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Comparative Analysis Of Human Resources In The Sterile Services Department At Three Hospitals: Insights From Instrument Check Performance

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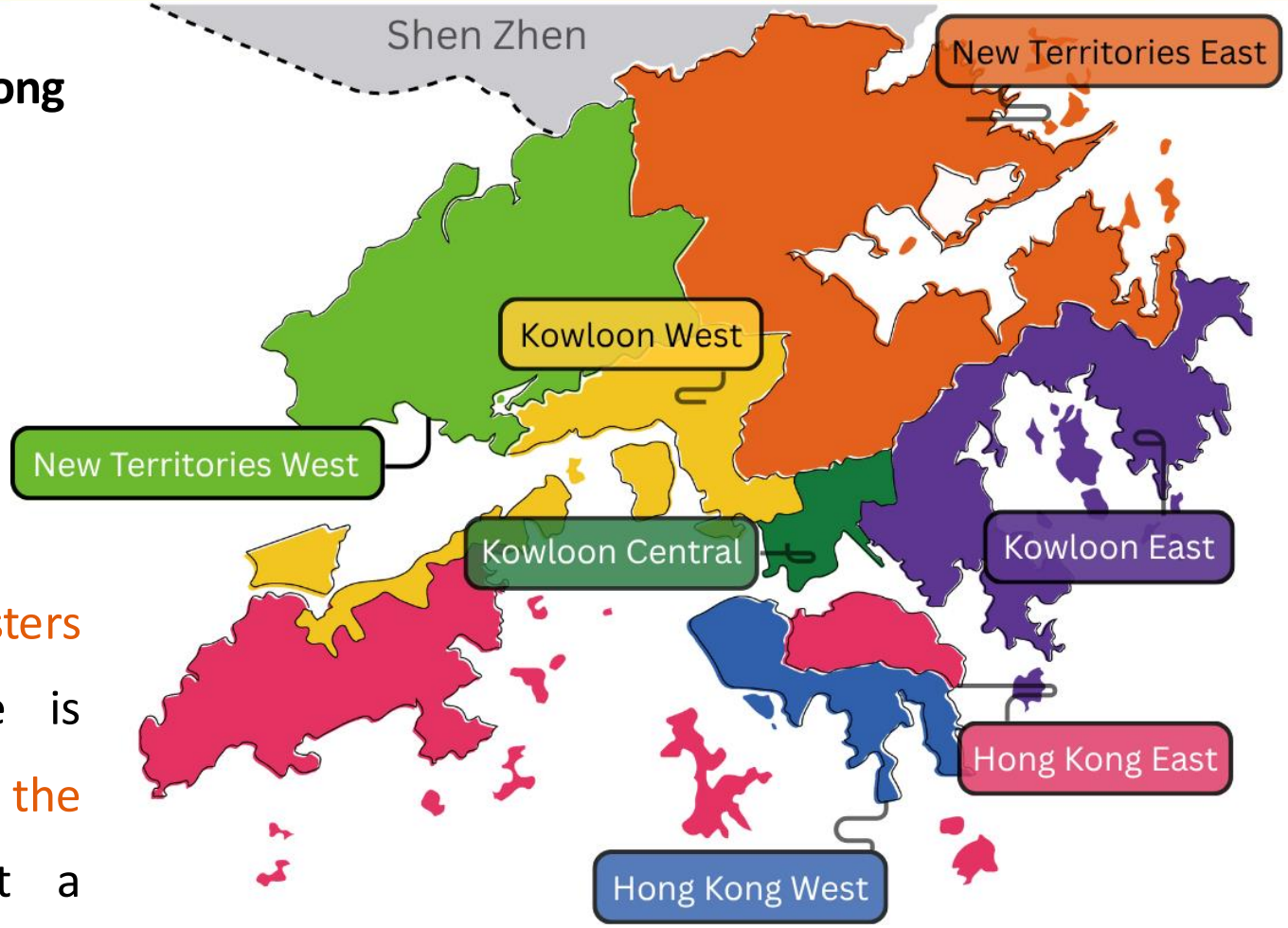
The Hospital Authority in Hong Kong

- 43 public hospitals and institutions
- 49 Specialist Out-patient Clinics
- 74 Family Medicine Clinics

These are organized into seven hospital clusters based on locations. High quality care is achieved by rationalizing operations of the hospitals within each cluster, so that a comprehensive and complementary range of services can be delivered to the community.



