4th Global Summit on European Healthcare & Hospital Management

Embracing DDMT Teaching Model and Design Thinking for Organization Development

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Abstract

- Multi-generational workforce poses organizational challenges due to diverse employee needs.

- Adapting learning and development strategies crucial for addressing age-based disparities.

- Application of DDMT Teaching Model from EA-Tsing Hua STEAM school with design thinking.

- DDMT: Discover, Define, Model & Modeling, Transfer – aims to bridge generational gaps.

- This study focuses on organizational development practices on healthcare nursing home by enabling higher support staff recruitment and retention.

Abstract

- DDMT-DT model-based approach used to understand evolving workforce challenges.

- Training alignment with changing workforce expectations emerges as crucial.

- DDMT-DT model enhances HR practices, addressing hiring and retention issues.

- Pilot study within healthcare sector demonstrates DDMT-DT model's efficacy.

- Model offers valuable insights for broader integration into HR strategies.

- Emphasis on adaptive approaches to accommodate the evolving workforce dynamics.

Research design

Client brief
(Empathy research from client point of views)
- context setting
- challenges and pain points
- objectives for the project

Scope of work
(Define the scope of the study)
- define project scope, timing and available resources
- employ the DDMT principles – discover & define

Research methodology
(Empathy research – frontline operations)
- quantitative research - time motion study
- qualitative research - job shadowing and interviews

Finding
(Data analysis)
- define and segment frontliners work activities
- frontliners point of views

Recommendations
(Empathy research from client point of views)
- Idea for improvements
- solutioning, if appropriate

Result 1: Employees tasks

- via observations, the employees' tasks (taken in mins) for the three nursing homes

- In reference to Duan et al. [26], such data can be used to identify the impact it has on causing nursing and healthcare workers' burnout.

