

Pandemic Influenza Briefing Paper: NHS Surge and Triage

NHS England

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1.0 Purpose

The purpose of this paper is to provide an update to Chief Medical Officer (CMO) and the Chief Scientific Advisor (CSA) on continuing refinement of the knowledge and understanding behind the potential decision that may be required in a future extreme pandemic influenza scenario to move to a state of population triage across the country in response to severe and sustained pressures across the NHS.

Further detail about the operationalisation and implementation of this process is included in the service-facing draft guidance which is being further developed by NHS England; this paper does not therefore replicate that content.

The majority of the detail in this paper will not be replicated in any publically available documentation and this must be borne in mind when sharing this paper beyond its initial intended audience. This is in part due to the continually evolving nature of such data given the way NHS care is evolving; data could rapidly become less accurate (eg baseline numbers of procedures performed, bed types available etc). As such, the numbers provided should be seen as illustrative and updated figures will be produced as and when required in response to a pandemic.

A number of biological caveats also need to be considered, including the uncertainties around how and when a future pandemic may present, and the population age / risk groups who may be most affected. Additional caveats are set out and explained within the paper where relevant. This paper is current as of July 2017.

2.0 Introduction

In an extreme influenza pandemic scenario, it is expected that NHS services will come under immense pressure, and difficult decisions will be needed about maintaining patient access to care. Work is ongoing at NHS England towards developing guidance for the NHS to enable appropriate frontline decisions about patient care, and that clinicians are supported to do so. This work is underpinned by discussions with ethical, legal and regulatory colleagues, as well as with clinicians and appropriate professional bodies.

This paper is comprised of three main discussions:

- excess deaths at the peak of a pandemic, including a table of highest number/ impact Healthcare Resource Group (HRG) codes for areas associated with services that could be affected
- surge capacity implications during an extreme influenza pandemic scenario
- the potential impacts of suspending various routine activities

It completes with an outline of the expected decision making requirements at national and local level.

There is significant discussion in the paper about ceasing or changing care to patients in the HRG categories; however a decision may more appropriately be taken to treat patients in the listed HRG groups rather than influenza patients, dependent upon likelihood of survival. This is further discussed in the paper and is an example of a feature that will be very much dependent on the pandemic epidemiological profile.

The role of NHS Improvement is not considered in this paper, however discussions are underway to understand their role in preparing for and responding to an influenza pandemic, both in support to the NHS and as a standalone organisation in maintaining their own core functions. Similar discussions have commenced with the regulators.

3.0 Population triage at the peak of the pandemic – potential excess deaths

This section addresses the potential for excess deaths in patients not suffering from pandemic influenza in the peak of a pandemic where normal hospital operations (such as level three care) are unable to be provided. This is the point at which population triage and triage by resource would be required due to the overwhelming demand on hospital services.

Patients would be assessed on probability of survival rather than clinical need, and higher level services would no longer be provided due to the need to redeploy nursing and medical staff to support ward care impacted by increased patient acuity and likely staff shortages. The move to population triage would require ministerial approval and would only be invoked once all capacity in the NHS was exhausted.

The data has been provided by NHS England National Clinical Directors (NCD) and Clinical Reference Group (CRG) Chairs, who were asked to identify the highest number/impact HRG codes for their speciality areas. They were asked to provide current and increased mortality rates if hospital admission was denied or curtailed based on either historical data or, in the absence of this, a clinical best estimate or international data.

Table 1 lists the HRG codes that have been identified as highest number/ impact speciality areas associated with NHS services that could be affected during a pandemic. The excess death rate is indicated in the second column, and the 'life years lost' are calculated using the data in the third column as per the following caveats: assuming approximately a 75 year life span, first child aged 30. The mortality figures are extrapolated from developing world data.

From this, it can be concluded that perinatal/ maternity care plus childhood care being protected would have the greatest benefit and should be maintained as much as is practicable. For most other HRGs, the numbers of life years lost are much lower due to many of them being life-limiting in their own right.

Table 1. Highest ranking/ impact speciality areas that could be affected in a pandemic, with an estimation of the cost of ceasing the service in terms of 'lost years of useful life'

HRG	Baseline deaths per week	Additional deaths per week		Additional life years lost
Perinatal deaths*		1,203	x 75	90,225
Maternal deaths		668	x 45	30,060
Childhood asthma**		304	x 65	19,760
Polytrauma ¹	43	245	x 40	9,800
Pneumonia		317	x 20	6,340
Heart failure ²	2163	3,029	x 2	6,058
Diabetic ketoacidosis		100	x 40	4,000
Myocardial infarction ³	113	169	x 20	3,380
Hip fracture ⁴	115	462	x 5	2,310
Stroke ⁵	185	278	x 5	1,390
Urosepsis		270	x 5	1,350
COPD ⁶	600	553	x 2	1,106
Vascular		105	x 10	1,050
Emergency bowel surgery		103	x 10	1,030

* perinatal deaths is a surrogate term for SCBU and NICU. ** childhood asthma is a surrogate for PICU. ,³ for the UK. 91 baseline deaths and 139 additional deaths for EnglandRare conditions are numerically too

small in number to practically be factored into these considerations.