New Territories West Cluster: 3 Sterile Services Departments

Scope of Service

- Operating Theatres
- Clinical areas
- Community Nursing Service Centres
- Siu Lam Hospital
- Castle Peak Hospital

Scope of Service

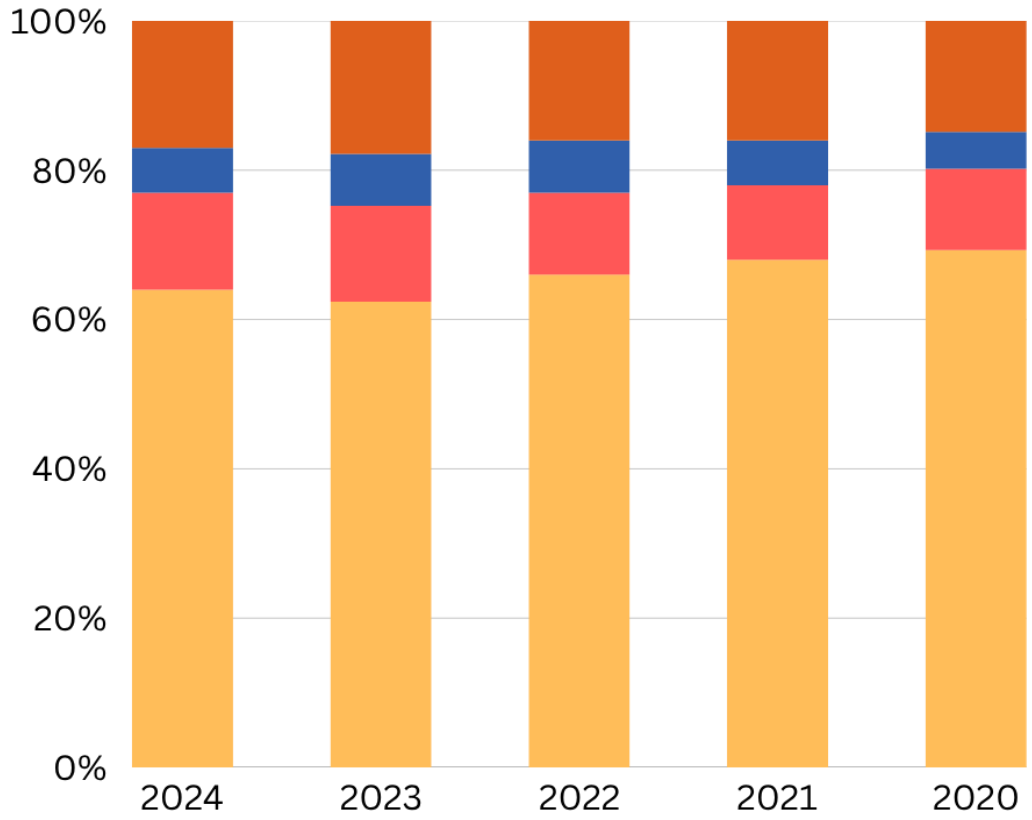
- Operating Theatres
- Clinical areas
- Tin Ka Ping Infirmary

Scope of Service

- Operating Theatres
- Clinical areas
- Tuen Mun Eye Centre
- 8 Family Medicine Clinics

Hospital Authority Annual Report 23-24

Expenditure by Category (in % of Total Expenditure)



Implementing workforce productivity analytics and optimized scheduling systems is critical to maximize resource efficiency without compromising care quality

- Other operating expenses
- Medical supplies and equipment
- Drugs
- Staff costs

