategic reforms such as the Trauma Strategy and the Health Service Capacity Review and enable the further development of national services such as organ donation and transplant.

Priority Areas for Action 2021

Increase critical care bed capacity

- Increase the baseline of 255 critical care beds by permanently funding the 40 additional adult critical care beds opened in 2020 and by adding a further 26 beds at University Hospital Limerick, Tallaght University Hospital and the Mater Misericordiae University Hospital (to bring the total number of adult critical care beds to 321 by end of 2021)

- Develop the critical care work force by increasing the numbers of on-site critical care nurse educators and by increasing access to critical care nurse education at foundation and post-graduate levels

- Improve patient care and reduce re-admissions to critical care units by increasing the numbers of hospitals with critical care outreach teams

- Increase the capacity of the NAS critical care and retrieval services

National adult ICU/HDU isolation room infrastructure survey 2018

Context

In 2017 the Minister for Health activated the Public Health Emergency Plan to address CPE (carbapenemase-producing enterobacteriaceae) in Ireland's health system. Accordingly, the *National Public Health Emergency Team (NPHET) for Carbapenem-producing Enterobacteriaceae (CPE)* is tasked with collating information concerning notifiable invasive CPE infection and CPE outbreaks and "*the development and implementation of a strategy to contain CPE*".

In the context of Infection Prevention and Control initiatives in the ICU setting, CCP proposed a repeat survey to quantify adult ICU/HDU isolation room capacity in Ireland for critically ill patients.

In June 2018 then, following a teleconference 18/5/18 with HSE Infection Prevention and Control, a national survey of adult ICU/HDU isolation rooms and facilities was commenced. 26 Hospital ICU Directors completed the survey instrument (see Appendix) for their Hospitals' ICU/HDU isolation room facilities.

Theoretical background

In addition to effective hand hygiene and other effective Infection Prevention and Control IPC hygiene and decontamination practices, ICU/HDU isolation room capacity decreases transmission of bacteria including multi-resistant bacteria (MRB) among vulnerable critically ill patients.

It is known hospital-acquired bacterial bloodstream infection has an attributable mortality of c. 15% in Ireland, with a higher attributable mortality for multi-resistant bacteria (M Brady et al, J Hosp Inf 2017).

Similarly, ICU patients who acquire bloodstream infection from ICU-acquired bacteria inc. multi-resistant bacteria sustain increased mortality (Garrouste-Orgeas at al OUTCOMEREA, Clin Inf Dis 2006).

Critically ill patients are vulnerable and are at high risk of increased mortality from bloodstream infection with ICU-acquired bacteria inc. multi-resistant bacteria.

HSE/HPSC Infection Prevention and Control 2021 guidance recommends HEPA filtration, air ventilation systems and air flow control infrastructure in '*high risk areas*' as follows -

"Filtration - An effective way to prevent infections is to control the source of pathogens. Heating, ventilation and air conditioning systems can be used to control the concentration of airborne particulates in high risk areas, to minimise the risk of infection by means of air pressure, flow control and air filtration (the physical removal of particulates from air). The level of control should be proportional to the risk. In acute healthcare settings a commonly used approach to filtration is the high efficiency particulate air (HEPA) filter. There is evidence that there is a lower incidence of infection when immunocompromised and other highly vulnerable patients are housed in HEPA filtered isolation rooms. HEPA Filters must comply with relevant standards (Hahn T et al 2002).

Ventilation systems and air flow control - Optimal ventilation rates, air flow patterns and humidity can help to minimises the spread of infection. The ventilation rate is a measure used to control indoor air quality and in healthcare facilities is usually expressed as room air changes per hour. The peak efficiency for particle removal in the airspace often occurs between 12 ACH and 15 ACH. A study of 17 Canadian hospitals found that the risk of healthcare workers acquiring tuberculosis was strongly linked with exposure to infected patients in rooms with low ACH rates such as waiting areas (Menzies et al 2000).
Air flow direction is also important:

• Negative pressure or neutral pressure is preferred for rooms housing people with airborne infections to prevent the dispersion on of pathogen-laden aerosols (examples include measles and chicken pox virus and M. tuberculosis). A review of 40 studies HSE Health Protection Surveillance Centre. www.hpsc.ie Page 257 of 345 concluded that there was strong evidence to support and recommend the use of negatively pressurised isolation rooms (Li et al 2007).

• Positive or Neutral pressure is desirable in the care of some immunocompromised people (for example some surgical patients, some people with underlying chronic lung disease or requiring haemodialysis, people who are profoundly neutropenic), to safeguard them from airborne pathogens and environmental spores entering from adjacent spaces".

HSE/HPSC *Interim Guidance on Infection Prevention and Control for the Health Service Executive 2021 V1.3*. *11.01.2021,* p256-257

Findings

The 2018 ICU / HDU isolation room survey finds fifty-two percent (52%) of ICU / HDU capacity in Ireland has no air management (air exchanges) or treatment (HEPA filtration) isolation room capacity to decrease air-borne transmission of infection. This proportion has worsened since the prior survey in 2013. The prior 2013 survey found "*Current isolation capacity in Irish critical care units is inadequate.*" The 2018 survey shows ICU/HDU isolation room capacity in Ireland has worsened since the 2013 survey.