Immediate survivability of patients in these HRG groups without the usual treatment will vary, and there are differential outcomes in terms of quality of life as well as subsequent life expectancy.

Total excess death rate would be in excess of 7,806 per week of the peak of the pandemic if all these services were stopped. So in the peak six weeks of a pandemic (recognising the typical profile of increasing and decreasing case numbers either side of the peak weeks), 46,836 excess deaths could be expected. On the one hand, this is likely to be an underestimate as it only considers the top 14 HRG codes and it does not take into account additional deaths occurring particularly in the elderly and frail across primary care where HRGs are not coded. However, in practice we would not expect that hospitals to cease all these treatments. These deaths would be in addition to the 500,000 excess deaths from pandemic influenza over the period of a severe pandemic.

4.0 Suspension of activity

4.1 HRG activity suspension

Suspension of some areas of core, routine NHS activity (as outlined in **Table 1**), could potentially, at least in the short term, result in some reduced mortality as patients would not be exposed to the risk of intervention. Cancelling elective day case activity (e.g. gastroscopy) or diagnostics (e.g. radiology) would happen earlier in a pandemic before the extreme surge activities were required. While this may release some resource, it would rapidly be subsumed within local NHS organisational plans to respond to and manage pandemic influenza pressures, and it is not appropriate to analyse specific or individual elective activities to the same degree of detail as the HRG analysis. Potential impacts on morbidity / mortality may occur, and in the short term could be addressed through urgent or acute patient presentations or through medium to long term catch-up screening campaigns etc. after the pandemic ends.

While potentially removing a risk of exposure to influenza in a hospital setting, those patients with the higher risks undergoing elective surgery will largely be the frail and elderly (e.g. orthopaedics) and those with long term conditions (eg cardiovascular surgery); both these groups may be more susceptible to a pandemic virus, or a subsequent secondary bacterial pneumonia.

It is not feasible or, more importantly meaningful, to attribute staff time and/ or resource to each HRG. Whilst the average bed days for a patient with an illness could be calculated based on extrapolating assumed staffing to bed number ratios, this does not in reality reflect the complexity of NHS services (for example how staff may work in different settings during a morning compared to an afternoon, how services are provided differently across the NHS landscape). Furthermore, it may be more appropriate, depending on the pandemic, to redeploy staff who may be released if the patients if these conditions were not admitted to provide supportive care in the community. Each HRG is staffed by a different skill mix within the disciplines of surgery and medicine. It could be argued that medics / medical nurses would have skills sets better aligned to the acute needs of the NHS during a pandemic, but the focus may more appropriately be on those patients needing 'best supportive' care. While suspending HRG activities would release some staff, the bed base will be subsumed into the overall pandemic influenza response and therefore would not necessarily be available for other purposes.

Ceasing any HRG activities would need to be decided in a flexible manner and it is not possible to set out in advance, a pre-defined order in which HRGs would be stepped down or stopped. The local impact of a pandemic on NHS staff and the specific profile of a future pandemic is likely to dictate where demand is likely to overwhelm resource, leading to local decisions which services are most appropriate to continue or cease depending on the age / risk group profile of the most susceptible portions of the population.

4.2 Critical care surge

The baseline NHS capacity for critical care is around 3,500 ventilated beds. Increased demand for critical

care beds above this (nominally by doubling capacity up to 7,000 ventilated beds) can be met through using areas within hospitals that are not usually used for long-term provision of such care (eg theatre recovery areas, operating theatres etc). These services would not be able to be maintained for long periods of time due to restrictions of staffing, consumables, pharmaceutical and physical space resources. In the 2009 pandemic, the NHS estimated critical care capacity could be doubled for up to a maximum of two weeks, though having significant impacts on other services (discussed later in this paper) however this was not necessary in the 2009 pandemic and so has not been tested in action.

The point at which treatments other than simple ventilation, inotropes and fluids are not able to be supported will depend upon what is happening to the staffing in the critical care unit and wider hospital. Areas where critical care is surged into will not be capable of offering higher levels of care than simple ventilation, but until surge is running at about 50% of normal critical care capacity, the main intensive care area might be able to still offer haemofiltration. The trigger point within these surge plans for moving to the withdrawal of permanent ventilation would be when there is no more capacity and increasing numbers of patients present who are likely to require it. This could be nominally set as when bed occupancy is approaching the 6,500 mark of the 7,000 enhanced capacity for ICU beds, however this would in reality need to be regularly reviewed and adjusted to reflect the pandemic profile. Once there are more patients presenting who would normally require ventilation than the surge capacity of the region then no more patients would be offered ventilation. As patients are discharged or die, if the number of patients requiring ventilation continues to exceed maximum surge capacity then critical care staff would be redeployed to ward areas to support higher levels of ward care (see below). If the numbers of patients are overwhelming then it may be necessary to suspend critical care to support the wards, see below.