Manpower Position in NTWC SSDs

Management	16
Supervisor	19
Supporting Staff	126

2024/25 Nominal Annual Mid-point Salary

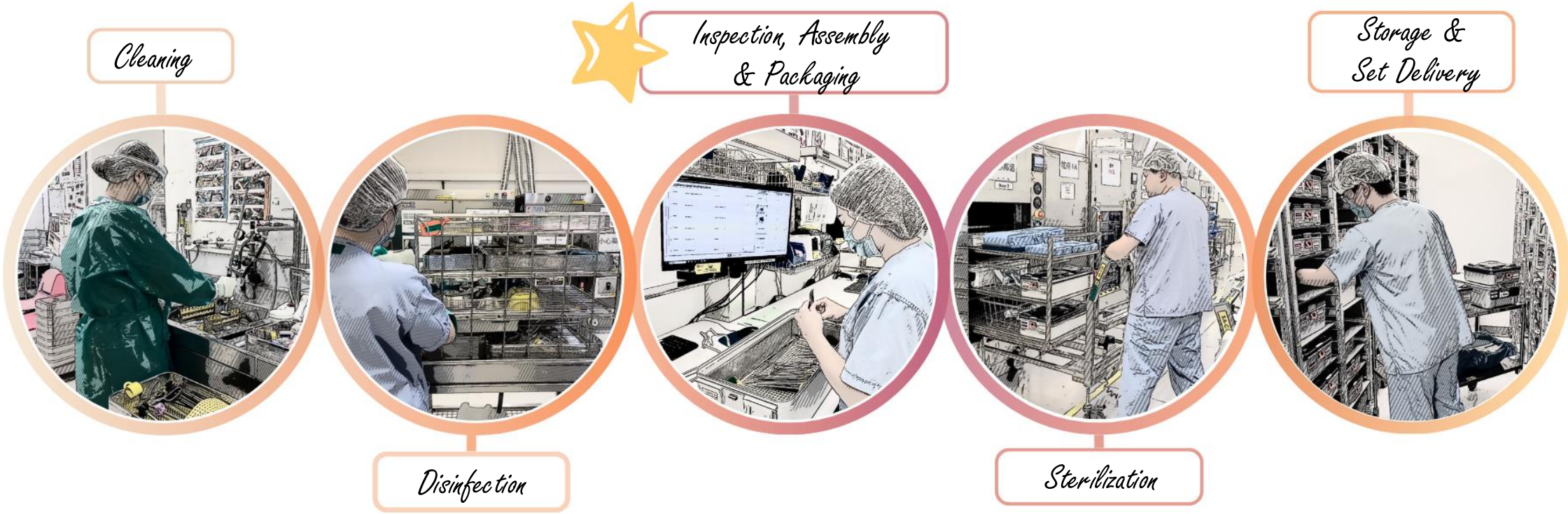
PCA II: $266,796

Staff costs: $266,796 x 126 = $33,616,296

HKD	33,616,296	per year
CNY	30,760,803	per year
USD	4,320,635	per year
GBP	3,204,036	per year
JPY	636,062,004	per year
EUR	3,680,799	per year

Main Job Duties of Patient Care Assistant

Inspection, assembly, and packaging are the most labor-intensive production processes, requiring meticulous attention to cleanliness, integrity, functionality of RMDs and strict adherence to protocols — all of which demand significant time and effort.



Aims of study:

1. To assess the checking and packaging performance of SSD staffs across three hospitals
2. To evaluate the current situations and demands for sterile services.

History of Tracking & Tracing in HK Public Hospitals

Enterprise Resource Management System (NTWC exclusive)

2007

2011

Surgical Instrument Tracking System (SITs)

Endoscopes Tracking System

2018

2021

SITs mobile solution

Main Function of SITs

1 Processing Configuration

2 Tracking and Tracing

3 Reporting

4 System Administration

5 User Account Management

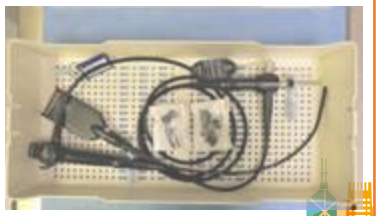
6 Integration with Existing Systems

Methodology:

SIT functions were used to evaluate the checking and packaging performance of SSD staffs at three hospitals

SITs Process Configuration - Set Template

Each surgical instrument set (SIS) was assigned with a unique identity code so as to trace the status of SIS during the reprocessing cycle including the return of soiled SIS, the assembly and packaging as well as the sterilization of SIS under SITs.

Item Code	Set Name	Bill of Materials
T M H . T 0 0 0 1 0 . 0 2	LAMINECTOMY SET (ORTH)(TMH)	20cm Waugh's 'p Dissecting forceps x 2 Retractor, nerve root, Mcculloch x 1 Dissector, Mcdonald x 2 4mm Osteotome, Mcculoch x 1 
P O H . T 3 0 0 0 8 . 0 1	G.I. SET (POH)	Dissecting forceps, Ramsey's 'P' x 1 Tissue Forceps, Long Babcock x 2 Artery Forceps, Mosquito 'C', 12.5cm x 6 Artery forceps, Kocker's, 'St', 18.5cm x 4 
T S H . L 4 0 0 0 3 . 0 4	FLEXIBLE CYSTOSCOPE	Len Flexible Cystoscope x 1 Semi Disposable Suction Valve (S.O.4) x 1 Forceps/Irrigation Plug (S.O.4) x 1 

Sterilization method

No of set under same template

Hospital

Packaging

SITs Process Configuration - Packaging

The packaging materials used typically correlate with the number of instruments in a set, with increased quantities necessitating larger containers.

