

BACKGROUND

- A large majority of hospitals worldwide use electronic health records and other technologies to facilitate patient care
- During downtime events, vital EHR functions and other hospital technologies may have limited to no functionality
- With these vital technologies and software having limited accessibility during downtimes, patient care may be suboptimal from a medication usage standpoint
- HSHS, a health system experienced a cyber-event in August 2023 which led to a downtime period from 08/27/2023 to 09/12/2023

OBJECTIVE

- To see how patient care is impacted during an extended downtime period from a medication usage perspective

METHODS

- Data was gathered from Pyxis machines, C-II safes, and Medkeeper across all HSHS hospitals
- This data was gathered over a 15-day downtime period of 08/23/2023 to 09/11/2023. This data was then compared to an arbitrary 15-day uptime period of 08/07/2023 to 08/21/2023.
- The data was analyzed to see how medication usage rates changed between the uptime and downtime periods.

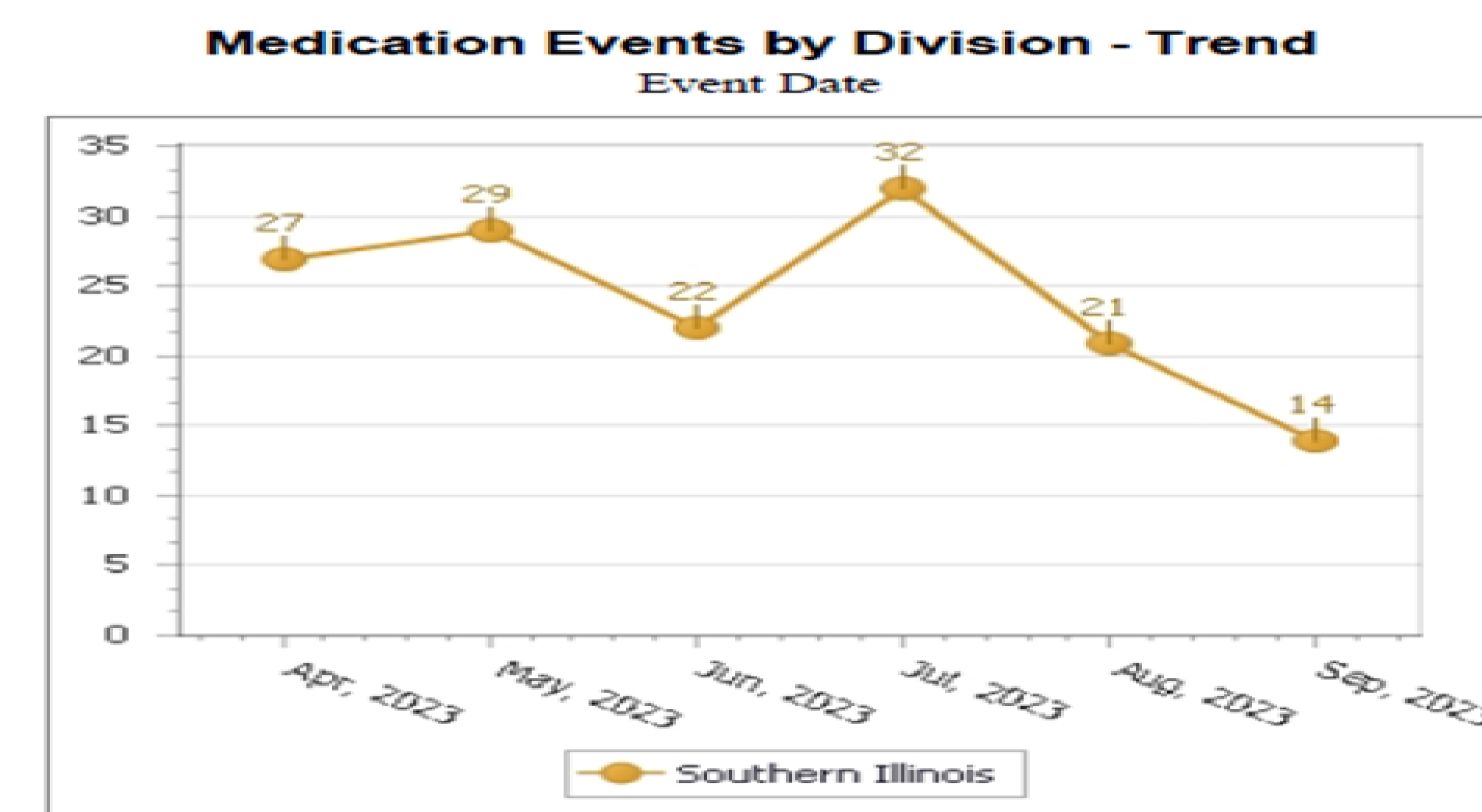
RESULTS

Percentage Change of Medication Usage Before and After Downtime	
Pyxis Transaction Data	-26.76%
Batch Compounds	-26.56%
Patient Specific Compounds	-81.73%
C-II Safe Vends	-90.42%

- From C-II safe vends to Pyxis medication vends/refills to compounding, everything decreased in electronic activity

Count of Refills and Vends during Uptime and Downtime	Uptime= Green, Downtime= Red															Grand Total
	253	134	105	96	128	144	156	222	146	183	145	167	152	123	189	
HSHS Good Shepard Hospital	212	107	102	102	123	123	103	58	111	86	69	74	111	75	133	1589
HSHS Holy Family Hospital	169	229	179	134	142	123	99	176	197	139	87	165	90	118	194	2241
HSHS Sacred Heart Hospital	1980	2053	1999	2110	2228	1634	1502	1784	1789	2005	2201	2034	1629	1876	2235	29059
HSHS St. Anthony's Hospital Effingham	1405	1311	1303	1385	1352	870	831	836	1112	1182	1240	1039	803	923	986	16578
HSHS St. Anthony's Hospital Effingham	1182	1310	1305	1256	1266	833	945	1548	1732	1328	1159	1116	888	840	1434	18142
HSHS St. Clare Memorial Hospital Onconto Falls	1066	1266	1237	1267	1223	930	921	979	1335	1298	1348	1304	989	877	1066	17106
HSHS St. Elizabeth's Hospital O'Fallon	346	274	364	424	331	297	310	299	265	306	388	309	251	263	402	4829
