

<b>Report to:</b>	Board of Directors					
<b>Date of Meeting:</b>	28 <sup>th</sup> October 2015					
<b>Report Title:</b>	Weekday Admissions vs Weekend Admissions Mortality					
<b>Status:</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;"><b>For information requirement</b></td> <td style="width: 25%;"><b>Discussion</b></td> <td style="width: 25%;"><b>Assurance</b></td> <td style="width: 25%;"><b>Approval</b></td> <td style="width: 20%;"><b>Regulatory</b></td> </tr> </table>	<b>For information requirement</b>	<b>Discussion</b>	<b>Assurance</b>	<b>Approval</b>	<b>Regulatory</b>
<b>For information requirement</b>	<b>Discussion</b>	<b>Assurance</b>	<b>Approval</b>	<b>Regulatory</b>		
Mark relevant box with X	X					
<b>Prepared by:</b>	Caroline Booton, Clinical Quality Analyst					
<b>Executive Sponsor (presenting):</b>	Mr. Karl Mainprize Executive Medical Director					
<b>Appendices (list if applicable):</b>	N/A					

### Purpose of the Report

To review data around the Trust mortality and the gap between weekday admissions mortality and that of patients admitted at weekends.

### Key points for discussion

The methodology follows that of a recently published article in the British Medical Journal that has been widely quoted in the media.

As of 28.8.15:

Hospital standardized mortality ratio (HSMR) for the Trust was:

Overall	85.38 – lower than expected
Weekday admissions	83.44 – lower than expected
Weekend admissions	92.30 – Within expected

Between January and December 2014, an increased proportion of higher risk patients were admitted on Fridays to Mondays when services inside and outside of the hospital are reduced.

Of the 1039 patient deaths within 30 days of hospital admission, almost 60% occurred between Friday and Monday; this cohort of patients had noticeably heightened predicted mortality.

All patients (n=13,230) admitted between Fridays and Mondays had a longer median length of stay by one day. For those who died, the median time to death was not shorter for those admitted between Fridays and Mondays when compared to the remaining days of the week.

This analysis does not demonstrate an increased risk of an early event for this group.

Further analysis would involve a large case note review by a team of senior clinicians and we believe the gain would not at this stage add value.

### Recommendation

The Board of Directors is asked to receive and note this report.

## Mortality in Weekday admissions vs Weekend admissions

The gap between ANHSFT mortality rates for patients admitted at a weekend and those admitted on weekdays appeared to be widening, although our overall standardized mortality rate was within expected range. We therefore undertook an analysis of our data. Our analysis helped by a BMJ publication that suggested that patients admitted at weekends are more likely to die than those admitted on weekdays<sup>1</sup>.

Mortality data as of 28.8.15 for ANHSFT:

HSMR 85.38 (CL 88.71 to 112.26). Expected: 698]	Lower than expected.	[Observed: 596;
HSMR Weekday: 83.44 (CL 86.7 to 114.66). Expected 496]	Lower than expected	[Observed 414;
HSMR Weekend: 92.30 (CL 78.16 to 125.77). Expected 173]	Within expected.	[Observed 160;

Mortality in Low risk diagnosis group 0.55 (CL 0.17 to 1.13). Within expected. National average: 0.59. [Observed 13]

### January – December 2014 30 day mortality and the “weekend effect”

According to Fremantle et al (2015), admission at weekend is associated with an increased risk of death (30 day mortality) compared to midweek admission. A generalised “weekend effect” where appropriate support services inside and outside of hospital are reduced late Friday, through the weekend, leading to disruption on Monday morning may impact on patient outcomes.<sup>1</sup>

Between January and December 2014, there were 34,095 Trust hospital spells of which 91% were acute admissions. Within this period, 1037 deaths occurred within 30 days of hospital admission:

- 678 occurred within hospital (65%); and
- A further 361 within 30 days (35%) of leaving hospital.

**Table 1: Characteristics of Trust hospital spells**

Admission day	Spell count by admission day [n = 34,095]	% of spells by admission day	Spell count of acute admissions [n= 31,113]	% of admission day spells that were acute
Monday	5509	16.2	4950	89.9
Tuesday	5472	16.1	4739	86.6
Wednesday	5230	15.1	4692	89.1
Thursday	5310	15.6	4676	88.1
Friday	5437	16.0	4984	91.7
Saturday	3537	10.4	3499	98.9
Sunday	3600	10.6	3573	99.3

<sup>1</sup> Freemante N., Ray D., et al., (2015), *Increased mortality associated with weekend hospital admission: a case for expanded seven day services?* BMJ 2015;351:h4596

- Around 16% of all Trust admission spells occurred on each weekday compared to just over 10% at weekends. At a national level 17% of all admissions occurred on weekdays, with 8% on Saturday and 6% on Sunday (Freemantle 2015).
- Whilst the percentage of Trust admission spells was lower at weekends than in weekdays, emergency admissions proportionately were 10% higher than on weekdays at around 99%.

Of the 1039 deaths that occurred in the period January 2014 to December 2014, almost 60% were admitted between Fridays and Mondays.

