Briefing paper- interim assessment of impact of various population management strategies in prisons in response to COVID-19 pandemic in England.

Prepared by: Dr. Éamonn O'Moore, National Lead for Health & Justice, PHE and Director UK Collaborating Centre, WHO Health in Prisons Programme (European Region).

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Summary:

- PHE have worked closely with HMPPS and NHS England to enhance social distancing, protect the most vulnerable, and increase compartmentalisation in prisons in England.
- Outbreaks of COVID-19 in prisons affecting staff and prisoners are being seen currently.
- But early emerging data collected by PHE suggests that the 'explosive outbreaks' of COVID-19 which were feared at the beginning of the pandemic wave are not being seen.
- Instead, there is evidence of containment of outbreaks.
- This may be driven by increased social distancing and compartmentalisation which has reduced the Reproduction Number (R0) to 1 or below.
- PHE have undertaken modelling which suggests that maintaining this reduction in social contacts will have a significant impact on the risk of infection in prison populations and consequences such as hospitalisation or death.
- Current data suggests that once containment of a specific outbreak in a prison has been achieved, incursion of new infections is driven primarily by new receptions and possibly by infected staff working in prisons.
- Reverse Cohorting Units are the best defence against incursions through newly received prisoners but there is work to be done to ensure they are available where needed and with sufficient capacity to meet the population flows now and in the near future.
- In the absence of a vaccine or effective treatment, risks of large outbreaks in the prison estate will remain. These risks may be escalated later in the year relating to relaxation of wider community restrictions, some return of normal police and court activities, with consequent impacts on prisoner flow which may exceed capacity of RCUs.
- The latter part of the year may also be complicated by risks from seasonal flu outbreaks.

Background:

During the current COVID-19 pandemic wave, PHE has worked closely with HMPPS to implement measures to save lives (prisoners and prison staff), protect the NHS (by reducing the number of people requiring specialist care in community-based hospitals), and enable continuing operation of the prison estate. The key concern at the start of the pandemic was the risk of 'explosive outbreaks' of COVID-19 in prisons with people living & working at close quarters in often over-crowded conditions at a time when the prison estate was at 97% of its operational capacity for population.

PHE advice aimed:

- **To enhance social distancing,**

- **To protect the most vulnerable**,
- and **to increase 'compartmentalisation' of the prison estate**.

Social distancing was enabled by a new instruction by HMPPS on March 24 to implement a restricted regime. This stopped all social visits, all education, training and employment activities (except for essential workers), all access to gyms, religious association and general association, and introduced restrictions on numbers of people unlocked, numbers of people in exercise yards at any one time, and supported enforcement of social distancing of 2M for staff and prisoners wherever possible. Intra-prison movement of prisoners was strongly discouraged and for specific areas with especially vulnerable prisoners, staff cross-deployment was advised against where possible.

The most vulnerable were identified through collaboration with NHS England and put into protective isolation initially but then into newly established Shielding Units.

Compartmentalisation was implemented at a macro-level by reducing significantly transfers between prisons with an order issued by HMPPS on March 31. Reducing movements between prisons was recommended to reduce risk of 'seeding' infections and subsequent outbreaks in prisons receiving infected prisoners. Within prisons, the most effective form of compartmentalisation is single-cell accommodation but it was recognised that this would require significant reductions in prisoner population to achieve across the prison estate (about 15,000 people was the estimate at the time the original advice was provided). But building on best evidence to protect the most vulnerable and reduce transmission of infection, new cohorting strategies were developed by HMPPS advised by PHE which were implemented from March 31. These included establishing:

- **Protective Isolation Units (PIUs):** to accommodate known or probable COVID-19 cases, ideally in single-cell accommodation.
- **Shielding Units (SUs):** to protect the most vulnerable identified through collaboration with NHS England, with enhanced levels of bio-security including dedicated staff;
- **Reverse Cohorting Units (RCUs):** to accommodate new receptions or transfers in for a period of 14 days to detect any emergent infectious cases before entering general population. These units could also accommodate any one returning from hospital (to prevent incursion of infection through nosocomial transmission).

Creation of all of the above units required time and head room and were implemented at a differential pace across individual prisons and the general estate but prioritisation was given to PIUs and SUs initially.