Task (time in mins)	Fixed / Variable	NH1 4th Floor Plan	% of Work Hour Per Day (7 hour per day, NH1 4th Floor Plan)	Average (All NH)	NH2	% from Avg	NH1	% from Avg	NH3	% from Avg
Clean Room - Sweep Room & Corridor	F	6 rooms with 8 beds	5.7%	4.0			3.2	-20.0%	4.7	17.5%
Clean Room - Mop Room & Corridor	F	6 rooms with 8 beds	8.1%	5.7			5.4	-5.3%	6.0	5.3%
Clean Nursing Station	F	2 nursing stations	2.5%	10.5					10.5	0.0%
Clean Storage Room	F	1 storage room	0.4%	1.5					1.5	0.0%
Clean Connecting Lift Corridor	F	2 corridors	0.7%	1.5					1.5	0.0%
Prepare Meals to Dietary Needs	V	Per meal	3.6%	15.2	15	-1.3%	14.2	-6.6%	16.7	9.9%
Clean Isolation Room	F	1 isolation room	1.0%	4			4.5	12.5%	3	-25.0%
Clean Treatment Cohort Room	F	1 cohort room	1.4%	6			6	0.0%		
Clean Toilet	F	14 toilets	35.0%	10.5			20	90.5%	10.5	0.0%
NGT Feeding 2 staff	V	2 staff 1 Resident	6.4%	13.4	17.1	27.6%	13.75	2.6%	11.8	-11.9%
Passing Report	F	1 per shift	3.3%	13.9	12.8	-7.9%	15.5	11.5%	12.2	-12.2%
Transfer Bed to Wheelchair	V	1 Resident per transfer	0.5%	2.2			2.1	-4.5%	2.3	4.5%
Transfer Wheelchair to Bed	V	1 Resident per transfer	0.9%	3.7			4	8.1%	2.3	-37.8%
Incidental Change Bed Linen	V	1 Bed per change	1.0%	4.3			4.3			
Routine Change of Bed Linen 1 Staff (per bed)	F	1 room per day	1.2%	5	3.75	-25.0%	5.0	0.0%	6.4	28.6%
Routine Change of Bed Linen 2 Staff (per bed)	F	1 room per day	0.4%	1.5	1.5	0.0%				
Change Diapers Bedridden Resident 2 staff	V	2 staff 1resident	1.0%	2.1	2.4	14.3%	1.5	-28.6%	2.5	19.0%
Apply Moisturizer	V	32 residents	5.6%	23.4	38.5	64.5%	15	-35.9%	10	-57.3%
Assist Shower 2 staff	V	2 staff 1 Resident	5.7%	11.9	8.7	-26.9%	14.2	19.3%	10	-16.0%
Assist Shower Bedridden Resident 2 staff	V	2 staff 1 resident	7.1%	15					15	0.0%
Clean DaySpace After Lunch - Sweep	F	2 Day space per shift	3.0%	6.4			7	9.4%	4	-37.5%
Clean DaySpace After Lunch - Mop	F	2 Day space shift	6.1%	12.8	10	-21.9%	13.5	5.5%		
Clean DaySpace After Dinner	F	2 Dayspace per shift	9.1%	19.2	15	-21.9%	20.3	5.7%	14.5	-24.5%
Deliver Rubbish to Central Collection Centre 1 Staff	F	1 Staff 1 Trip per shift	3.4%	14.2	15	5.6%	15	5.6%	10	-29.6%
Deliver Rubbish to Central Collection Centre 2 Staff	F	2 Staff 1 Trip	2.4%	5			5	0.0%		
Prepare Change of Clothes for Shower	V	1 Change Per Resident	1.0%	4	4.4	10.0%	2.5	-37.5%		
Wipe Down Wheelchair 1 Staff	V	1 staff per wheelchair	0.8%	3.5			5	42.9%	2	-42.9%
Wipe Down Wheelchair 2 Staff	V	2 staff per wheelchair	1.3%	2.7			2.7	0.0%		
Clean Sluice Room	F	1 sluice room	0.6%	2.5			2.5	0.0%		
Washing Rubbish Bins 2 Staff	F	2 staff 10 bins	5.7%	1.2			1.2	0.0%		
Serving Meals 4 Staff	V	4 staff serving meal	14.8%	15.5	12.6	-18.7%	20	29.0%	16.5	6.5%
Serving Meals Bedridden per 1 Staff	V	1 staff 1 resident	1.9%	8					8	0.0%
Serving Bids per 1 Staff	V	1 staff 1 resident	0.1%	0.355			0.355	0.0%		

[26] Duan, Y.; Song, Y.; Thorne, T.E.; Iaconi, A.; Norton, P.G.; Estabrooks, C.A. The Complexity of Burnout Experiences among Care Aides: A Person-Oriented Approach to Burnout Patterns. Healthcare 2023, 11, 1145. https://doi.org/10.3390/healthcare11081145.

Result 2: Challenges in jobs

- From the interviews, we have discovered several job challenges

- Such as the need for physical fitness, the additional workload each worker needs to handle, managing the emotions of residents' family members, handling residents' discomfort cum behaviors, and decreasing employees' benefits. From a person-oriented approach to burnout [27], the below variables are to be managed.

Physical Fitness / Manpower / Family of Residents	Residents / Compensation/Benefits/Motivation
Physical Fitness - Need physical strength - Physically fit and strong **Manpower** - Need to do more tasks per person - Cover employees on medical leave **Family of Residents** - Fussy and demanding - Often escalate to staff nurse without discussion - Complaint by family - Keeps talking to busy staff	**Residents** - Handle to handle residents with difficult behaviors - Behavior of residents such as aggressive, uncooperative, elderly issues such skin tears, throwing feces - Language/communication, e.g., dialects, Malay **Compensation/Benefits/Motivation** - Behaviors of colleagues - Meals provided from 3 cut to 1. Monthly meal allowance not sufficient to replace 2 previously provided meals - Lower salary than other nursing homes - Do not feel empowered to do things that are helpful

[27] Mäkikangas, A.; Kinnunen, U. The person-oriented approach to burnout: A systematic review. Burn. Res. 2016, 3, 11–23. https://doi.org/10.1016/j.burn.2015.12.002.