**Table 2: Admission day for all 1039 deaths occurring in and outside AGH up to 30 days**

<b>Admission day</b>	<b>Count</b>	<b>%</b>
Tuesday	144	13.86
Wednesday	150	14.44
Thursday	130	12.51
Friday	179	17.23
Saturday	132	12.70
Sunday	128	12.32
Monday	176	16.94

Of the 678 deaths that occurred in hospital, 60% were admitted between Fridays and Mondays.

**Table 3: Admission day for 678 deaths occurring in hospital**

<b>Admission day</b>	<b>Count</b>	<b>%</b>
Tuesday	87	12.83
Wednesday	108	15.93
Thursday	79	11.65
Friday	116	17.11
Saturday	93	13.72
Sunday	85	12.54
Monday	110	16.22

For the 361 deaths that occurred following discharge and within 30 days, 46% were discharged between Fridays and Mondays.

**Table 4: Discharge day for 361 deaths outside of hospital**

<b>Discharge day</b>	<b>Count</b>	<b>%</b>
Tuesday	70	19.39
Wednesday	61	16.90

Thursday	65	18.01
Friday	70	19.39
Saturday	34	9.42
Sunday	11	3.05
Monday	50	13.85

Across England, the cohort of patients admitted at weekends had higher predicted mortality (Freemantle 2015). Table 5 shows the mean of Trust patients' risk of death, as calculated in the SHMI model and split Tuesdays to Thursdays and Fridays to Mondays. The model takes into account diagnosis, admission method, Charlson Index for comorbidities, gender and the spell start age. Day cases, regular day attenders, regular night attenders and still births are excluded from the SHMI calculation (n= 24,870). The probability of the risk of death lies between zero (no risk) and one (death).

**Table 5: Estimated risk of death occurring in Airedale General Hospital (AGH) or within 30 days of discharge calculated from the SHMI risk model**

	Sample	Risk probability Mean score	95% confidence interval
All admissions	24870	0.045	0.044 to 0.046
Tuesdays to Thursdays	11640	0.041	0.040 to 0.043
Fridays to Monday	13230	0.047	0.046 to 0.049
Admissions - Survived	23831	0.038	0.037 to 0.039
Tuesdays to Thursdays	11216	0.035	0.034 to 0.037
Fridays to Monday	12615	0.040	0.038 to 0.041
Admissions - Died	1039	0.204	0.041 to 0.046
Tuesdays to Thursdays	424	0.201	0.195 to 0.213
Fridays to Monday	615	0.206	0.194 to 0.217

The mean score of individual patient risk of death, based on the SHMI risk model, is increased at weekends for all admissions, irrespective of outcome. However, for those patients who died, there is a noticeably heightened probability. According to Freemantle (2015), this makes weekend admissions (Fridays to Mondays) at a higher risk of an early event.

### Median<sup>2</sup> Length of Stay

For all patients (whether discharged alive or dead, n= 24,870), the median LoS was 2 days (interquartile range [IQR] 1 to 4).

- For those admitted Tuesdays to Thursdays (n= 11,640), the median LoS was 1 day (IQR 1 to 4); and,

<sup>2</sup> The median has been selected as more representative of the data location as length of stay is skewed by extreme outliers. The interquartile range is the appropriate summary measure of spread.

- For those admitted Fridays to Mondays (n=13,230) the median LoS was 2 days (IQR 1 to 4). (The latter group have higher predicted mortality.)

Those patients who were discharged alive (n=23,831), the median LoS was 1 day (IQR 1 to 4 days).

- For those admitted Tuesdays to Thursdays (n=11,216), the median LoS was 1 day (IQR 1 to 4 days); and,
- For those admitted Fridays to Monday (n=12,615), the median LoS was 2 days (IQR 1 to 4 days).

Among those who died in hospital (n=678), median LoS was 8 days (IQR 3 to 17 days).

- For those admitted Tuesdays to Thursdays (n=274), the median LoS was 8 days (IQR 3 to 16 days); and,
- For those admitted Fridays to Mondays (n=404), the median LoS was 8 days (IQR 3 to 18 days).

For those patients who died within 30 days of hospital discharge (n=361), median hospital LoS was 9 days (IQR 3 to 18 days).

- For those admitted Tuesdays to Thursdays (n=150), the median hospital LoS was 8 days (IQR 2 to 17); and,
- For those admitted Fridays to Mondays (n=211), the median hospital LoS was 9 days (IQR 4 to 18).

## Summary

Between January and December 2014, an increased proportion of higher risk patients were admitted on Fridays to Mondays when services inside and outside of the hospital are reduced. Of the 1039 patient deaths within 30 days of hospital admission, almost 60% occurred between Friday and Monday; this cohort of patients had noticeably heightened predicted mortality. All patients (n=13,230) admitted between Fridays and Mondays had a longer median length of stay by one day. For those who died, the median time to death was not shorter for those admitted between Fridays and Mondays when compared to the remaining days of the week. This analysis does not demonstrate an increased risk of an early event for this group.

Further analysis would involve a large case note review by a team of senior clinicians and we believe the gain would not at this stage add value.