

# A Structured Approach to Shift Scheduling in the Emergency Department: Implementation of Simple Statistical Methods to Evaluate Physician Workload

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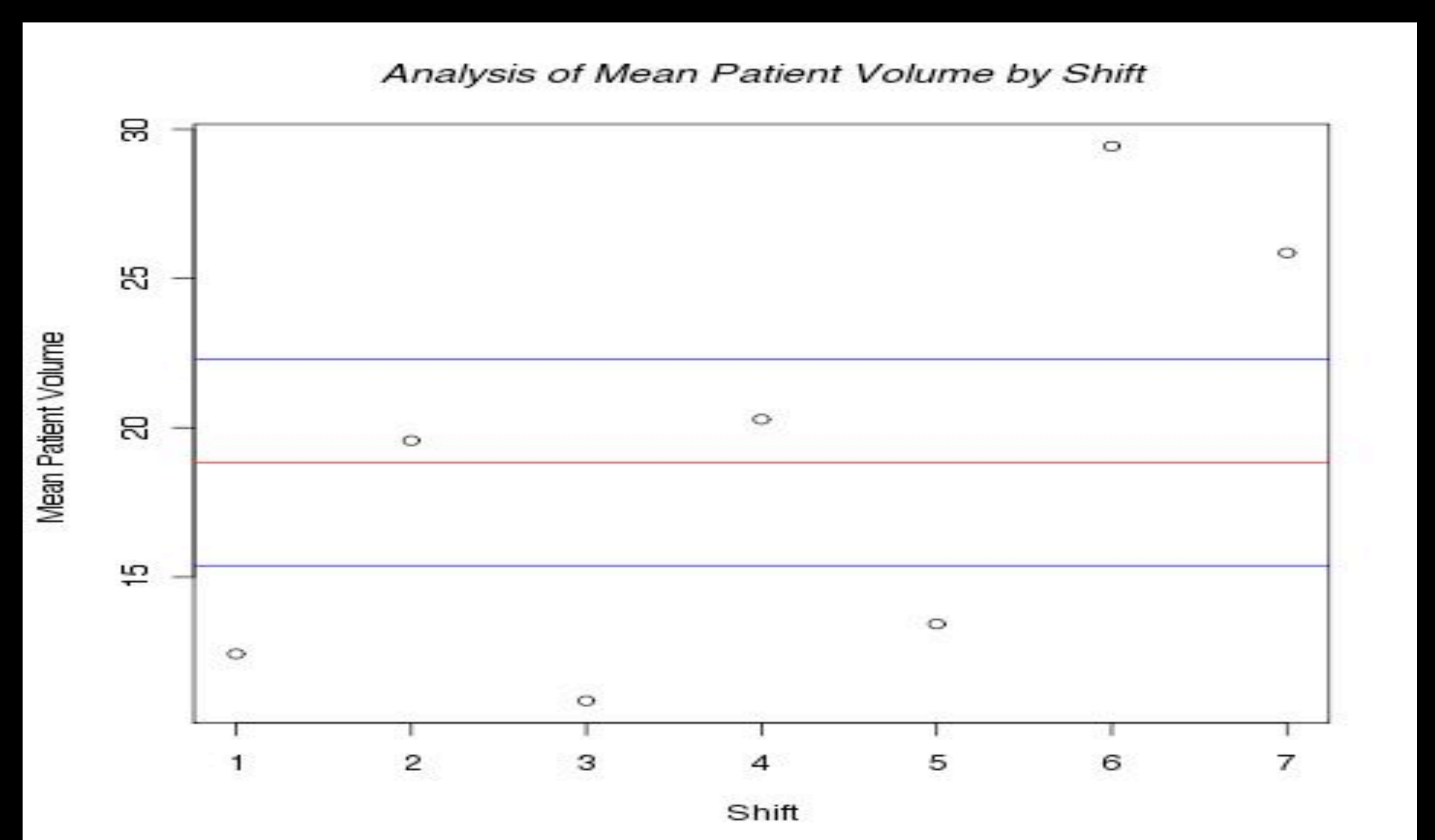
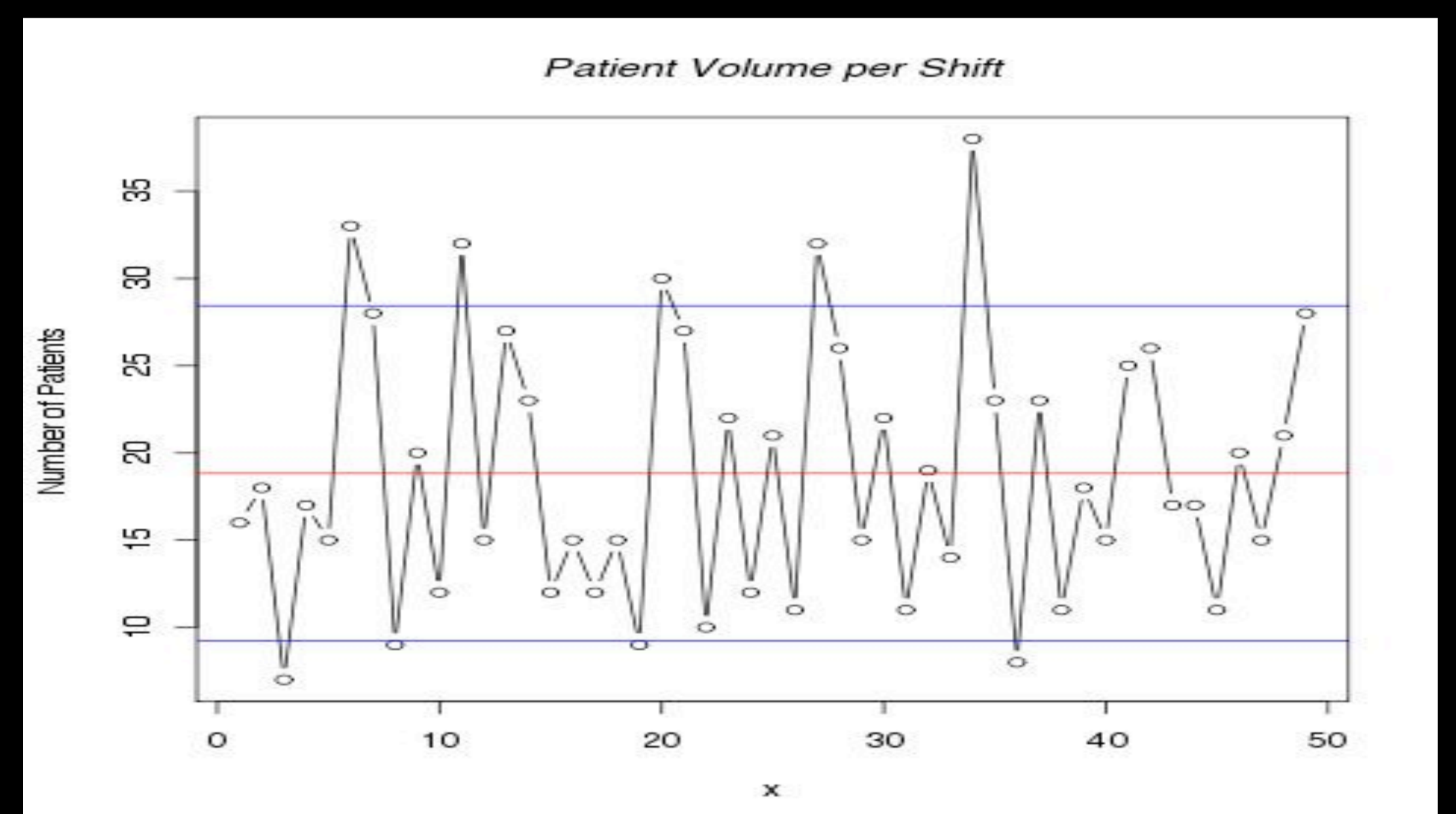
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**Introduction:** The University of Alberta hospital emergency department provides care for approximately 150 adult patients each day. Emergency physician consists of seven shift of eight hours each. Informal observation suggests that the patient volume appears to be unequally distributed among the shifts, with certain shifts being routinely over-worked while others and under-worked. A statistical analysis of the patient volume seen during each shift may allow a more rational approach to shift scheduling.