T0/N0	Sterile Container System 1/1
T1/N1	Sterile Container System 1/1
T2/N2	Sterile Container System 3/4
T3/N3	Sterile Container System 1/2
T4/L4/N4	Wrapper set
T5/T6/L5/N5/E5	Pre-pack
TA	Dental container

SITs Reporting - Storage Area Value Report

Set template	Set type	Set name	No. of instrument	No. of set
TMH.T20010	TMH.T2	DCR SET TRAY B	22	2
TMH.T20011	TMH.T2	NEURO ADVANCED SET	25	12
TMH.T20025	TMH.T2	BONE GRAFT SET (PLASTIC)	22	2
TMH.T20027	TMH.T2	RETRACTOR, LEYLA (NEURO)	23	2
TMH.T20028	TMH.T2	LAMINECTOMY SET (NEURO)	22	3
TMH.T20050	TMH.T2	NASAL SET	34	6
TMH.T20059	TMH.T2	THR EXTRA INSTRUMENT	31	2
TMH.T20060	TMH.T2	HIP REVISION SET A	26	1
TMH.T20075	TMH.T2	TKR-LEGACY,BOX 2(S.O.28)	34	1

Weighted Average Score of Each Set Type Packaging $= \frac{\sum (x_i \times w_i)}{\sum w_i}$

A score was calculated for each set type using a weighted average approach

Set type	Score	Set type	Score
TMH.T1	49	POH.T1	41
TMH.T2	30	POH.T2	24
TMH.T3	18	POH.T3	18
TMH.T4	6	POH.T4	8
TMH.T5	2	POH.T5	2
TMH.TA	15	POH.T6	2
…	…	…	…
…	…	…	…

SITs Reporting - Re-processing Progress Report

Set ID	Set Name	1st Inspection Date	1st Inspection by
TMH.T30117.09	Ophthalmic Basic Set	1/8/2025	CXXX XXX XXXXX +18
TMH.T51295.02	IOL Exchanged Set	1/8/2025	TXXX XXXX XX +2
TMH.T51423.07	Cap, Mic, Black, Small	1/8/2025	YXXX XXX XXX +2
TMH.T52525.01	Yamane Set	1/8/2025	WXXX XXX KX +2
TMH.TA0001.01	IOL Set	1/8/2025	CXXX XXX XXXXX +15
TMH.T20395.01	UBE Endoscope Set	2/8/2025	TXX XXX XXX +30
TMH.T10229.10	Ortho Upper Limb Set	2/8/2025	CXXX XXXX XXX +49
TMH.T30028.11	Cordless Driver Iii	2/8/2025	CXXX XX XX +18
TMH.T41015.08	Phaco Set (Centurion)	2/8/2025	KXX XXX XXX +6
TMH.TA0001.06	IOL Set	3/8/2025	CXXX XX XXXX +15

Each packer will earn a score for each set they inspected, based on the score associated with that specific set type.

Established score for each set type

Set type	Score	Set type	Score
TMH.T1	49	POH.T1	41
TMH.T2	30	POH.T2	24
TMH.T3	18	POH.T3	18
TMH.T4	6	POH.T4	8
TMH.T5	2	POH.T5	2
TMH.TA	15	POH.T6	2
…	…	…	…
…	…	…	…

Cumulative scores earned by each packer for the sets they inspected

Packer	POH.T1	POH.T2	POH.T3	TMH.T1	TMH.T2	TMH.T3	TMH.T4	TMH.T5	TMH.TA	TSH.T1	TSH.T2	TSH.T3	•••	Total
CXXX XXXXX XXX	1726	242	238											2846
CXXX XX XX				1317	477	350	19	14						2513
CXXX XXX XXXXX				293	328	608	50	203	91					1979
CXXX XXX XXX	1233	73	128											2436
CXXX XXX XXX	1808	1066	731											4606
CXXX XXXX XXX										1064	863	306		5033
CXXX XXX XXX				683	507	516	19	30						2281
CXXX XXXXXXX				829	268	184	100	224	106					2279
CXXX ZXXXXX				781	238	239	81	105	61					1670