If critical care was discontinued, it could be expected that approximately 4,800 critical care admissions per week would die resulting in a potential total of 28,800 excess deaths over a six week peak period. Further potential excess deaths due to changing service delivery in a pandemic are set out in the following section. Adding the top 14 HRG code potential excess deaths as outlined in section 3.0, equates to a potential total of 12,606 excess deaths per week and a potential total of 75,636 over a six week peak pandemic period. If excess primary care deaths not otherwise counted are also factored in, this figure could be rounded to 100,000 deaths over a six week period.

Capacity surging of NICU and PICU facilities will take place within wider intensive care surge arrangements, and it is likely that PICU provision maybe maintained for longer than NICU or adult ICU care through redeployment of adult intensivists, as this presents the biggest potential impact in terms of potential life years lost.

4.3 Ward surge

The resources that would be gained from suspending some HRG activities can be simply summarised or calculated as follows:

- each theatre closed would free up a couple of nurses, an anaesthetist and a couple of surgeons
- each out-patient clinic would free up a clinician and possibly a nurse or health care assistant (HCA)

However, the suitability of the staff that are released through this activity to support an influenza response would depend on a number of factors, such as the speciality and whether or not they could be redeployed into other areas of secondary care or community services to bolster capacity. There are also implications for professional regulation and indemnity that need to be addressed, in addition to supporting staff competency and confidence in different roles

Model hospital data indicates that in most general hospitals roughly 50% of the staff/wards are surgical. Therefore, stopping elective surgery at the height of the pandemic would result in a rough doubling of capacity to admit to an acute bed.

Intensive care beds represent a very small percentage of the overall hospital bedstock, but have a proportionally high staffing ratio with an average of six nurses per level three bed and three per level two bed. Therefore ICU beds would contribute relatively little additional bed availability if such provision was ceased, but do have the potential to provide staff to ‘prop up’ ward staffing if there were significant staff shortages due to sickness.

As an example, a 600 bed hospital would have roughly 12 level three beds and 6 level two beds supported by 90 nursing staff. If it is assumed that an average acute ward has 35 nursing staff to care for 24 to 30 patients, then the ICU staffing of 12 beds equates to staffing for three acute wards. These figures are based on 2014 NICE safe nursing establishment review data¹. These ICU nurses could be used to support surgical ward nurses with sick medical patients. Furthermore, releasing health care assistants into the system early in a pandemic would be of limited use compared to the use they may be able to add in a palliative care scenario, whereas releasing intensive care nurses early in a pandemic would have a more significant impact due to their relevant training.

The pool of staff freed up from theatres is much smaller and they would not have ward nursing experience but could be deployed to medical wards supported by ward nurses. Approximately a third of the nurses in most acute sites are described as ‘health care of the elderly’, which is essentially acute general medicine. These would remain supporting that care.

4.4 Primary care activities

Initial thoughts around what primary care services could be suspended and those which must be continued are set out in the following table (Table 2). A change in patient health seeking behaviour is likely to see a change in demand for certain treatments, and demand for other primary care services (such as dental and optometry) will diminish significantly, freeing up potential capacity from clinicians. Services in demand may need to be delivered differently, eg through telephone, email or video consultation, through nurse-led services, or provided through creating greater pharmacist autonomy. Finally, support will be required from other sectors as well as an awareness of the whole of health response locally to ensure primary, secondary and social care providers are working in concord and not conflicting each other (eg through primary care continuing to send patients with acute fractures to hospitals, when the acute sector is unable to support this).

Table 2. Primary care suspensions and priorities

Priority to maintain...	Could be ceased...
<ul style="list-style-type: none"> • Managing infections, e.g. sepsis, cellulitis, meningitis and influenza • Acute and urgent illnesses and traumas, e.g. fractures, acute abdominal pain • Palliative, pain management and end of life care 	<ul style="list-style-type: none"> • All routine Dental / optometry services • Management of chronic disease • Low level mental health care • Learning difficulties • Routine diabetes screening • Musculoskeletal care • Preventative care (eg vaccination) • Dementia diagnosis, old age/ frailty management

4.5 Activation and Deactivation of Primary and Secondary Care Activities

The following table, Table 3 outlines activities that could be activated and deactivated in primary and secondary care through an escalation of pandemic influenza surge response. This is further elaborated in

¹ www.nice.org.uk/guidance/sg1/chapter/1-recommendations

Appendix 1. These two tables are taken from the current draft of the NHS England guidance for the NHS on pandemic influenza surge and escalation. Drilling down into any more detail would be counter-intuitive as the flexibility to adjust the response is essential in the face of a pandemic of unknown presentation. At the request of CSA/CMO, a figure has been developed that illustrates the information in the table and relevant points elsewhere in this document (Figure 1).