Impact of COVID-19 across the prison estate:

PHE have been collecting data from our Health Protection Teams (HPTs) and Health & Justice Leads on incidents and outbreaks of COVID-19 in prisons and other places of detention. Our data focuses mainly on prisoner cases as cases among staff are reported to HMPPS. We have also latterly gathered data on hospitalisations and deaths from COVID-19. We have shared and compared data with HMPPS and NHS England. There are some data differences due to reporting intervals, coverage of data collection processes and data sources, but the trends and impact assessments are in general agreement.

At the time of writing and over the recent period, access to testing for prisoners across the estate has been limited and variable. Therefore, the number of laboratory confirmed cases reported does not represent the true burden of infection in the prison system. During outbreaks, where a number

of positive laboratory samples have been received (usually around five or more) on prisoners who have been swabbed, then subsequent cases who meet the clinical case definition are included as 'possible/probable cases'. At the time of writing, PHE had stood up 146 separate Incident & Outbreak Control Team meetings responding to situations in 67 different prisons (See **Appendix 1**). PHE data showed there had been 227 laboratory-confirmed cases of COVID-19 diagnosed in prisoners in England but also over 1,385 possible/probable cases. Our data further shows that 29 people had been hospitalised for complications of COVID-19 infection, and 14 deaths were attributable directly or indirectly to COVID-19 infection. There is also some degree of regional variation in the data, possibly relating to regional variation in COVID-19 in the community but also potentially linked to other factors including prisoner movements into prisons.

But some emergent issues are being identified from this early data:

- Outbreaks are occurring in prisons but to date we have not seen the 'explosive outbreaks' which previous modelling suggested possible if mitigations not taken;
- While outbreaks continue to be reported, the frequency is reducing and the number of cases recruited to outbreaks over time is reducing indicating that the initial outbreak is being contained effectively. **Figure 1** illustrates this point at a macro-level, showing a decline in numbers of cases of COVID-19 in prisons in England over time.
- At prison level, we are also seeing evidence of control of identified outbreaks. **Figure 2** is an epicurve from HMP Littlehey provided as an example which is typical of many others- this shows that following an initial upsurge in cases (in both prisoners and staff), there is then a deceleration with falling off in recruitment of cases, especially among prisoners. This represents the impact of social distancing and isolation of infectious cases, leading to a reduction of the Reproduction Number (R0). Cases among staff are influenced both by prison and community prevalence of infection. But what is also noteworthy here in this example is that while cases in prisoners have been contained since April 10, cases among staff continue to be seen. In this instance, those later staff cases included staff who became ill while at work and in whom at least two were confirmed COVID-19 +ve (some results awaited at time of writing). This represents an ongoing risk of incursion of infection in the prison.

Figure 1: Cumulative frequency curve and 7-day moving average curve of cases associated with incidents and outbreaks of COVID-19 in prisons in England (Source: PHE Health & Justice).