Data Collection:

- Study period: June 2024 to March 2025
- No. of packers: 87 across three hospitals
- Tracking items involved: 58056 container sets, 12972 wrapper sets & 69260 prepack items

Methodology Overview

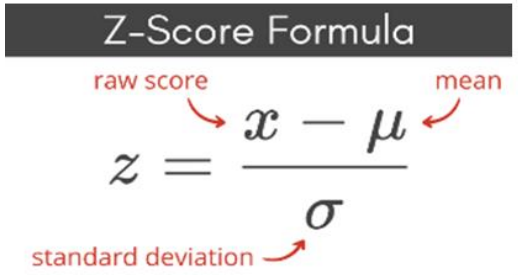
1. Download reprocessing progress report of 3 Hospitals from SITs
2. Put them to the same excel worksheet
3. Check the packer's score for each inspected set based on its set type
4. Create a Pivot Table to calculate the total score for all staff members
5. Generate charts to facilitate comprehensive analysis

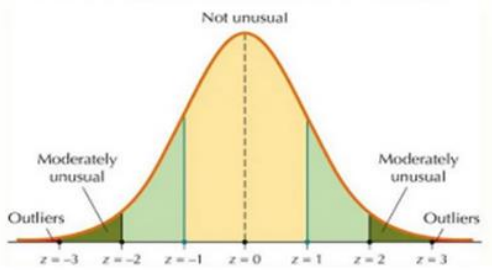
10 mins

Step 2 to 5: The use of weighted average score at a set type level speeds up the calculation time, allowing results to be generated within 10 minutes.

Results

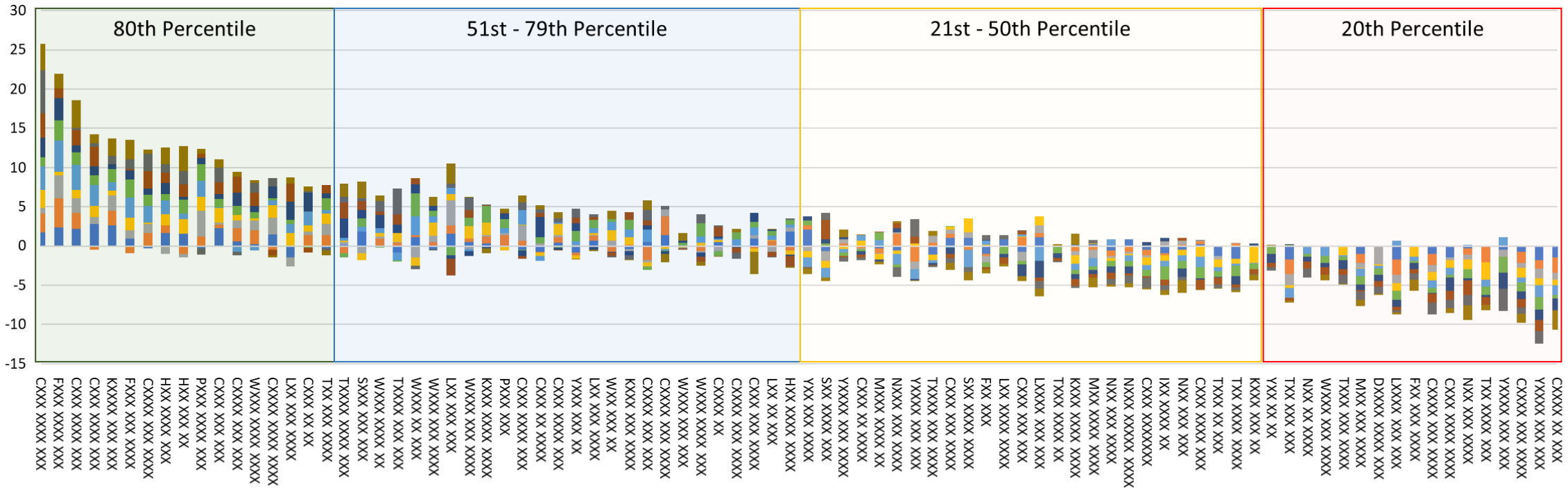
Hosp	Name	Years of exp	06/2024	07/2024	.....	02/2025	03/2025	06/2024	07/2024	.....	02/2025	03/2025
TMH	CXXXXXXXXXX	9	3129	3963	.....	6210	4839	2	2	.....	6	3
POH	FXXXXXXXXXX	7	3536	4991	.....	2120	3711	2	4	.....	0	2
TSWH	CXXXXXXXXXX	16	3405	3740	.....	2311	5033	2	2	.....	0	4
POH	CXXXXXXXXXX	4	3828	1846	.....	2442	3147	3	0	.....	0	1
POH	KXXXXXXXXXX	9	3760	3538	.....	2932	3941	3	2	.....	1	2
POH	FXXXXXXXXXX	1	2548	1504	.....	3072	4200	1	-1	.....	1	3
TMH	CXXXXXXXXXXX	16	1685	3393	.....	3755	2625	0	2	.....	2	1
POH	HXXXXXXXXX	10	3027	2939	.....	2949	3866	2	1	.....	1	2