Table 3. Activation and Deactivation of Primary and Secondary Care Activities

STAGE	ADDITION		REMOVAL	
	PRIMARY CARE	SECONDARY CARE	PRIMARY CARE	SECONDARY CARE
Steady state baseline standard surge arrangements	Review plans and processes Be prepared to activate surge and escalation plan	Review plans and processes Be prepared to activate surge and escalation plan		
↓				
Severe winter pressure surge arrangements	Implement business continuity arrangements Increased support to nursing/care homes	Implement business continuity arrangements Increased support to nursing/care homes	Reduce/delay non-essential services	Reduce/ delay non-essential services: eg outpatient appointments
↓				
Mild influenza pandemic surge arrangements (may not need all severe winter actions)	Training to enable staff to undertake additional/ alternate roles Collaborate with other practices	Training to enable staff to undertake additional/ alternate roles Review operational arrangements within the trust, eg to cohort patients, create flu ED etc	Reduce availability of face to face consultations, increasing telephone management.	Reduction in services: eg orthopaedics, urology and gynaecology
↓				
Moderate influenza pandemic	Identification of additional staffing requirements Urgent referrals on a 'probable' diagnosis rather than 'likely diagnosis' Support and expand end of life facilities	Identification of additional staffing requirements Urgent referrals on a 'probable' diagnosis rather than 'possible' diagnosis Support and expand end of life facilities	Reduction in non-urgent services	Reduction in non-urgent services: eg general surgery, ENT and vascular surgery As situation develops - Reduction in services eg cardiac and cancer surgery
↓				
Severe influenza pandemic surge arrangements	Undertake triage of patients by resource Increased supportive/	Undertake triage of community patients by resource Increased		



Figure 1. Illustrative representation of activities during escalating periods of pandemic influenza surge

Consult with	Critical care capacity	Phase	
Ongoing discussions with DH (Sofs, ministers), professional bodies, staff, legal, regulators etc.		Severe pandemic	<ul style="list-style-type: none"> • Cease ventilation • Withdraw ventilation • Triage commences • Maintain maternity, perinatal and childhood as much as possible throughout the whole pandemic
	7,000 increased capacity reached	Moderate pandemic	<ul style="list-style-type: none"> • ~6500 critical care beds – decision to move to triage • Reduction in non-urgent primary care appointments e.g. routine dental, optometry, diabetes screening, chronic disease management etc. as per Table 2 • Reduction in non-urgent secondary care appointments e.g. general surgery, ENT, vascular surgery, gastro, audiology; ten reduce cancer and cardiac surgery
	3,500 business as usual capacity reached	Mild pandemic	<ul style="list-style-type: none"> • Reduce face to face consultations in primary care, increased phone/ remote management and care • Reduced secondary care service, e.g. orthopaedics, urology, gynaecology
		Severe winter	<ul style="list-style-type: none"> • Reduce/delay non-essential services in primary and secondary care e.g. some outpatient appointments
		Baseline	<ul style="list-style-type: none"> • Business as usual

The NHS is not uniformly structured, as it has evolved to meet the needs appropriate to local populations. Outpatient services could expect to be ceased, but released resource will look different in different localities (eg some services may be in separate buildings, or held on wards; staffing skill mix will vary, for example many clinics may be supported by HCAs who may not have the appropriate skills to care for influenza patients). Additionally, acute medical clinics will be delivered differently in all trusts, and specialised staff (eg orthopaedic nurses) may not have the competencies to care for respiratory patients. This local variation prevents prescriptive national dictation of exactly what should or could be stopped as the specific local knowledge is key to ensure the most benefit for the most patients. Additionally, a decision may be taken to preferentially treat patients in the listed HRG groups rather than influenza patients, dependent upon likelihood of survival.

At the extreme peak of a pandemic, the over-riding principle may be to only provide supportive care (eg

giving medication, oxygen, fluids, and encouraging oral intake) This is a generic skill and one that most (if not all) staff should have regardless of their usual area of specialty. Specialised care will in all likelihood have been significantly reduced if not completely ceased.

Underpinning principles that could outline the scope for local decision making, based on those discussed with BMA ethics committee and others around doing the greatest good for the greatest number, can be further refined once the epidemiology of the pandemic is known, based on this paper and other resources such as the Committee on Ethical Aspects of Pandemic Influenza (CEAPI) guidance².