Recommendation

National Clinical Programme for Critical Care follows JFICMI *National Standards 2019* recommendation, "*The Intensive Care Unit – Minimum Requirements"* (p10), which requires appropriate ICU/HDU facility isolation rooms and air filtration

and air ventilation equipment and plant to meet up-to-date Infection Prevention and Control standards and guidances in ICU / HDU construction / retro-fit inc HSE/HPSC IPC and HBN 04-02 guidances -

"*Infection Control standards need to be adhered to, with particular reference to the numbers of single rooms, neutral pressure rooms and airborne isolation rooms. The specialty case mix will help determine the numbers of airborne isolation rooms. Design and building standards and infection control standards as referenced below are subject to revision and up-dating. The HBN 04-02 and SARI guidelines are appropriate for 2019 and the most recent versions should be considered the standard of the day*" - JFICMI *National Standards 2019* - "*The Intensive Care Unit – Minimum Requirements"* (p10)

The appropriate ICU / HDU IPC construction standard today is provided in UK Department of Health building code, HBN 04-02 (published 2013) and is endorsed by UK ICS *Guidelines for the Provision of Intensive Care Services 2013* (p22).

UK HBN 04-02 recommends -

"6.4 *Single-bed rooms with lobbies are required for the isolation of patients to control the spread of infection or for the protection of immunosuppressed patients*" and

"6.6 *The ventilation system should be designed to provide simultaneous source and protective isolation*". (p11).

As in JFICMI *National Standards 2011*- "*The specialty case mix will help determine the numbers of airborne isolation rooms"*. Hence local hospital Clinical Microbiology, Infectious Disease, Infection Prevention and Control and Intensive Care Medicine expertise in conjunction with National Clinical Programme Healthcare Associated Infection Antimicrobial Resistance (HCAI-AMR) Clinical Programme expertise and with Critical Care Programme will advise and determine the quantum and location of isolation capacity required during construction / retro-fit.

The National Isolation Unit at Mater Hospital has specific Infection Prevention and Control and Intensive Care Medicine requirements for the management of patients with viral haemorrhagic fevers VHF.

References

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Health Service Executive Critical Care Programme & Healthcare Associated Infection Clinical Programme; *Survey of Hygiene & Healthcare Associated Infection Prevention Practices in Irish Critical Care Services- Report Version 2*; February 2013

HSE/HPSC *Interim Guidance on Infection Prevention and Control for the Health Service Executive 2021 V1.3. 11.01.2021,* p256-257

Joint Faculty of Intensive Care Medicine of Ireland, *National Standards for Critical Care Services 2019*. *The Intensive Care Unit – Minimum Requirements* (p10)

UK Department of Health; Health Building Note HBN 04-02 Critical care units; 2013

UK Intensive Care Society; *Guidelines for the Provision of Intensive Care Services*; 2013

Evidence from a critical care access evaluation study

Critically ill patients with brain injuries from neurological conditions (e.g. trauma, intracranial haemorrhage, CNS infection etc) require time-critical access to neuro-specific interventions at a neuro-specialty centre for survival and outcome (Patel 2005; Harris 2015).

A retrospective neuro-specialty ICU access study* found for a consecutive cohort of fifty-one critically ill ‘neuro’ patients requiring ICU care at a neuro-specialty centre, that four of fifty-one patients (7.5%) did not gain access to the ICU at a time when the ICUs were shown to be overcrowded in the neuro-centre. While the forty-seven patients who gained access to neuro-ICU received many timely neuro-specialty interventions to good effect, the four critically ill patients who did access the neuro-ICU, did not receive the required neuro-interventions required for outcome. The evidence is clear that critically ill patients who do not access neuro-centres have decreased survival.

Accordingly, increased neuro-ICU capacity resource is required for critically ill patients with brain injuries from neurological conditions.

*NIHR Research Bulletin Spring 2020; *Access of neuro critically ill patients to neuro-critical care in Ireland- does lack of capacity cause an access ‘lottery’?* R Sweeney, P O’Halloran, P Corr, D Nolan, M Power; Beaumont Hospital, Dublin

Appendix 1 - National adult ICU/HDU isolation room survey 2018 – Hospital returns