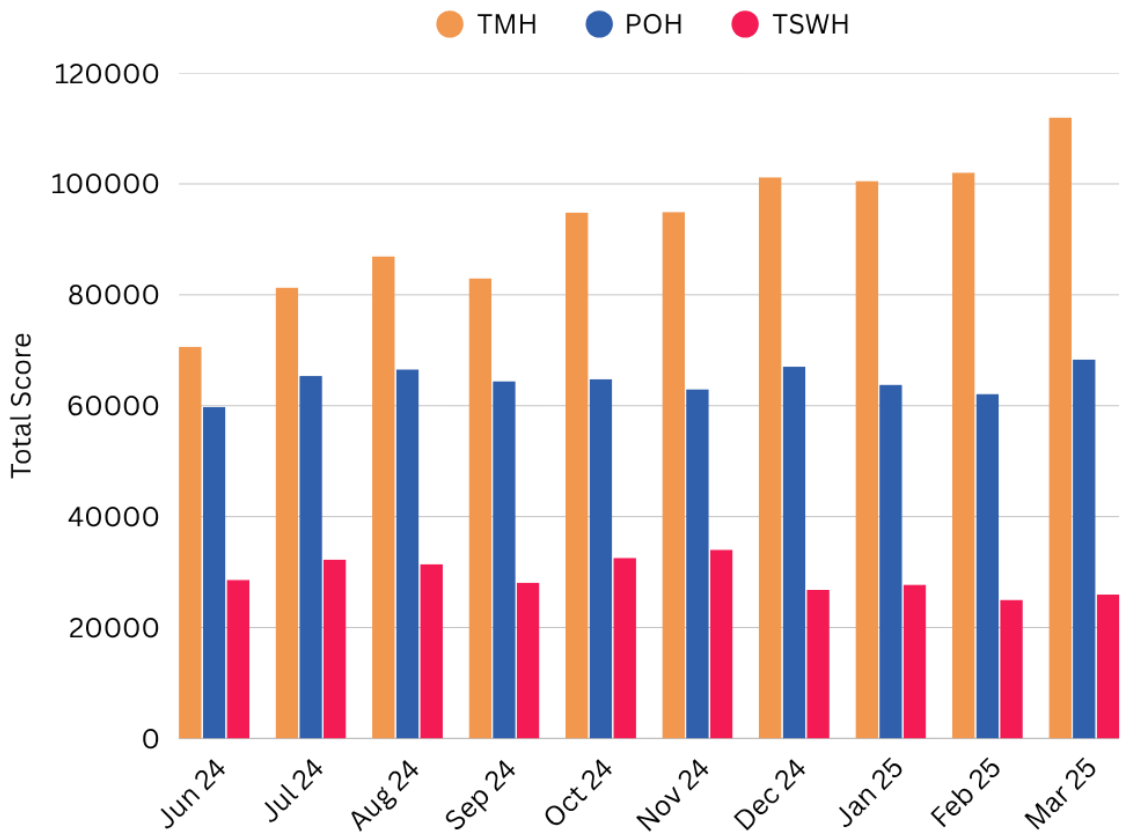
The z-value provides a statistical perspective on individual performance relative to the group

Z-values stacked bar chart



Stacked bar chart is used to visualize the z-values of each staff member throughout a year. This format helps identify trends in performance over time, revealing which staff consistently perform above or below average.