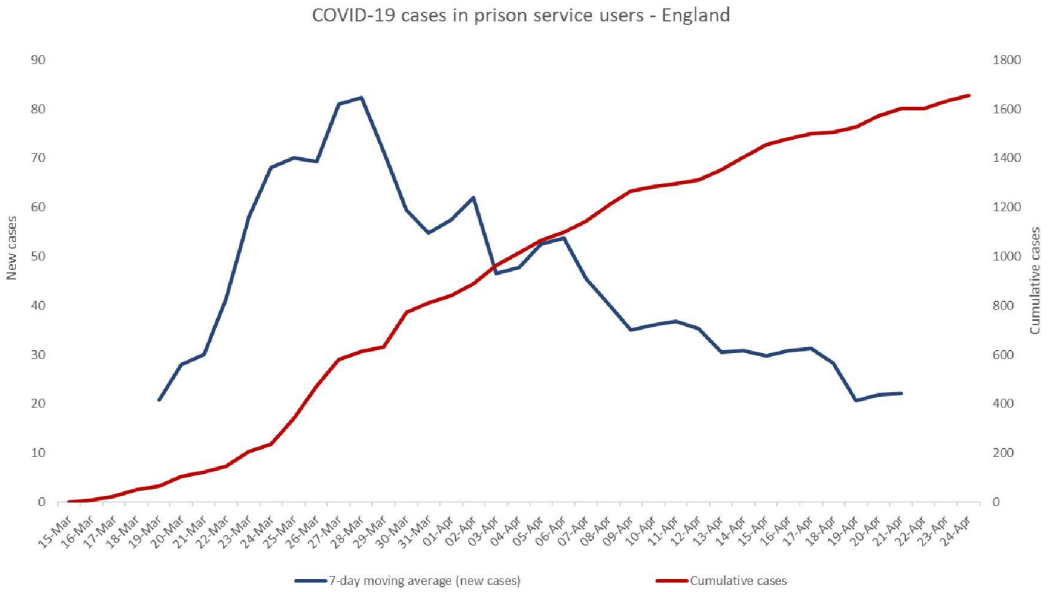
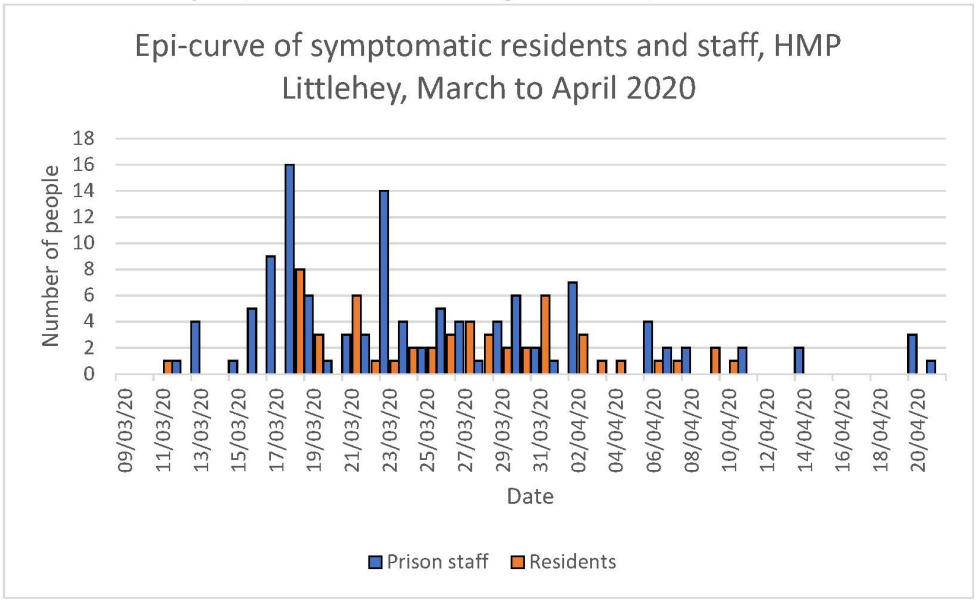


Figure 2: Epicurve of outbreak in HMP Littlehey showing onset of symptoms in prisoners and staff from March to April. (Source: PHE East of England Centre).



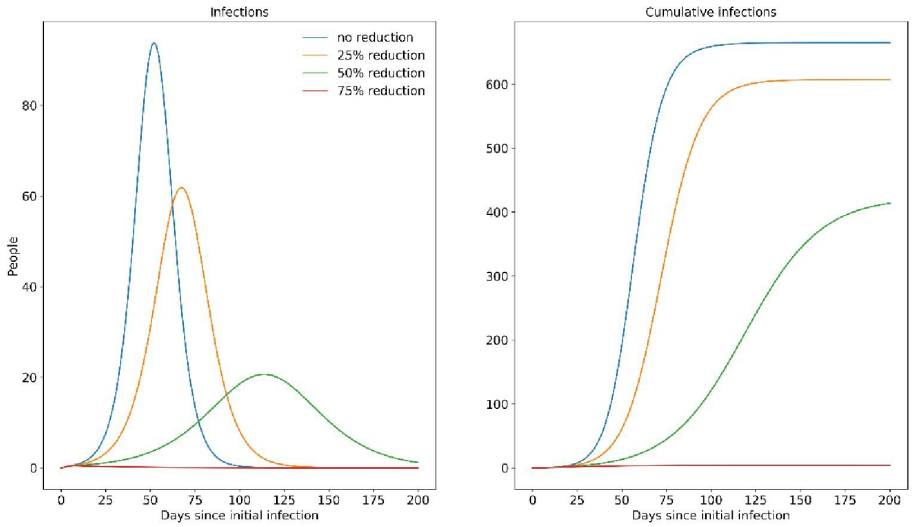
Analysis of current situation and PHE modelling:

From engagement with HMPPS nationally and through working with individual prisons at OCTs, PHE has been able to ascertain that as of 21 April, around 25% of prisons have fully implemented the compartmentalisation strategy, around half have implemented Protective Isolation Units and Shielding units in full, and around 35% have implemented Reverse Cohorting units. Further, there have been impacts on the prison population due to the wider impact of COVID-19 on the criminal

justice system resulting in fewer people being sent from courts to prisons. The total prison population has already fallen by over 2,400 between 28th February and the 17th April, creating in effect the 'head-room' required to implement the cohorting strategies recommended by PHE (although the impact is uneven across the prison estate with some prisons still experiencing significant population pressures). The impact of early release schemes has been much less significant to date in terms of population reduction.

PHE have undertaken modelling (full report available on request and previously provided to HMPPS) to understand the potential impact of reduced social contact on transmission of COVID-19 in prisons. Below we can present indicative graphs of how infections may develop over time in scenarios where contacts between people are reduced between 0% and 75%.

Figure 3: The effect of reduction in contacts between people in the transmission risk on infections in a prison of average (n=703) size.



PHE and HMPPS have made the reasonable assumption that compartmentalisation and other social distancing protocols has reduced contacts across HMPPS by up to 50% compared to the pre-pandemic regime. Further work to understand the true extent of the reduction is required and, whilst this is a best-case scenario estimate across the whole estate, individual prisons may have more or fewer levels of contact. Increasing social distancing impacts on the Reproduction number (R0) which is the number of cases generated by one case. PHE working with HMPPS have therefore undertaken new modelling of potential impact of COVID-19 on the prison estate in this new scenario where compartmentalisation has increasing social distancing by up to 50% and R0 has now been reduced to 1 or lower. Findings are summarised in **Table 1.**

Previous RWCS modelling (31/03/2020)		**Reproduction R_o[1]**	**Number of people infected**	**NHS bed required for Covid cases**	**Deaths (SAGE 2.7% fatality rate)**
No population reduction		3		3,300	2,300
4,000 population reduction				3,200	2,100
15,000 population reduction				2,700	1,800
Updated based on actual population reduction to date: 2,255 (81,454)					
No regime changes	100% contact	3	77,800	4500	2,700
Compartmentalisation strategy (Cohorting and shielding)	No regime changes	2	62,400	3500	1,900
Regime changes AND Compartmentalisation strategy (Cohorting and shielding)	Reduces contact by up to 50%*	1	2,800	200	100

Table 1: Modelling by HMPPS and PHE on reasonable worst case scenario and then escalating level of containment with compartmentalisation and regimen changes on numbers of people infected in prisons, hospitalisations and death rates due to COVID-19 infection.

Key findings:

- The impact of social distancing through regime changes and use of cohorting strategies is profound – reducing the R0 to 1 or less, with resultant significant reductions on numbers of people infected, and consequently rates of hospitalisation and deaths.
- Modelling shows that in an unmitigated scenario, 80.2% of infectious introductions into prisons result in outbreaks of greater than 5 cases. Compartmentalisation results in under half (44.3%) of all introductions resulting in greater than 5 cases, with additional regime changes reducing this probability further.
- The real-world experience of observed data to date supports that this theoretical model is being realised but we are at an early stage and further data collection is required before we can be confident that this is truly the scenario.
- Even with various measures suggested deployed, some large outbreaks will still occur through chance events.
- It has not been possible to model multiple outbreaks or 'peaks' because once there is transmission within a prison, this will outweigh any risk of importing an infection until the epidemic has been brought under control or reached its natural end. However, should a significant number of susceptible individuals remain within an institution's population following an outbreak, which is likely when intervention measures are in place, then

[1] The Reproduction number (R_o) is the number of cases generated by one case. An R_o of 3 means one case infects three more people.

