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| Business question | Sub questions | Relevant dataset(s) and variables? | What visualisation(s) or test(s) will answer the question? | What did the test/chart tell us? | Is it important? Why? |
| To what extent is the winter crisis real? | How many patients are seen, treated and admitted, transferred or discharged within 4 hours of checking in at the A&E desk? (from Lawson & Lovatt, 2020)  Does this differ by HB? |  | Neil’s Percentage of A&E departments meeting the 4 hr turnaround for patients graph  Neil’s map of percent of A&E depts making the 4 hr target | Chart: You can see consistent dips in the percentage of A&E departments meeting the 4hr turnaround target in January. Also in general, you can see that the percentage of departments meeting the target has gotten consistently worse over time. | It is important because the 4 hour metric is one of the main yardsticks agreed upon for measuring NHS performance. The lower the number, the more severe the crisis (Lawson & Lovatt, 2020). By this metric, the winter crisis is “real” since we see consistent dips in January, but there is also an overall consistent downward trend in this metric, which indicates that the winter crisis is part of an overall NHS crisis. |
|  | Are emergency admissions significantly higher in the winter months (Dec, Jan, Feb)? (potential cause for having to wait 4+ hours)   * Are there any differences by HB? | Covid datasets (any HB dataset)  -Number of admissions  -HB  -week\_ending | * Difference in means stat test (mean for Dec/Jan/Feb compared with mean for rest of year) | The difference in means test tells us that there is no evidence that there are significantly more mean admissions/week in the winter months than in the non-winter months | It is important because number of admissions can’t explain the consistent dips in percentage of A&E depts meeting the 4hr turnaround target in January. There is no evidence of significant uptick in number of admissions over the winter. |
|  | Is there evidence that the number of emergency admissions was exacerbated by Covid? | Covid datasets (any HB dataset)  -Number of admissions  -20182019Average  -week\_ending | * Graphical comparison between 2018/2019 average and Covid averages (2020/2021/2022) * Difference in means stat test between 2018/2019 average for winter months and 2020/2021/2022 winter month averages |  |  |
|  | Is there evidence that the percentage of A&E depts meeting the 4hr target was negatively impacted by Covid? | Do we have the data for this? (JZ) |  |  |  |
|  | What other measures of impact should we consider? | To discuss at meeting on Monday, potentially follow up at client meeting in afternoon. |  |  |  |
| How has winter impacted NHS Scotland in the past? | How many of each admission type are there?  Does this differ by HB?  Does this differ by speciality? | Covid datasets (any)  -Number of admissions, admission type | Grouped summary table by admission type  Grouped summary table by HB and admission type  Grouped summary table by speciality and admission type  Jamie’s grouped column chart showing avg admissions for winter/not winter for each speciality | Speciality grouped column chart  For the average 20182019 admissions, certain specialties saw an increase in average number of emergency admissions per week during the winter period. These were:  -Medical (both including and excluding Cardiology and Cancer)  -Pediatrics (both including and excluding Cardiology and Cancer)  These same increases actually lessened during the Covid years 2020/2021/2022 to the point where there was only a small increase during the winter months. During the Covid years, there was a slight increase in average number of emergency admissions per week for Cardiology and for Surgery, which is notable because average emergency surgery admissions actually decreased in the winter pre-Covid |  |
|  | Do people have longer lengths of stay from elective or emergency admissions?  Does winter differ from the rest of the year?  Does this differ by HB? | ?? dataset  -admission\_type  -average stay in days(?)  -quarter | Neil’s graph showing average stay for elective vs emergency patients | Emergency inpatients seem to have significantly longer average stays than elective inpatients | Since emergency inpatients tend to have longer average stays than elective inpatients, if the number of admissions also goes up in the winter months, this could lead to fewer beds being available. |
|  | Does the number of available beds vary over time?  Is there a difference between winter and the rest of the year?  Is there a difference between specialities?  Is there a difference between HBs? |  |  |  |  |
| Do patient demographics have an impact on hospital activity? | Is there evidence that there is a connection between episodes and patient SIMD? |  |  |  |  |
|  | Is there evidence that there is a connection between stay and patient SIMD? |  |  |  |  |
|  | Is there evidence that there is a connection between number of emergency attendances and patient SIMD? |  |  |  |  |
|  | Is there evidence that there is a connection between episodes and patient sex? |  |  |  |  |
|  | Is there evidence that there is a connection between stay and patient sex? |  |  |  |  |
|  | Is there evidence that there is a connection between number of emergency attendances and patient sex? | Covid age/sex datasets (HB/HSCP)  -sex  -number of admissions | Jamie’s box plot for number of admissions by sex and whether or not it is winter  Jamie’s column charts for number of admissions for each month by sex | The charts don’t show any significant differences | Not important |
|  | Is there evidence that there is a connection between episodes and patient age? |  |  |  |  |
|  | Is there evidence that there is a connection between stay and patient age? |  |  |  |  |
|  | Is there evidence that there is a connection between number of emergency attendances and patient age? | Covid age/sex dataset  -age\_group  -number of admissions  -avg 20182019 admissions | Jamie’s column chart for avg number of admissions for winter vs not winter by age group. | For age groups over 65, admissions are slightly higher in the winter. The same pattern is not seen for younger age groups  The increase in admissions in winter months for age groups over 65 was more drastic pre-Covid than during Covid. This is potentially due to the lockdown measures in winter Dec2020/Jan-Feb2021 and some remaining restrictions in winter Dec2021/Jan-Feb 2022 as well as the vaccination campaign targeting these age groups in early 2021 with boosters in late 2021/early 2022. | Not super important, but useful for context to show that admissions do go up for age groups over 65 in the winter. This could be because they tend to be more severely impacted by respiratory viruses like the flu than younger age groups |
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What metrics do we have to measure impact?