5.0 Decision making

The Secretary of State for Health and other Ministers will be asked to decide that population triage can be enacted. This will allow NHS England to allow clinicians in local hospitals to make appropriate decisions about providing care to those patients who will benefit the most in a situation where the system is under extreme and unprecedented pressure.

The request for such a decision will be informed by insight from NHS England, NHS Improvement, the frontline and DH, as well as specialist advisory bodies established in response to a pandemic. Consideration will need to be taken as to whether such a decision is made at England level or nationally across all four UK countries.

Such a decision to move to population triage will effectively be an extension of the usual routine and daily clinical decisions made by clinicians regarding admissions and discharges. However, rather than decisions being made on a basis of triage by clinical outcome, triage by resource availability will also inform the decision. The decision to move to population triage will serve as a trigger to implement changes to the regulatory landscape, allowing the professional regulators to communicate to their registrants any amendments to their code of practice, reflecting the severity of the pandemic. Some decisions will be organisationally enacted by a hospital, for example if a decision is taken to cease all support to particular HRG group.

The Secretary of State for Health will NOT be required to make clinical decisions, decisions about support for specific disease areas, or decisions about individual patients.

Population triage will be enacted for the shortest period possible, and will be regularly reviewed such that it can be ceased as soon as possible.

5.1 Ethics

The ethical aspects underpinning this area are covered by DH published guidance from 2007 that was developed by the Committee on Ethical Aspects of Pandemic Influenza (CEAPI). These have been reviewed subsequent to the 2009/10 pandemic and it has been agreed that they remain fit for purpose. In a pandemic, it will be appropriate to review them again, and specific ethical aspects may need to be debated should a more severe pandemic arise than that seen in 2009/10.

5.2 Supporting the response through Legislation and Regulation

The concept of a pandemic influenza bill has been discussed within health and across government. A number of aspects of legislation and regulations are being considered that could be amended during

²http://webarchive.nationalarchives.gov.uk/20100407210045/http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_080751

pandemic in order to enable a more effective response. These include things around teacher/ carer to child ratios, death certification, and regulations around clinicians returning to the NHS after leaving the service for retirement or other reasons.

Localism could be removed from the NHS response to some extent if there was a requirement for staff in one trust to be redeployed to another; for example, if a pandemic wiped out the midwifery department of trust A, the service could be 'propped up' by staff from trust B if the decision was that maternity services should be the last to cease, and such transfer of staff was enabled through legislation and regulation, such as the invocation of section 252a, Health & Social Care Act.

6.0 Next Steps

The development of the clinical facing guidance and associated briefing to DH and central government will continue into 2017. A number of steps are planned towards delivery of guidance that is useful and meaningful for healthcare professionals:

- Continue to refine the service-facing guidance
- Consider whether further ethical engagement is needed through CEAPI
- Socialise further with Academy of Medical Sciences
- Socialise with Presidents of the Royal Societies
- Review again with BMA Ethics committee
- Review with legislators/ regulators
- Review with professional bodies
- Develop appropriate communications as required around this specific piece of guidance

Appendix 1. Sequential steps for managing surge and escalation in NHS organisations

STAGE	PRIMARY CARE	COMMUNITY CARE	SECONDARY CARE	999	111	COMMISSIONERS
Steady state: baseline standard surge arrangements	<ul style="list-style-type: none"> -local admission and referral criteria apply -review plans and processes -be prepared to activate surge and escalation processes 	<ul style="list-style-type: none"> -local admission and referral criteria apply -review plans and processes -be prepared to activate surge and escalation processes 	<ul style="list-style-type: none"> -local admission and referral criteria apply -review plans and processes -ED redirects on ad hoc basis -use of mutual aid -be prepared to activate surge and escalation processes 	<ul style="list-style-type: none"> -local admission and referral criteria apply -review plans and processes -be prepared to activate surge and escalation processes 	<ul style="list-style-type: none"> -local admission and referral criteria apply -review plans and processes -be prepared to activate surge and escalation processes 	<ul style="list-style-type: none"> -review plans and processes -routine monitoring
Severe winter pressure surge arrangements	<ul style="list-style-type: none"> -comms campaign to direct patients to 111, developing clinical advisory service through NHS 111, encouraging self-care, triage. -reduce/ delay non-essential services -implement business continuity arrangements -potentially patients under primary care who would normally be admitted (eg discharged earlier than usual) -increased support to nursing/ care homes to reduce admissions to secondary care 	<ul style="list-style-type: none"> -comms campaign to direct patients to 111, self-care -reduce/ delay non-essential services -implement business continuity arrangements -potentially patients in community care who would normally be admitted (eg discharged earlier than usual) -increased support to nursing/care homes to reduce admissions to secondary care 	<ul style="list-style-type: none"> -increasing requests for redirects, potentially less frequently granted -implement business continuity arrangements -increased oversight of pressure within organisation, including through dashboards of metrics -comms campaign to direct patients to primary care/ 111 -reduce/ delay electives -change outpatient clinic profile: reduce/ delay routine/ low priority outpatient clinics, increase 'hot clinics' to address specific areas of demand to reduce ED presentations/ admissions -reduce/ delay non-essential services -support from private sector/ voluntary sector -national management of ECMO services -activation of surge plans -step down of critical care patients to other areas of acute care to release capacity -increased support to community care/ nursing/ care homes to maintain in the community 	<ul style="list-style-type: none"> -use of REAP, DMP and other escalation plans to prioritise calls -implement business continuity arrangements -promote alternative care pathways to patients -use alternative care pathways to reduce/ adjust demand profile across NHS 	<ul style="list-style-type: none"> -additional staffing -implement specific alternative pathways to respond to call types -implement business continuity arrangements -promote alternative care pathways to patients -use alternative care pathways to reduce/ adjust demand profile across NHS 	<ul style="list-style-type: none"> -command and control of the system -consider redeployment of staff (geographically or service wise) -increased oversight of pressures at local level, implementation of dashboards/ reporting -CCGs hold daily/ weekly calls with providers to understand pressures/ mitigation activity -NHS England daily/ weekly calls with CCGs and other local system management groups, eg system resilience groups -consider altering commissioning arrangements to increase appropriate social care spaces -increasing use of private social and