HSHS St. Elizabeth's Hospital O'Fallon	229	259	254	234	279	189	199	204	193	278	264	220	147	181	304	3434
HSHS St. Francis Hospital Litchfield	3823	3703	3707	3739	3795	3231	3136	3984	4267	4295	3833	3926	3135	3130	4179	55883
HSHS St. Francis Hospital Litchfield	3480	3639	3226	3282	3056	2254	2206	2120	2777	2902	3026	3032	2513	2402	3025	42940
HSHS St. John's Hospital Springfield	613	608	474	595	393	310	240	399	543	707	475	299	188	221	373	6438
HSHS St. Joseph's Hospital Breese	339	410	391	283	222	182	233	266	341	292	348	443	355	295	423	4823
HSHS St. Joseph's Hospital Breese	8183	8353	8167	7693	7574	5608	5782	7680	7641	8347	8247	7689	6725	6466	8727	112882
HSHS St. Joseph's Hospital Breese	6821	6527	6381	5984	5238	4381	4192	4333	5382	5625	5477	5272	3941	3912	5240	78706
HSHS St. Joseph's Hospital Breese	590	455	479	460	361	296	305	383	430	459	432	282	310	293	493	6028
HSHS St. Joseph's Hospital Breese	338	457	500	410	365	323	296	279	452	332	329	281	211	264	355	5192
HSHS St. Joseph's Hospital Chippewa Falls	438	556	472	420	505	425	393	430	467	551	572	643	586	597	537	7592
HSHS St. Joseph's Hospital Chippewa Falls	409	366	402	443	294	288	286	269	342	508	425	382	370	380	374	5538
HSHS St. Joseph's Hospital Highland	484	620	704	637	562	462	441	509	601	603	416	487	452	395	482	7855
HSHS St. Joseph's Hospital Highland	454	502	478	337	386	307	300	308	436	462	475	469	329	327	345	5915
HSHS St. Mary's Hospital Decatur	1146	1069	1284	1135	954	726	683	972	1053	1171	1187	1062	954	943	1173	15512
HSHS St. Mary's Hospital Decatur	1013	850	943	828	901	582	550	522	533	1003	949	944	663	719	863	11863
HSHS St. Mary's Hospital Green Bay	1187	1177	1451	1224	980	731	708	1002	1159	1163	1132	1153	840	847	1155	15909
HSHS St. Mary's Hospital Green Bay	1052	978	944	707	737	557	649	576	825	912	999	875	668	639	1014	12132
HSHS St. Nicholas Hospital Sheboygan	502	631	673	780	629	481	167	388	600	553	616	758	597	389	657	8421
HSHS St. Nicholas Hospital Sheboygan	430	537	426	340	468	361	234	234	653	634	458	594	447	440	545	6801
HSHS St. Vincent's Hospital Green Bay	3621	3679	3933	3758	3682	3011	3255	3768	3765	4271	3603	3503	2871	2799	3436	52955
HSHS St. Vincent's Hospital Green Bay	3082	3461	2879	2496	2421	1960	1956	2130	3368	2638	2680	2830	2140	2109	2716	38866
Grand Total																346089
Grand Total																253479