Result 3: Makes work enjoyable

- In reference to Rinnan et al., [28] five dimensions to Joy of Life working in a nursing home.

- Such as the purposefulness in the work, supporting colleagues, the organization putting an effort to encourage the employees, and affirmation from the residents and managers.

Passion/Calling/Meaningfulness
- Passion, meaningfulness
- See this job as a calling to provide love to others
- Providing best care to the residents
- Enjoy the friendship of residents
- Able to handle and build relationships with residents because they are lonely
- Feel appreciated by the residents
- Provide for family in home country
- Learning new things every day

Organization
- The gatherings/freebies/benefits from the organization

Colleagues
- Value teamwork
- Colleagues become friends— bonding
- Colleagues are helpful, friendly, enjoyable
- Entrusted and valued by colleagues

Affirmation of Good Service
- Good feedback and appreciation from the manager and supervisor
- Able to handle and build relationships with residents because they are lonely
- Able to manage difficult residents, e.g., Dementia
- Receive "Thank You"; feel appreciated by the residents

[28] Rinnan, E.; André, B.; Drageset, J.; Garåsen, H.; Espnes, G.A.; Haugan, G. Joy of life in nursing homes: A qualitative study of what constitutes the essence of Joy of life in elderly individuals living in Norwegian nursing homes. Scand. J. Caring Sci. 2018, 32, 1468–1476. https://doi.org/10.1111/scs.12598.

Result 4: Things to be removed from jobs

- According to a Norway study [29] on nursing homes, quality and safety challenges include structure, coordination, organization politics, and external demands.

- In this study, from the nursing aides and health attendants, in addition to focusing on the core medical tasks, the employees were looking to reduce tasks such as changing diapers, floor mopping, manual documentation, dealing with difficult colleagues, and over-supporting colleagues.

About the Job
- Transferring residents because it is physically demanding
- Change diapers because it is smelly
- Showering because there are only 3 employees to shower 40 residents at night, and follow timetable (start from 5 a.m. to 7 a.m.—manpower shortage)
- Floor mopping because it is menial work, prefer to practice medical skills
- Documentation (lots of paperwork)
- Some recording that can be reduced
- Equipment checklist maintenance
- Cleaning the wheelchair (daily 47 residents)
- Manual work due to equipment breakdown for long period without repair
- Overlapping work with HA; do not mind helping but not regularly. Job scope definition between NA and HA is not very clear in some parts. E.g., housekeeping is the job of HA as a result of labor shortage

About the People
- Difficult and gossipy colleagues
- Dealing with family members
- Stress from unexplained difficult behaviors from the residents, e.g., non-stop crying
- Heavy workload due to manpower shortage (high attrition date)

[29] Johannessen, T.; Ree, E.; Aase, I.; Bal, R.; Wiig, S. Exploring challenges in quality and safety work in nursing homes and home care—A case study as basis for theory development. BMC Health Serv. Res. 2020, 20, 277. https://doi.org/10.1186/s12913-020-05149-x.

Result 5: Advice for job seekers

- According to Stone and Dawson (2018) [30], healthcare workers are essential for good patient care.

- Job seekers need to understand the roles of nursing aide and health attendant require a mindset of treating this as a calling will be sustainable.

- The need for tact in communication, handling the stakeholders, long working hours, and duty beyond self would be expected.

• Work environment is different from other industries • Must have passion and interest, patience, and enthusiasm • Job as a calling rather than just a job • Physically, mentally, and emotionally prepared • Sweaty, physically uncomfortable • Pray duty is free from troubles • Expect to clean rubbish like a janitor • Have initiatives	• Learn how to interact with the residents and colleagues • Appreciate your colleagues and be helpful in all ways • Trust in yourself to do the job well • Related healthcare skills will be helpful • Expect overtime • Need to manage own work–life balance • May need to work for full 10–11 days before 1 off day is given.

[30] Stone, R.I.; Dawson, S.L. The origins of Better Jobs Better Care. Gerontologist 2008, 48, 5–13. https://doi.org/10.1093/geront/48.Supplement_1.5.

