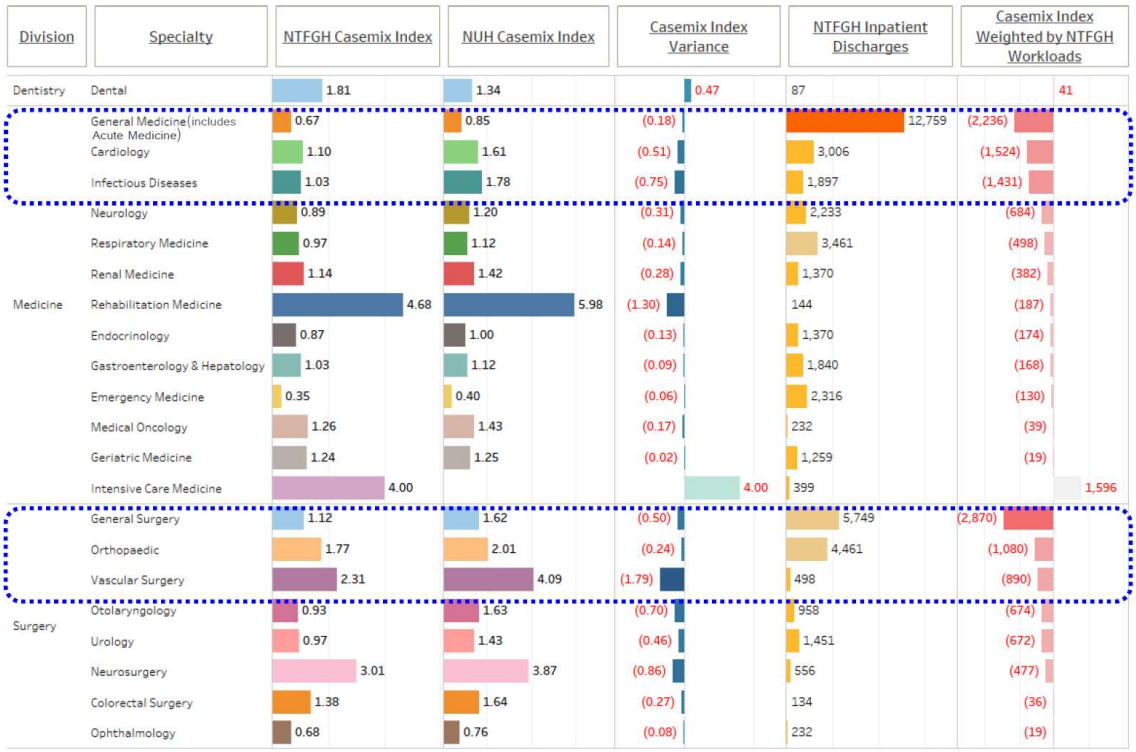
Case Study: Diagnosis-related Group (DRG) Coding & Subvention

Clinical Problem and Pre-Implementation Performance

1. Please incorporate specific data showing focus area service lines where CMI did not align with baselines in Singapore into the Clinical Problem section.
2. For the purpose of case study replicability, please identify which data points are collected to appropriately review service line CMI average. Show any reports or interfaces utilized to show which service lines required the most workflow revision. How did data specifically influence the visual interface and workflow described in the case study?

   The data collected on the Casemix Index (CMI) for each specialty for both NTFGH and NUH included CMI variance, the number of discharges and a final weighted CMI weighted by workload. A data-driven approach was utilised to identify specialties with a workload that allowed the physicians and coders to perform a manual review of each case admitted during a period. The specialties selected reflected both those with a similar CMI between institutions (Geriatrics) and those with differences (Orthopedics).