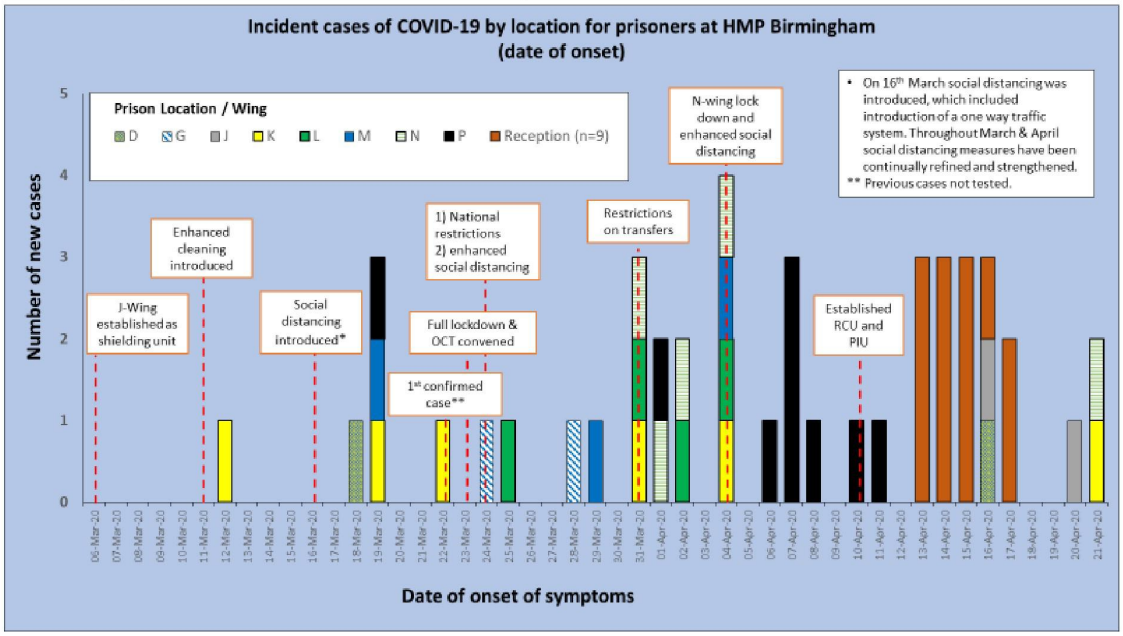
subsequent introductions could lead to additional outbreaks. Similarly, following an outbreak in an institution that has a high population turnover it is highly likely that the susceptible population may be sufficiently replenished to permit secondary outbreaks even where a substantial outbreak has already occurred.

- We have assumed that the modelled interventions are operationally delivered and sustained over time. We are not able to comment on the deliverability, nor on the potential wider impacts of restrictive interventions over time.

Future considerations:

While the current situation is cause for cautious optimism, significant threat levels remain. An example from practice is a recent outbreak in HMP Birmingham. **Figure 4** shows the 'epi-curve' from this outbreak, which documents cases among prisoners by wing over time and highlights specific interventions which represent implementation of increasing levels of control and compartmentalization. This has led to successful containment of the original outbreak, recognizing the delay from implementation to control because of the relatively long incubation period of up to 14 days. But the key note from this outbreak is that subsequent newly diagnosed cases have all come directly from reception. This demonstrates the point that following effective containment of a specific outbreak in a prison, risks of 'seeding' is driven primarily through new receptions. Therefore, highly effective reception screening protocols need to be in place to identify symptomatic patients as well as to enable effective quarantine for 14 days before being admitted to the general population. As more testing capability and capacity is evolved, this should be directed appropriately to RCUs.

Figure 4: Epicurve showing outbreak of COVID-19 in HMP Birmingham and associated control measures (Source: PHE West Midlands Centre).