STAGE	PRIMARY CARE	COMMUNITY CARE	SECONDARY CARE	999	111	COMMISSIONERS
						health care capacity -encourage appropriate patients to have pneumococcal vaccination
Mild influenza pandemic surge arrangements (may not need all severe winter actions)	-decision support tools to enable staff to undertake additional/ alternate roles -primary care services develop hub / spoke model to collaborate with other practices. Work geographically/ remotely with community / social care teams to target vulnerable. -Develop clinical networks to better deliver services for influenza infected patients; acute care / chronic and visits etc -Reduction in non-urgent services - provide best supportive care for bereaved / distressed patients/ families	-training to enable staff to undertake additional/ alternate roles	-increased management of patient flow within networks/ sectors/ regions -increased repatriation of patients from respiratory services to DGHs -training to enable staff to undertake additional/ alternate roles -potentially cohorting patients -potential increased non-invasive ventilation for respiratory patients	-use of pandemic flu algorithm	-use of pandemic flu algorithm -link to NPFS	-system command and control implemented -communications to the system and partners -system intelligence – data collation through Unify etc. to inform local/ regional/ national decision making -activate pandemic specific response arrangements (e.g. NPFS/ ACPs) -enact pandemic flu plans
Moderate influenza pandemic	-reduction in screening services. Increased	-reduction in some non-urgent services -increased caring for	-maintain triage by outcome - use of respiratory specific triage-tools where appropriate (e.g. SOFA, CURB-65)-alternative access for patients with	-identification of additional staffing capacity -	-identification of additional staffing capacity - retired/	-authorises activation of all surge interventions to be

STAGE	PRIMARY CARE	COMMUNITY CARE	SECONDARY CARE	999	111	COMMISSIONERS
surge arrangements	<ul style="list-style-type: none"> mobilisation of workforce to care for those ill at home, who would normally be in secondary care -identification of additional staffing capacity – retired/ students -clinical management on a 'probable' diagnosis rather than 'likely' diagnosis, reducing requirements for diagnostics / secondary care referrals -end of life care facilities supported and expanded if possible 	<ul style="list-style-type: none"> patients who would normally be in secondary care -identification of additional staffing capacity – retired/ students -end of life care facilities supported and expanded if possible 	<ul style="list-style-type: none"> possible/probable influenza avoiding ED unless severely ill and requiring sepsis management and resuscitation -manage some patients who would normally be admitted throughout-patients clinics-maximise acute ward capacity -all non-essential services (all out-patients including cancer services, rehabilitation and general medicine) cease on a temporary basis -maintain critical services only (eg intra/ peripartum care, lifesaving emergency surgery, dialysis) -identification of additional staffing capacity - retired/ students -ECMO escalation implemented -end of life care facilities supported and expanded if possible -adjusted staff : patient ratios -move towards less resource-intensive models of care/ restrict access to resource-intensive care models -children cared for in adult beds - particularly ICU; patients cared for in DGHs rather than specialist trusts (especially paediatric ICU) 	retired/ students	students	<ul style="list-style-type: none"> implemented locally as needed -all senior staff to support front end NHS service and patient flow
Severe influenza pandemic surge arrangements	<ul style="list-style-type: none"> -undertake triage of community patients – by resource rather than by outcome -increased supportive/ end of life care 	<ul style="list-style-type: none"> -undertake triage of community patients - by resource rather than by outcome -increased supportive/ palliative care 	<ul style="list-style-type: none"> -triage by resource rather than by outcome -provide active critical care treatment for those acutely ill from all conditions irrespective of age, who are clinically assessed as far as possible having a greater than 10% chance of survival -three wise men discussions -increased supportive/ palliative care -rigorous exit strategies from critical care/ other admissions -reduction in complex interventions and re-focus on resource low interventions 	As above	As above	As above