Monthly workload differences across three hospitals



TMH

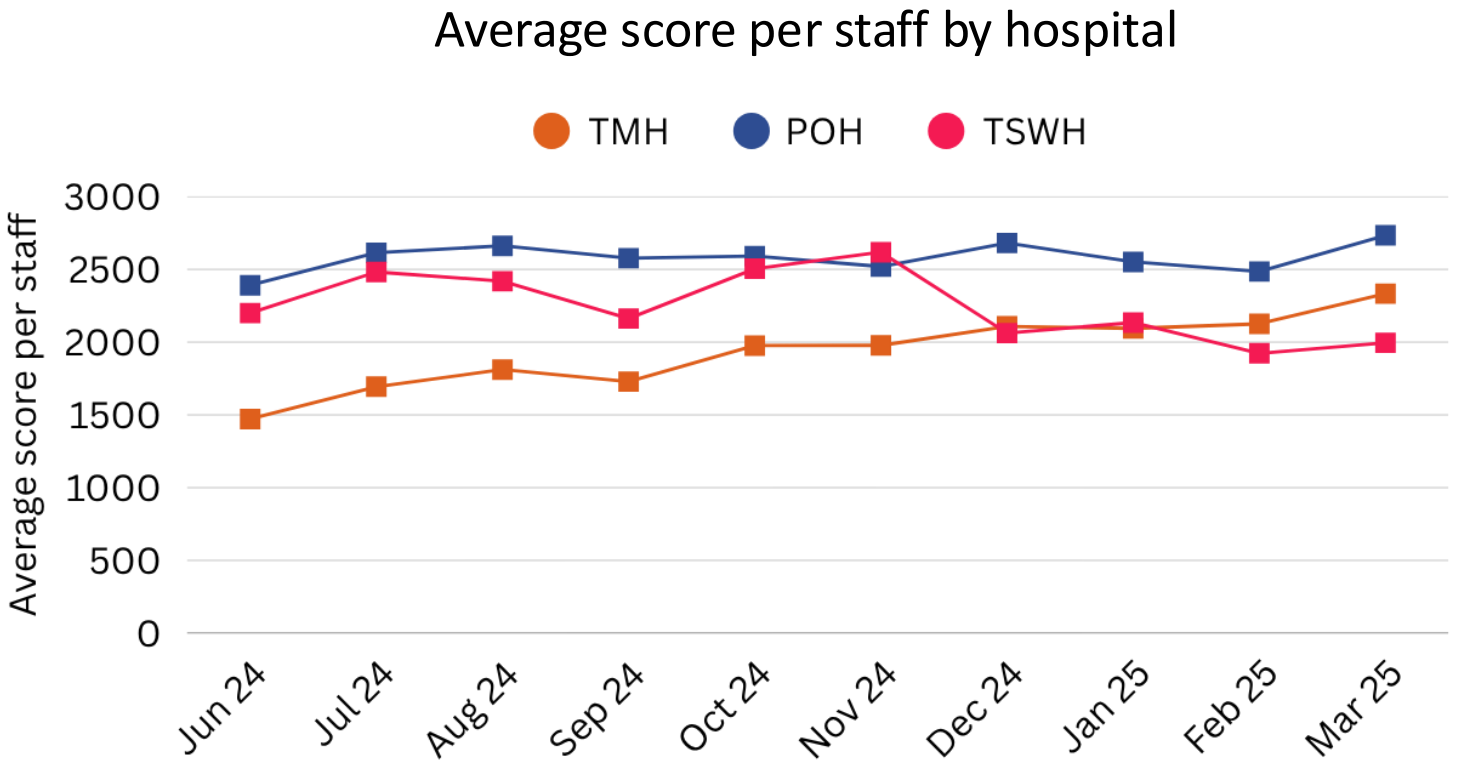
Processes more instruments than other hospitals, with data showing increasing workload over time.

POH

Minimal fluctuations in total scores, indicating a relatively stable workload month-to-month.