Discussion

- Caregivers in healthcare nursing homes confront a myriad of challenges as they tend to elderly residents with intricate health issues, necessitating specialized support.

- Notably, the DDMT-DT design methodology, emphasizing empathy and iteration, proves invaluable here. This involves pinpointing user needs, defining issues, brainstorming solutions, prototyping, and testing. Applying DDMT-DT to caregiving helps unearth caregivers' needs and challenges, leading to solutions like streamlined medication management tools or emotional support programs.

Research limitations

- The application of DDMT-DT in hospitals holds potential for improving patient care, employee experience, and efficiency. However, its implementation faces challenges due to the complex healthcare system, resistance to change, limited resources, data privacy issues, hierarchy, power dynamics, and time constraints. These factors complicate the effective use of design thinking within the healthcare context, necessitating tailored strategies to overcome these barriers while capitalizing on the benefits.

- Despite these challenges, DDMT-design thinking can be a valuable approach for hospitals to improve patient care and organizational efficiency. To overcome these challenges, hospitals should invest in building design thinking capabilities, prioritize stakeholder engagement, and allocate sufficient resources to design thinking initiatives.

Recommendation: Opportunities for improvements

- Chua [31] suggests in his article 'Challenges Confronting the Practice of Nursing in Singapore' that there is a need to deploy the Industry Transformation Map (ITM) and creative use of technology to circumvent the labor dependency.

- The resident-centricity would need to be reimagined, and all work processes adhered to in delivering good medical care to residents cum families and motivating the employees.

Cleaning Technology	ITM Technology
• Technology in the cleaning industry • NEA Guide on Specifications for Outcome-based/Performance-based Cleaning Contract [32] • Office Cleaning Template • Washroom Cleaning Template	• Healthcare Industry Transformation Map for aging population and rising chronic diseases [33] • Develop new/redesign existing jobs • Raising productivity through innovations and patient-centric solutions
Residents Welfare	**General Workflow**
• Resident-centric • Maintain level of independence in movement • Greater understanding between employees and residents • Support for caregivers and relatives of residents	• Workflow that requires articulation of cost and benefits • Detail workflow for implementations may include items from the other 3 categories. • Workflow which requires further studies to unleash hidden values using LSS BB/YB Projects

[31] Chua, G.P. Challenges Confronting the Practice of Nursing in Singapore. Asia-Pac. J. Oncol. Nurs. 2020, 7, 259–265. https://doi.org/10.4103/apjon.apjon_13_20.

Conclusion

The research delved comprehensively into healthcare nursing home employees' tasks, employing methodologies like job shadowing, interviews, and the DDMT-DT approach to understand practices and enhance tasks. Utilizing lean methodologies, stakeholder mapping, and more, it revealed challenges, guiding policy improvements for resident care.

The study showcased DDMT and design thinking's value, offering 15 recommendations that influenced broader studies across Singapore's healthcare facilities. It emphasized strategic and cultural leadership, streamlined processes, and multi-faceted solutions to create a supportive work environment benefiting employees and residents.

Future studies should consider dynamic factors like festivities and pandemics, necessitating critical skills and rapport with caregivers for insightful research.

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Backup

Cleaning Technology

S/N	Description	Current Practice	Opportunities and Benefits	Improvement Opportunities / Recommendation			Technology Lifecycle Stage
				Short Term	Mid Term	Long Term	
1.	Clean Room Sweeping & Mopping (Fixed - 13.8%)	Manual broom and mop, with pail and trolley	• Concurrent vacuum and mop handheld to combine 2 steps into 1 to improve cycle time. • This saves water, detergent and eliminate the use floor of dryer.	Test concept with domestic version of handheld and noise level	Source for commercial version of handheld	Co-develop robots with IHLs such as but not limited to SUTD for customization. See note below	LionBot collaborates with SUTD to roll out 300 robots in 2020
			• Vacuum and mop robot to replace 80% of manual work, remaining 20% into incidental cleaning. • This saves water, detergent and eliminate the use of floor dryer.	Test concept with domestic version of iRobot and noise level	Source for commercial version of cleaning robot		
2.	Cleaning Denture (Var - 0.24% per denture)	Manually brush every denture by personal brush and store in individual container	• Ultrasonic cleaning for dentures that can allow concurrent cleaning in a shorter time. • Small form factor cleaner is required as space is limited • Other items can be cleaned such as feeding tube, utensils	Test concept with medical grade small formfactor ultrasonic cleaner	Full implementation of ultrasonic cleaner for denture and other equipment. See note below		Matured. High adoption in medical grade environment.
3.	Spraying air freshener after diaper change	Manually spray air freshener in rooms after routine diaper change (after meals back in the room)	• Time controlled automatic spray device according to schedule after routine change of diapers • Portable air-purifier can be considered if odor is a concern • Saves time to spray and to control the amount used. • Limit manual spraying to incidental change of diapers.	Immediate. Explore odorless options to address resident's concern about smell.			Matured. High adoption in commercial and home settings.