Annex: Pandemic Influenza Patient Triage Scenarios

The patient case scenarios in the table below are examples of the routine cases that clinicians will need to make decisions about providing treatment or admission to in a period of severe influenza pandemic surge. Staff will be required to work under conditions where demand far exceeds resources. Clinical decisions regarding admission will be based on principles of resource triaging, working on a utilitarian principle determining how the greatest number of patients can benefit from the available resource. In this situation there will be a resetting of the expectations of provision of healthcare and recognition that not all patients will receive the level of treatment that they would under non-extreme pandemic circumstances.

The following scenarios provide some narrative about whether the patient is likely to be offered a bed when inpatient resources are severely constrained and with limited intensity of what can be offered. Where a patient is not admitted, or discharged following only partial treatment, the expectation would be that they would be supported as best as possible in the community, with the priority on providing humanitarian support, analgesia and dignity.

Patient Case Scenario	Notes to consider during 'resource triage'.	Does a scoring system exist (that could be adapted) to estimate prognosis on presentation?	If not treated in hospital, what resources may be required, where might care be provided, and by whom?	Average Length of Stay (ALoS) in hospital if admitted and resources required (e.g. doctors, nurses, theatre, ICU)	Likelihood of being offered a bed and why?
Teenager with Acute Appendicitis	An acute illness which left untreated could result in peritonitis and death within a few days. Significant Life years lost	Scoring systems only exist to predict the presence of appendicitis, not the ability to treat patients conservatively.	Non-complicated appendicitis can be treated with IV antibiotics but would require regular assessment not easily delivered in community 30% of patients treated conservatively fail, requiring surgery	ALoS: 3-5 days in uncomplicated case. If complex case could be as long as 3 weeks. In hospital care – benefits from paediatric surgical experience.	Highly likely to be admitted, though with early discharge (e.g. within 24hrs) to reduce risk of acquiring infection (e.g. flu). Rapid appropriate management offers significant advantage in survival and reduced morbidity.
72 year old female, fallen from a nursing home bed and likely Fractured Neck of Femur. Carers are in attendance.	Life years lost limited impact (life expectancy could be < 10yrs).	Nottingham Hip Fracture Score (NHFS) estimates 30-day mortality for patients having surgery and good nursing care. Based on literature around quality	Intensive nursing and carer needs to manage patient's pain in bed.	ALoS: 14-21 days Possible 2 days inpatient and care back in community.	Unlikely to be prioritised for admission, although resources required in community to support dignity in end of life pathway.

		conservative management, mortality with constrained resource > 50% mortality			
30 year old male, Road Traffic Accident and a # femur in need of a nail insertion.	Will need theatre time but ultimately survivable	Estimate survival probability using the "Injury Severity Score"	Limited conservative management available - strong analgesia and Thomas' splints + nursing care. Risk of severe pressure sores within 48 hours. NB. Limited capacity to teach family and carers how to manage in community.	ALoS: following Nail insertion NEXT day discharge is possible.	High mortality untreated (c.f. example of Pre WW1>80% mortality) Option to admit for intramedullary nail to stabilise and discharge home (potentially next day discharge).
30 year old female healthcare worker, sepsis (circulatory infection leading to multi organ failure)	During height of pandemic no inotropic support limited value in going to hospital would consume bed days. Definition of sepsis is not clear, could be caused as a result of pneumonia	CURB65 indicative patient score 3	Home resources may include IV antibiotics, (possibly IV Fluids and Oxygen) but more likely community resources limited to oral antibiotics – therefore high death rate.	ALoS: uncomplicated cases 48-72 hours. In severe pandemic circumstances if patient responds to treatment after 48 hours could then be discharged. Would need doctor, nurse..	Likely to be prioritised based on high death rate, - decision to admit may be influenced by estimates of number of years lost (e.g. older patients would not be admitted)
64 year old male with an acute non- ST elevation Myocardial Infarction (Heart Attack) with no co-morbidities <i>Versus</i> 64 year old male with an acute non ST elevation Myocardial	A patient without co-morbidities: it may be possible to undergo stenting same day discharge possible. <i>Versus</i> A patient with co-morbidities , may need short stay in hospital	GRACE score is well validated for assessment of risk related to the acute coronary syndrome.	Almost all the same drugs could in theory if available be given in community (without continuous cardiovascular monitoring).	ALoS: uncomplicated case: 2-3 days Cardiologist, Coronary care nurse(s) and catheter lab staff (cardiologist, cardiac physiologist, cath lab nurse(s) and cardiac radiographer).	All patients with Non-ST elevation myocardial infarction are at risk of developing ST-elevation MI and/or cardiac arrest in the acute phase before medical treatment has had an impact (mainly first 48 hours). These patients would therefore be