Division	Specialty	NTFGH Casemix Index	NUH Casemix Index	Casemix Index Variance	NTFGH Inpatient Discharges	Casemix Index Weighted by NTFGH Workloads
Dentistry	Dental	1.81	1.34	0.47	87	41
Medicine	General Medicine (includes Acute Medicine)	0.67	0.85	(0.18)	12,759	(2,236)
	Cardiology	1.10	1.61	(0.51)	3,006	(1,524)
	Infectious Diseases	1.03	1.78	(0.75)	1,897	(1,431)
	Neurology	0.89	1.20	(0.31)	2,233	(684)
	Respiratory Medicine	0.97	1.12	(0.14)	3,461	(498)
	Renal Medicine	1.14	1.42	(0.28)	1,370	(382)
	Rehabilitation Medicine	4.68	5.98	(1.30)	144	(187)
	Endocrinology	0.87	1.00	(0.13)	1,370	(174)
	Gastroenterology & Hepatology	1.03	1.12	(0.09)	1,840	(168)
	Emergency Medicine	0.35	0.40	(0.06)	2,316	(130)
	Medical Oncology	1.26	1.43	(0.17)	232	(39)
	Geriatric Medicine	1.24	1.25	(0.02)	1,259	(19)
	Intensive Care Medicine	4.00		4.00	399	1,596
Surgery	General Surgery	1.12	1.62	(0.50)	5,749	(2,870)
	Orthopaedic	1.77	2.01	(0.24)	4,461	(1,080)
	Vascular Surgery	2.31	4.09	(1.79)	498	(890)
	Otolaryngology	0.93	1.63	(0.70)	958	(674)
	Urology	0.97	1.43	(0.46)	1,451	(672)
	Neurosurgery	3.01	3.87	(0.86)	556	(477)
	Colorectal Surgery	1.38	1.64	(0.27)	134	(36)
	Ophthalmology	0.68	0.76	(0.08)	232	(19)

***Note:** NUH's operating units have been mapped to NTFGH's specialties by matching their descriptions as closely as possible. Actual clinical work may differ.

- Specialties have been sorted according to their workload weighted Casemix Index.
- Review of DRG coding for past cases should be prioritized for the top 3 Specialties from each Division as their high volume of discharges contribute more heavily towards NTFGH's institutional level Casemix Index.

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Design and Implementation

1. Please provide more concrete details for the governance structure, similar to the information shared in the presentation.

    a. What SME roles were involved in the product selection and workflow design process?

    b. Does NUSH have a structured governance apparatus which meets regularly with these SMEs, or are SMEs tapped on an ad hoc basis to offer guidance on IT adoption initiatives?

The DRG subvention workgroup was formed in April 2017 and was led by the Chairman Medical Board. The workgroup consisted of members who represented Medical, Nursing, Allied Health Group, Clinical Operations, Finance, Medical Records Office and Epidemiology. Medical Representatives were from Inpatient (Medicine and Surgery) and Emergency Department. Each subspecialty was present and accounted for during the meetings, which were conducted quarterly to tackle the problem in the early phase.

2. Define the training timeline for the new documentation workflow. Once the new protocols were developed, how long did it take to fully train the clinical team on the new protocols?

3. Detail the training environment utilized to train clinical staff on documenting using the new identified best practices and visual interfaces.

   The training was conducted in 2018 (pre-COVID era).

   a. For the training of the doctors, a large classroom format was utilised.
   b. The initial training was conducted for all associate consultants, consultants and senior consultants at various department meetings (which has now been shifted to an e-learning module).
   c. For residents, senior residents and medical officers, the training was conducted as part of the department onboarding (since they rotate between different hospitals in the cluster on a frequent basis).
   d. House officers were trained quarterly as part of their post-graduate curriculum programme in a large classroom format (which has now been shifted to an e-learning module).
   e. Tip-sheets and training guides were created by the Medical Informatics team to help support the users and were uploaded to the hospital website for easy access.
   f. Roadshows were conducted for each department from 2018 to 2019 and this included presentation of the data on existing CMI as well as the results of the pilot study and best practices.

Clinical Transformation enabled through Information and Technology

1. Chest pain admissions data points show that particular patient cohort as a significant outlier as an outlier regarding DRG costs. Discuss how, using the process identified in this case study, better documentation associated with chest pain admissions drives a higher standard of care:

   a. Example: establishment of short term monitoring modules to monitor chest pain patients without a hospital admission to keep cost down, with corresponding evidence to show that post visit outcomes (30-day readmission for chest pain), mortality, or other quality metrics do not drop as result of not being admitted

2. Also see comment under improving patient outcomes.

Please refer to the section 'Improving Patient Outcomes'.