National Survey Adult ICU/HDU Infection Prevention and Control Isolation Rooms/ Facilities	Total number of ICU/HDU beds open/ operational	Total quantity of ICU/HDU bed-spaces closed/empty /non-operational	Total number of ICU/HDU beds and bed-spaces	Total number of open-plan open-floor beds/bed-spaces- No air management plant (No air filtration (HEPA)/ No air ventilation (12 air exchanges per hour)	Total number of open-plan open-floor beds/bed-spaces- Yes air management plant (Yes air filtration (HEPA)/ Yes air ventilation (12 air exchanges per hour)	Total number of cubicle/partition beds/bed-spaces- No air management plant (No air filtration (HEPA)/ No air ventilation (12 air exchanges per hour)) Ante-room with sink- No	Total number of cubicle/partition beds/bed-spaces- No air management plant (No air filtration (HEPA)/ No air ventilation (12 air exchanges per hour)) Ante-room with sink- Yes	Total number of Airborne Infection Isolation Rooms (AIIRs) with air management plant (Yes air filtration (HEPA)/ Yes air ventilation (12 air exchanges per hour)) WITH ante-room + sink	Total number of Airborne Infection Isolation Rooms (AIIRs) with air management plant (Yes air filtration (HEPA)/ Yes air ventilation (12 air exchanges per hour)) WITHOUT ante-room + sink
Dublin Midland Hospital Group									
StJames'	27	4	31	0	17	2 (Burns Unit)	0	12 (Comment 1)	
Portlaoise	3	0	3	3	0	0	0	0	0
Naas	4	0	4		3			1 (Comment 2)	

Tullamore	4	3	7	4	0	0	0	2	0
TUH	14	0	14	9	0	3	0	1	1
Ireland East Hospital Group									
Mater	29	7	36	0	0	25	10	1	
Navan	4	1	5	4	0	4	0	0	1
StVincent's	13	3	16	0	8	3	0	5	0
Mullingar	6	0	6	4	0	2	0	0	0
Kilkenny	4	0	4	4	0	3	0	0	0
Wexford	5	0	5	0	4 (Comment 3)	0	0	0	1
RCSI Hospital Group									
Beaumont	17	5	22	0	14	0	6	2	0
Drogheda	8	1	9	0	0	5	0	1	0
Cavan	4	1	5	4	0	0	0	1	0
Connolly	4	1	5	0	4	0	1	0	0
Saolta Hospital Group									

UHGalway	20	4	24	0	18	2	0	4	
Ballinasloe	5	1	6	0	3 (Comment 4)	0	0	0	5 (Comment 5)
Letterkenny	5	0	5	4	4	0	0	1	0
Castlebar	4	0	4	4	0	4	0	0	0
Sligo	5	0	5	3	0	1	0	1	0
South South West Hospital Group									
CUH- GICU	11	5	16	0	12	4	0	0	0
CUH- Cardiac ICU	6	14 (Comment 6)	20	0	10	0	6	0	4
Waterford	9	1	10	0	8 (Comment 7)	0	0	2	0
Mercy	5	1	6	4		2	0	0	0
Tralee	5	0	5	5	0	2	0	0	0
Clonmel	4	1	5	0	4	0	0	1	0
University Limerick Hospital Group									
UHL	17	11	28	0	0	0	0	13	15

Total	225	45	270	52	83	57	16	48	23

2018 Survey instrument forwarded to 26 Acute Hospitals

National Survey of Adult ICU/HDU Infection Prevention and Control Isolation Rooms/Facilities	
Hospital name:	Name of unit (e.g. CT/ICU, HDU etc):
Name of ICU Director completing form: Date of completion: __/__/__	
Total number of ICU/HDU beds and bed-spaces in your unit (open/operational + closed/empty/non-operational) = Row A = Row B + Row C	
Total number of ICU/HDU beds open/operational = Row B	
Total number of bed-spaces closed/empty/non-operational = Row C	
Total number of open-plan open-floor beds/bed-spaces- No air management plant (No air filtration (HEPA)/ No air ventilation (12 air exchanges per hour)) = Row D	
Total number of open-plan open-floor beds/bed-spaces- Yes air management plant (Yes air filtration (HEPA)/ Yes air ventilation (12 air exchanges per hour)) = Row E	
Total number of cubicle/partition beds/bed-spaces- No air management plant (No air filtration (HEPA)/ No air ventilation (12 air exchanges per hour)) Ante-room with sink- NO = Row F	
Total number of cubicle/partition beds/bed-spaces- No air management plant (No air filtration (HEPA)/ No air ventilation (12 air exchanges per hour)) Ante-room with sink- YES = Row G	
Total number of Airborne Infection Isolation Rooms (AIIRs) with air management plant (Yes air filtration (HEPA)/ Yes air ventilation (12 air exchanges per hour/ Yes positive and negative room pressure))	

WITH ante-room + sink = Row H	
Total number of Airborne Infection Isolation Rooms (AIIRs) with air management plant (Yes air filtration (HEPA)/ Yes air ventilation (12 air exchanges per hour/ Yes positive and negative room pressure)) WITHOUT ante-room + sink = Row I	
Confirm Row A = Row B + Row C = Row D + Row E + Row F + Row G + Row H + Row I = Row A = Total number of ICU/HDU beds/bed-spaces in unit (open/operational + closed/empty/non-operational)	Yes/No

Ends

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