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