Note: S/N 1-3 must meet relevant sections in
- Environmental Cleaning Guidelines for Healthcare Settings (Version 1, Jun 2013)
- The National Infection Prevention and Control Guidelines for Acute Healthcare Facilities (2017)

ITM Technology

S/N	Description	Current Practice	Opportunities and Benefits	Improvement Opportunities / Recommendation			Technology Lifecycle Stage
				Short Term	Mid Term	Long Term	

4.	Manual update on records
	
	(Var Daycare: 35%, NH: 3.6%)
		All manual records in practice.	Digitize manual updating: Daycare
			• Daycare attendance sheet
			• Daycare personal files
			• Inventory records check on
			  o PPE
			  o Cleaning related
			  o Equipment maintenance
			  o First aid related
			  o Pantry supplies
			  o Shower essentials & toiletries
				Test out concept in small quantity.	Implementation of full integrated ERP system for control, and automated documentation control software.		Matured for 4G technology, developmental for 5G technology.
							
							Doc Control software at accelerated adoption for environmental sustainability and cycle time improvement.

		Manual monitor medicine stocks and expiry in the prep room fridge for nursing homes	Digitize manual updating: NH
			• Nursing home laundry handover/takeover
			• Inventory records check on
			  o PPE
			  o Cleaning related
			  o Residents / clients related
			  o Equipment maintenance
			  o First aid related
			  o Pantry supplies
			  o Shower essentials & toiletries,				

5.	Laundry counting (Fix 7%)	Manually count when taking / handing over, distribution, inventory control. Current SAP ERP system is deployed but not integrated.	• Use RFID technology to tag all fabrics such as residents' clothing, bed linens. Laundry friendly tags can last through 300-400 wash cycles. • Inventory count using scanner in batch. • Wash cycles, wear & tear by ward, safety stock level, quality of linens by suppliers. • Outsource to company who used RFID tag but need to keep same machine for incidental cleaning	Explore and test out concept in small quantity for RFID with vendors.	RFID full version into integrated ERP System		Matured for 4G, developmental for 5G technology. High adoption in commercial laundry factories. E.g. Orchid Laundry, NY Laundry.