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| Metric(s) for measuring impact | Dataset |
| Number of admissions (2020/2021/2022)  Average number of admissions (2018/2019 combined)  Percent variation (between admissions that week and the 2018/2019 avg) | All Covid datasets |
| Number of episodes  Length of episodes/Average length of episode  Number of spells  Length of spell/Average length of spell | Activity by board of treatment and speciality |
| Number of episodes  Length of episodes/Average length of episode  Number of stays  Length of stay/Average length of stay | Activity by Board of Treatment, Age and Sex  Activity by Board of Treatment and Deprivation |
| Number of Attendances(aggregate)  Number of Attendances(episode)  Number Meeting Target (aggregate)  Number Meeting Target (episode)  Discharge Destination Admission (num attendances admitted to same provider)  Discharge DestinationOther (num attendances discharged to private provider or died)  Discharge Destination Residence (num attendances discharged to private residence)  Discharge Destination Transfer (num attendances transferred to another NHS provider)  Discharge Destination Unknown (num attendances with unknown or other discharge destination)  Attendance Greater 8 hrs (num attendances that have been in A&E dept longer than 8 hrs)  Attendance Greater 12 hrs (num attendances that have been in A&E dept longer than 12 hrs) | Monthly A&E Activity and Waiting Times |
| All Staffed Bed Days (??) probably the number of days a staffed bed was available whether or not it was occupied  Total Occupied Beddays (num of days a bed was occupied?)  Average available staffed beds (daily average num of available staffed beds)  Average Occupied beds (Daily average number of occupied beds)  Percentage Occupancy (percentage of daily occupancy of beds – total occupied bed days/all staffed bed days) | Beds by Board of Treatment and Specialty |

-Number of admissions (Covid datasets)

-Number of episodes (Activity by board of treatment and speciality)

-Length of Episodes/Average length of episode (Activity by board of treatment and speciality)

-Number of spells (Activity by board of treatment and speciality)

-Length of Spell/Average length of spell (Activity by board of treatment and speciality)