TSWH

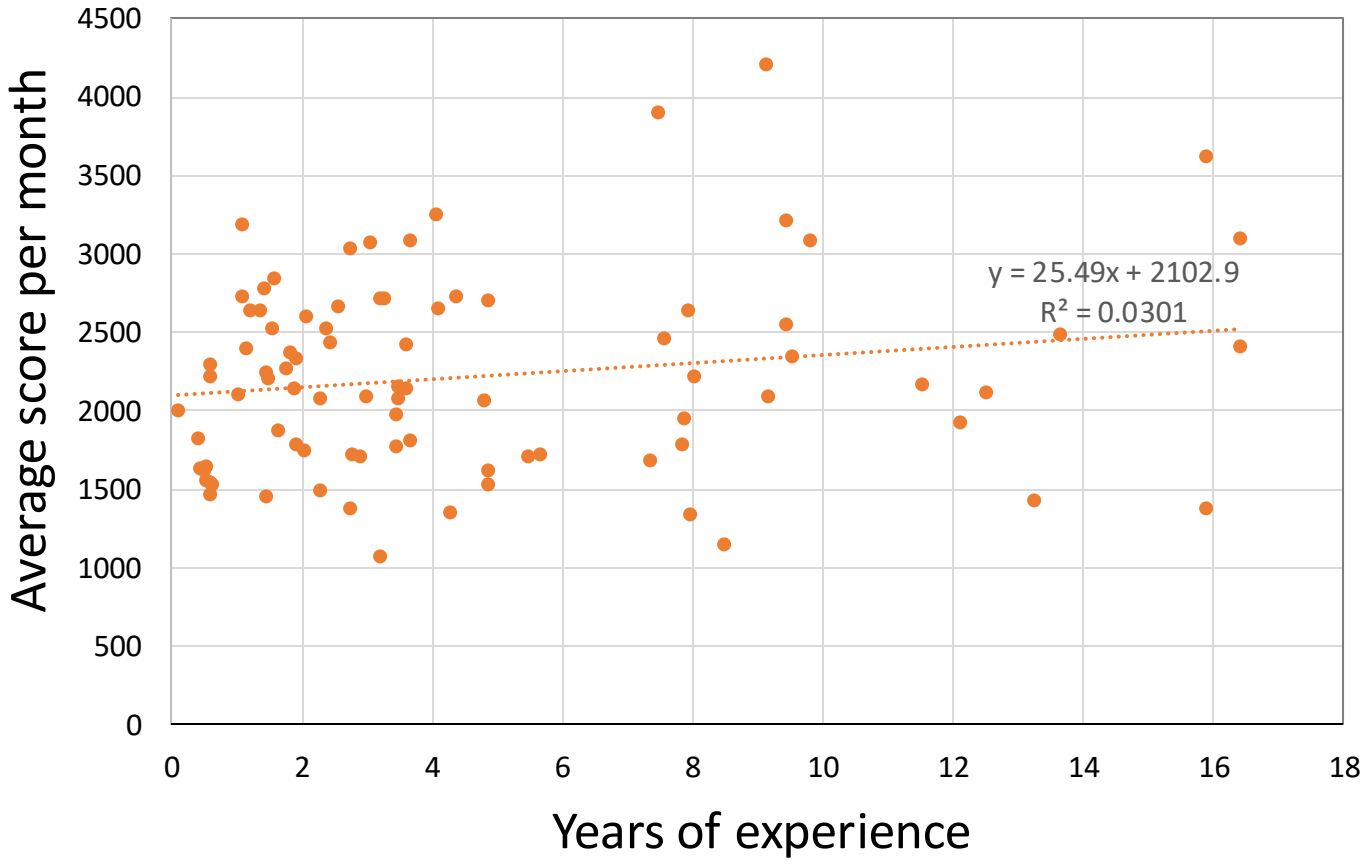
Consistently lowest scores indicate lighter workload than TMH and POH.



The total scores earned by each staff member in the same hospital for a month are summed and divided by the headcount, reflecting the average workload of staff in each hospital, independent of individual performance.

POH consistently has the highest workload, with the exception of November 2024. This indicates that POH staffs may be sharing a heavier workload compared to their peers in the other hospitals during most of the observed period.

Scatter Plot – relationship between work experience and inspection performance



Weak positive correlation between years of experience and average score per month

Conclusion

The study demonstrated the use of analytical tools for human resource management to achieve fair staffing assessments, including the ability to:

- Identify high performers for recognition;
- Target support for skill gaps; and
- Promote fair workload distribution.

These tools provide data-driven recommendations to guide rationalization decisions in staff allocation, enabling managers to:

- Right-size teams per hospital while maintaining quality standards; and
- Balance workloads across cluster to prevent burnout or idle capacity.

Acknowledgments

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Thank you for your attention