Top 5 decreased medication rates	Percentage
Laxative	-39.1
Muscle Relaxant	-37.3
Vitamin Supplement	-36.3
Antidepressant	-30.2
Analgesic	-27.8



- The rate of reported adverse events at St. Elizabeth's was found to surprisingly decrease during the downtime from 21 to 14
- The top 5 the largest medication usage decreases were seen in medication classes that may not be as crucial in patient care
- A decrease in medication usage was seen in all 15 HSHS hospitals

DISCUSSION

- Medication usage rates declined in all areas of investigation as originally hypothesized
- Things that likely contributed to this decrease in medication usage were loss of order sets, transition to paper medication ordering, loss of communication methods, and chaotic workflow environment
- Adverse event data was not able to be gathered from other HSHS facilities, only St. Elizabeth's
- Cloud-based features were completely unavailable at certain facilities
- Decrease in reported adverse events was likely due to stressful work environment as well as dispensing less medications

CONCLUSION

- Downtime events can have a strongly negative impact on medication usage rates
- The hospital staff needed to adapt to using technologies and software with limited or no functionality in order to continue providing safe and efficient patient care
- The loss of many different functionalities likely had a combined effect which led to the decrease in medication usage
- The pharmacy staff reported that having downtime procedures installed on all the computers would have been helpful, as well as general things like more internet hotspots and computers

REFERENCES

1. Assistant Secretary for Public Affairs (ASPA). (2023, December 6). *HHS announces next steps in ongoing work to enhance cybersecurity for health care and public health sectors*. HHS.gov. <https://www.hhs.gov/about/news/2023/12/06/hhs-announces-next-steps-ongoing-work-enhance-cybersecurity-health-care-public-health-sectors.html#:~:text=According%20to%20the%20HHS%20Office,in%20large%20reaches%20involving%20ransomware>.
2. Lyon R, Jones A, Burke R, Baysari MT. What Goes Up, Must Come Down: A State-of-the-Art Electronic Health Record Downtime and Uptime Procedure in a Metropolitan Health Setting. *Appl Clin Inform.* 2023 May;14(3):513-520. doi: 10.1055/s-0043-1768995. Epub 2023 Jul 5. PMID: 37406674; PMCID: PMC1032225.
3. Riggi, J. (2018). *The importance of cybersecurity in protecting patient safety: Cybersecurity: Center: AHA*. American Hospital Association. (n.d.). <https://www.aha.org/center/cybersecurity-and-risk-advisory-services/importance-cybersecurity-protecting-patient-safety#:~:text=Losing%20access%20to%20medical%20records,also%20to%20either%20intentionally%20or>
4. Vogel, S. (2023, August 22). *Scale of healthcare cyber attacks increase as criminals change tactics, report finds*. Healthcare Dive. <https://www.healthcaredive.com/news/cyber-attacks-healthcare-scale-increase-critical-insights/691478/>