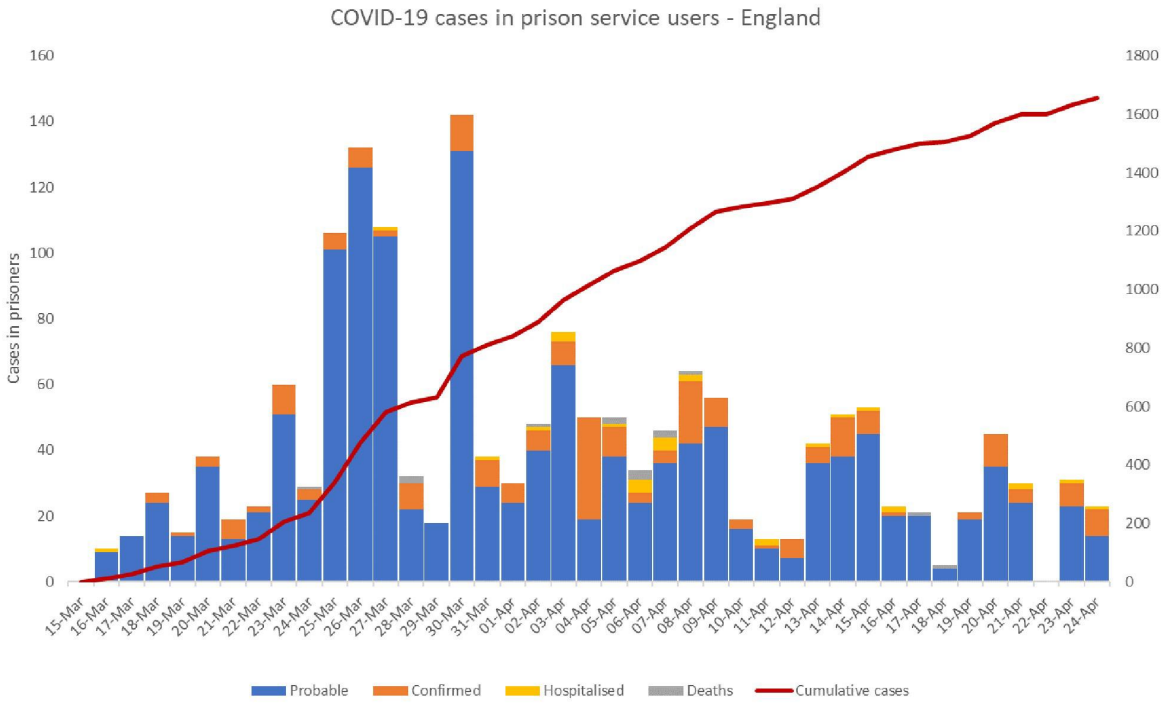
The risk of incursion of infection in prisons exists as long as COVID-19 is circulating in the community and we have no vaccine against it. This situation is likely to persist for at least the rest of the financial

year. While the level of prevalent infection in the community will likely wane over the summer months as the pandemic wave plateaus and then decreases, there will still be circulating COVID-19 virus and epidemiologists predict a risk of a second wave or even a third wave before we have a vaccine. These are important considerations for policy makers in determining how to lift current restrictions on normal life in the community but will also be a consideration for prisons going forward for the rest of this year. It is anticipated that Shielding Units will still be required for the remainder of this financial year. Further, that Protective Isolation Units will be required, although scale of need is difficult to predict and even with low level of COIVD-19 prevalence in the community, there can be large outbreaks in prisons. The latter risk is heightened significantly if and when strategies around social distancing and compartmentalization are relaxed which could be consequent to similar considerations in the wider community. And once prisoner reception flows and/or transfers return to nearer normal levels of activity, this risk is escalated.

The best defence against incursions of infection into prisons is to maintain RCUs going forward for the remainder of this financial year. This will be especially important as we enter the seasonal flu season from end September when there may be diagnostic challenges based on clinical presentation alone between influenza and COVID-19 infection.

Appendix One: Data on impact of COVID-19 collected by PHE National Health & Justice Team.

National Health & Justice Team, PHE data over pandemic wave period up to April 24, 2020:

Total Incident/Outbreak Control Team (I/OCT) meetings stood up by PHE in English prisons	137
Total establishments	67

Covid 19 cases in prisons by region - service users - England								
Region	**Probable**	**(%)**	**Confirmed**	**(%)**	**Hospitalised**	**%**	**Deaths**	**(%)**
East Midlands	100	7%	19	8%	2	7%	3	21%
East of England	115	8%	35	15%	4	14%	3	21%
London	146	11%	50	22%	2	7%	1	7%
North East	29	2%	2	1%	0	0%	1	7%
North West	202	15%	30	13%	9	31%	3	21%
South East	264	19%	19	8%	1	3%	0	0%
South West	111	8%	9	4%	0	0%	1	7%
West Midlands	298	22%	48	21%	6	21%	1	7%
Yorkshire & Humber	120	9%	15	7%	5	17%	1	7%
Total	**1385**	**100%**	**227**	**100%**	**29**	**100%**	**14**	**100%**