<p>Infarction (Heart Attack) with co-morbidities</p>	<p>may be deprioritised and treated at home with analgesia and aspirin etc.</p>				<p>considered for admission for 48hrs depending on other competing demands.</p>
<p>Premature baby needing ventilatory support</p>	<p>If nothing is done, there is the risk of the patient not actually dying but surviving with poor outcomes.</p>	<p>APGAR is a descriptor of the child's status at birth. At extremes it is associated with later cerebral palsy mediated through encephalopathy. No other scoring systems help.</p>	<p>The 26 week baby needs technical support and cannot be treated outside of the neonatal unit in hospital.</p>	<p>ALoS: 8 weeks: of which 1 week or so in NICU, then mostly HDU or SCBU. Care dependant on intensive care support from fully trained neonatal medical and nursing staff In the absence of ventilator support : <28 weeks old: very few would survive, prob 1-15%, versus 90% if there is ventilatory support 28-30 weeks old: ~30-40% survive versus 90-95% if there is ventilatory support 30-32 weeks old: 70-80% survive versus 99% if there is ventilator support. However, this is impossible to estimate; the percentages above represent current practice and optimal care at delivery - so good Level 3 Care on site especially for the</p>	<p>Decision not to ventilate has to be balanced by risk of long term morbidity arising from postnatal trauma where baby does not succumb to illness - admission would depend on local availability of specialist care staff.</p>

				highest risk babies. There may be significant long-term complications which were otherwise avoidable with the optimal care.	
Baby born to diabetic mum, 'flat' at birth with a poor APGAR of: i) 3 at 1min ii) 7 at 5min	This baby may be OK, would need oxygen through a head box and septic screen - IV antibiotics – but given potential years of life saved would be a patient we would be keen to prioritise (assuming capacity available in NICU)	APGAR (health assessment score covering: Appearance, Pulse, Grimace, Activity, Respiration)	The baby of the diabetic other is probably fine and needs monitoring for blood sugar to avoid acquired brain injury, so with appropriate support and access to best professional advice this could possibly be done in the community	ALoS: <7days probably, perhaps 3-4 Resources: midwife and blood sugar test.	Benefits of admission for support, weighed against risk of acquiring infection from hospital environment. Baby may be safer at home after short admission.
22 year old, mild / moderate asthma, pandemic flu, developing viral pneumonia. Significant respiratory compromise. <i>Versus</i> 22 year old pregnant, mild / moderate asthma, pandemic flu, developing viral pneumonia. Significant respiratory compromise.	Young patient: in the high risk group for pandemic flu. Under age 65, CURB65 tends to underestimate, if patient was over 65 the CURB65 score would be 4.	CURB65 indicative patient score 3	Home Resources: IV fluids and antibiotics, and oxygen. Would need district nursing to manage IV and home Oxygen supply	ALoS: uncomplicated cases 48-72 hours. If patient responds to treatment could be discharged in approx. 48 hours with Tamiflu. If patient deteriorated, additional intensive treatment unlikely to be available and patient likely to be discharged for end of life care.	Given availability of active treatment, admission is likely if the patient demonstrates greater benefit in years of life saved (e.g. younger people prioritised over older patients or younger patients with life limiting long term conditions (e.g. cerebral palsy). A patient is likely to be prioritised for admission if pregnant, as risk of ILI greater but benefit of saving two lives.

The CURB-65 calculator (e.g. <http://emcalculator.com/curb>) can be used in the emergency department setting to risk stratify a patient's community acquired pneumonia. CURB-65 is fast to compute, requires likely already-available patient information, and provides an excellent risk stratification of community acquired pneumonia. It can facilitate better utilization of resources and treatment initiation. It does not, however, assign points for co-morbid illness and nursing home residence.

* CURB-65 scores:

0	Low risk group: 0.6% 30-day mortality.
1	Low risk group: 2.7% 30-day mortality
2	Moderate risk group: 6.8% 30-day mortality.
3	Severe risk group: 14.0% 30-day mortality.
4	Highest risk group: 27.8% 30-day mortality.
5	Highest risk group: 27.8% 30-day mortality

Patients who are pregnant and/or obese have higher mortality, this would be useful to consider as part of a 'CURB-65 plus' calculation.

Annex Contributors

[Redacted content]