ITM Technology

S/N	Description	Current Practice	Opportunities and Benefits	Improvement Opportunities / Recommendation			Technology Lifecycle Stage
				Short Term	Mid Term	Long Term	
6.	Sending and collecting laundry (Fix: 1.2%)	Staff are required to manually deliver to or collect laundry from ward. Current SAP ERP system is deployed but not integrated.	• Robot to transport laundry. • This will cut down about 5 minutes per trip and to be less reliant on human availability.	RFID integration concept together with tag on laundry trolley	Requires 5G technology to be more effective for integrated ERP system		Panasonic autonomous delivery robot HOSPI in CGH. S'pore 5G to be ready in 2023
7.	Warchart update	Staff has to go to level 2 office to obtain information monthly, and manually update on notice board.	• Warchart is pride of Nursing staff hence should not be digitalized	Explore with Chwee Eng to streamline process so that update could be minimized to once a month. NH teams indicate information update a few times a month, and suggests electronic display and team bonding can be achieved by designing display page.			
8.	Sending and collecting food (Fix: 3.6%)	Staff are required to go to kitchen to collect or deliver food trolley	• Robot to transport food. • This will cut down about 5 minutes per trip and to be less reliant on human availability.	RFID integration concept together with tag on food trolley	Requires 5G technology to be more effective for integrated ERP system		Panasonic autonomous delivery robot HOSPI in CGH. S'pore 5G to be ready in 2023
9.	Manually tap on door access using staff pass	Currently, all access must be tapped by using staff pass. With trolleys and wheelchairs, excess movement is required tap and to respond to time limit of door access	• Automate using handsfree access system, such as smart staff pass currently in research overseas. • This can cut down on motion and improve safety.	Test out smart staff pass concept with technology vendors.	Requires 5G technology to be more effective for integrated ERP system		Hi-tech ID badge Humanyze.com Device under development. S'pore 5G to be ready in 2023.
10.	Staff to staff communication	Currently, mobile phones are not allowed by NA/HAs in the ward. Staff requiring the help of another has to walk around to look for help.	• Staff to staff communication using technology such as smart staff pass currently in research overseas. • This can cut down time spent to track and locate staff for help.	Test out smart staff pass concept with technology vendors.	Requires 5G technology to be more effective for integrated ERP system		Hi-tech ID badge Humanyze.com Device under development. S'pore 5G to be ready in 2023.
			• Allow usage of handphone	Explore to allow usage of handphone but block certain websites. This will also help item 13.			

Residents Welfare

S/N	Description	Current Practice	Opportunities and Benefits	Improvement Opportunities / Recommendation			Technology Lifecycle Stage
				Short Term	Mid Term	Long Term	
11.	Resident's movement	Manually wheelchair for all residents	• Power wheelchair with commode for selective residents who can move on their own.	Test concept and workflow to determine feasibility.	Pending on concept testing.		Developmental in India.
12.	Dealing with Resident's Relative	Staff in wards are responding to relative's enquiries on resident's information.	• Appoint a Resident Service Manager to centralize resident's welfare communication so as to relieve ward staff from job interruption and emotional stress with unhappy relatives. This is similar to hospitals where only the assigned spokesperson will communicate on patient's welfare and conditions.	Identify 2-3 NA/HA per ward level as ambassador and they should be guided on how to handle difficult NOK and escalation to MSW/SQ. Status: updated Service Quality for review			Matured. One-point contact for patients already in used in hospitals for communication with relatives.
13.	Language Barrier	Staff has difficulty understanding Mandarin, Malay, Tamil	• Language training for staff who are motivated to learn the basic conversational level. • To have resident language teacher in collaboration with LHUB to teach language at nursing home after work. • Provide incentives such as but not limited to time-off, OT, promotion	Collaboration with LHUB to teach language at nursing home AFTER work	Incentive plan for learning languages (need not be monetary incentive).		Matured. LHUB has established courses and system.
			• Translation application for written and voice.	Explore translation application, pilot with small group of staff. This requires to work with item 10.			

General Workflow

S/N	Description	Current Practice	Opportunities and Benefits	Improvement Opportunities / Recommendation			Technology Lifecycle Stage
				Short Term	Mid Term	Long Term	
14.	Sorting the clean-up trolley	Sorting cups/plates/spoons before bringing to kitchen.	• If there is no other workflow definition issue or manpower issue, this can be eliminated. • If separation is required by auto washer, design a ready-to-use tray that can be inserted into the auto washer.	Immediate, but to be agreed upon by various stakeholders such as but not limited to kitchen department.	Design ready-to-use trays for auto washer.		Matured. Trays can be designed to custom fit auto washers.
15.	Process / Task Optimization and Standardization	Currently there are variations of tasks and processes being carried out in different time of the day.	• Optimization of task can be accomplished by detail study of effectiveness and efficiency. • Standardization can help to achieve productivity goals	LSS BB / GB projects combine with design thinking methods to optimize and standardize processes / tasks according to operation needs			Matured. LSS has been a proven methodology for operations improvement