Improving Adherence to the Standard of Care

1. No additional questions

Improving Patient Outcomes

1. Please provide at least one example of how a higher CMI score alters the standard of care (for example, more rapid follow up post-discharge to reduce readmission risk) for patients in a particular service line. If higher CMI scores correlate to lower readmissions, lower mortality, or some other improvement post-hospital visit, even in one individual service line where CMI has noticeably increased due to more accurate documentation, please provide an example.

   The above low DRG cost weight cohort received the same inpatient care (i.e. attended to by inpatient nurses and doctors with a full suite of inpatient services such as physiotherapy etc.) but had expedited appointment slots (usually on the day of admission) for treadmill test and other tests, which would reduce their waiting time and by extension, length of stay. This workflow facilitated the placements of the above patients in our short-stay (Ambulatory) ward and in the Extended Diagnostic Treatment Unit (EDTU).

   The right-siting of short-stay patients into an appropriate unit facilitated by accurate diagnosis labelling via DRG also contributed to a reduction in overall readmission rate.

   As DRG was mainly a cost-recovery exercise, the overall study was not powered to look at specific patient-focused outcomes. Despite this, it is clear that high coding accuracy had a significant impact on other projects throughout the whole institution, such as contributing to the early recruitment of patients in the Hip Fracture, Pneumonia and Urinary Tract Infection VDO (Value Driven Outcomes) projects. These have shown an increase in mean clinical quality index as well as a reduction in cost.

		Calendar Year 2019 (January - December)			**Calendar Year 2020 (January-May)**			**Change in mean clinical quality index**	**Change in mean cost**
No.	**JHC VDO Projects**	**Clinical Quality Index (dropping elective wait time indicator where applicable)**	**Mean Cost**	**Total Care Volume**	**Clinical Quality Index (dropping elective wait time indicator where applicable)**	**Mean Cost**	**Total Care Volume**		
1	Hip Fracture #	46%	$18,164	287	57%	$17,361	99	22.3%	-4.4%
2	Community Acquired Pneumonia (CAP)	26%	$8,821	1,861	34%	$7,541	963	29.4%	-14.5%
3	Urinary Tract Infection (UTI)	52%	$6,031	1,239	57%	$5,937	417	9.6%	-1.6%

After patients are diagnosed, the physicians enter the data into the Problem List and trigger the respective clinical pathway workflows. Better coding practices have resulted in a higher possibility of making early and accurate medical diagnoses, averting the need for repeated diagnosis attempts. This, in turn, has led to timely intervention and prompt activation of department resources, allowing for more accurate subvention. It has also enabled patients to be recruited into VDO pathways at an accelerated rate.

Accountability and Driving Resilient Care Redesign

1. Please provide lessons learned on how these best practices can be scaled to other health systems in Singapore and beyond.

Implementing these best practices into other health systems on a nationwide or global scale can aid in minimising CMI data variation and elevating quality of healthcare delivery. They have provided sustainable benefits to our own clinicians and patients:

1. The Problem List offers a succinct summary of all medical diagnoses of a patient. Staff are also able to contribute information on the patient's existing and new conditions. Through this central repository of data which is consistently updated, staff can obtain important details at one glance and from a single source. By negating the need to access multiple sources, unproductive use of time is prevented.

2. With the Problem List, it is easier for non-medical staff to interpret and understand patients' medical problems. The use of objective language and common recognisable terms (e.g. diabetes mellitus instead of high fasting glucose level) via a standardised coding system prevents ambiguity and confusion. Additionally, the ease of accessibility makes it a good base for effective outreach to various staff. Communication channels will be strengthened when such information can be conveyed to and beyond our care partners in the community, positively impacting both inpatient and outpatient cases.

3. Developing the Problem List led to the establishment and maintenance of two-way communication between physicians and the Medical Record Office (MRO). Coding is now faster, more reliable and accurate as the coders directly liaise with the physicians to clarify any doubts.

4. Measures such as generating a list of Best Practice Advisories with discharge summaries, and requiring junior physicians to co-sign them, promote stronger accountability during the documentation process.

5. Finally, curating a list of high-impact DRG modifiers is valuable for educating physicians on how to use DRG codes and accurately code for patients' conditions. Higher coding precision improves the accuracy of reimbursements to patients and as this represents the quality of care rendered to the patient, the overall clinical quality index will rise.

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