**Hypothesis:** The null hypothesis of equal patient volumes for each shift was tested against the alternative hypothesis of inequality of patient volumes.

**Methods:** Patient volume for forty-nine consecutive shifts was obtained by direct observation from the computer tracking system. Differences in patient volume between each of the seven shifts was compared using Analysis of Means (ANOM). Possible cofactors including daily patient volume, average triage score and operator, were assessed using ANOM and Analysis of Variance (ANOVA).

**Results:** Mean patient volume per shift was 18.8 (SD=7.5). ANOM revealed a significant difference between shifts with a large range between the highest and lowest volume shift (10.9 – 29.4). Three shifts were consistently below mean patient volume, and two consistently above. Patient daily volume and average triage score were not shown to be significant using ANOVA. Unfortunately, it was difficult to separate operator effect from the shift effect due to the small sample size and large number of operators.



OBSDate	Initials	Time	Type	CTAS-1	CTAS-2	CTAS-3	CTAS-4	CTAS-5
1	SD	00-14	AG	1	5	7	4	3
2	BW	01-13	CD	0	3	4	2	1
3	AN	12-20	AG	0	3	4	2	1
4	KY	14-22	CD	0	3	10	2	2
5	AS	18-02	AS	0	3	7	0	0
6	KN	19-05	CD	0	3	16	10	2
7	KF	24-07	AG	0	6+2=8	10+6=16	3	1
8	SS	6-14	AG	1	3	5	0	0
9	SD	01-13	CD	0	3	12	3	2
10	AH	12-20	AG	1	2	2	0	0
11	AN	14-22	CD	0	0	16	15	1
12	KF	18-02	AS	2	0	5	0	0
13	AG	19-05	CD	0	2	13+2=15	7	1
14	KN	24-07	AG	1	1+4=5	4+5=9	2+3=5	2+1=3
15	TF	01-13	CD	0	6	10	4	1
16	TF	01-13	CD	0	6	10	4	1
17	DH	12-20	AG	0	6	5	1	0
18	AH	14-22	CD	0	2	7	4	0
19	KY	18-02	AG	1	5	3	7	0
20	AG	19-05	CD	0	6	15	9	0
21	KN	24-07	AG	2	5+6=11	9	5	0
22	TF	01-13	AG	1	6	1	2	0
23	SS	01-13	CD	0	10	15	2	0
24	AH	12-20	AG	0	1	2	0	0
25	DH	14-22	CD	0	4	9	0	0
26	MI	18-02	AG	0	6	2	0	0
27	KY	19-05	CD	0	2	17	12	1
28	KN	24-07	AG	1	7	12	1	0
29	TF	01-13	AG	0	6	4	5	0

**Conclusions:** The null hypothesis of equivalent patient volumes between shifts was rejected, as some shifts clearly performed above the mean and others below. A suggestion for an alternative shift pattern was described, which should be implemented on a trial basis and the study methods repeated. Further studies are likely to be indicated to further characterize the effect of average triage score and operator. Future replication of the study methods at other sites is suggested.