Relationships between resilient health care and workload: an exploratory study

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In everyday work, people hardly notice the extra effort made by health workers to provide care for their patients.

"As a result, they fail to recognise the vulnerabilities clinicians compensate for, the challenges they overcome or the emotional toll 'normal work' imposes on clinicians."

Smaggus (2019)

Law of fluency: *"Well adapted cognitive work occurs with a facility that belies the difficulty of the demands resolved and the dilemmas balanced."*

Woods (2002)

Objective

To investigate the relationships between workload and resilient health care.

Method

Public university hospital with ~900 in-patient beds and ca. 6000 employees

Radiology Department, 220 Staff, 155 Participants

Method

1 The centrality of each actor in four ability-based social networks (i.e., monitoring, responding, anticipating, and learning) was considered as a proxy of each actor's contribution to the overall system resilience.

Network metrics: in-degree, closeness, and betweenness. And two non-network metrics: availability and reliability.

2 We assessed the workload based on the NASA-TLX questionnaire, which produces indicators related to six dimensions of workload (in addition to an overall score).

Dimensions: Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and Frustration Level.

3 Follow-up with semi-structured interviews with 21 respondents.

SNA-Questionnaire

Roster	From the list of peers below, choose those you interact with for advice or information.	Marks on names
Ability to Monitor	#1 Mark how often you consult to understand what is happening or has occurred in real-time in your work.	Marks on a 5-point scale for each one from the list of peers shortlisted in the roster by you:
Ability to Anticipate	#2 Mark how often you consult to anticipate short, medium, and long-term trends concerning your work.	1 – never 2 – less than once a month
Ability to Respond	#3 Mark how often you consult to know what to do when an event occurs (either expected or unexpected) in your work.	3 – one to three times a month 4 – one to three times a week
Ability to Learn	#4 Mark how often you consult to learn about positive or negative events in your work.	5 – daily
Non-network attributes	#5 Score the list of peers shortlisted in the roster regarding their likelihood of being available when needed.	Marks on a 5-point scale for each one from the list of peers shortlisted in the roster by you:
	#6 Score the list of peers shortlisted in the roster regarding the frequency in which they provide exactly the information requested.	1 – never; 2 – rarely; 3 – sometimes; 4 – frequently; 5 – always

Resilience Score of **actor** *i* , **network** *j*

$$RS_i = \left[\sum_{j=1}^{4} ID_{ij} \times C_{ij} \times B_{ij}\right] \times A_i \times R_i$$

ID = In-Degree C = Closeness B = Betweenness

Non-network metrics: A = Availability R = Reliability

NASA TLX- Questionnaire

1

1. Rate the following scales, in your opinion, the level of influence of each factor in your work.   Low/High

Mental Demand   How much mental and perceptual activity was required ?

Physical Demand   How much physical activity was required ?

Temporal Demand   How much time pressure did you feel due to the pace of tasks ?

Performance   How successful do you think you were in accomplishing the goals of work and your personal goals at work ?

Effort   How hard did you have to work (mentally and physically) to accomplish your goals ?

Frustration   How insecure, discouraged, irritaded and stressed did you feel during your tasks ?

2

2. Choose, between each pair of factors, the one that represents the major contributor to your workload.

1. **Mental Demand** vs **Physical Demand**

:

15. **Effort** vs **Frustration**

Hart & Staveland (1988)

☹ (+ Workload) 1ˢᵗ ⟺ 155ᵗʰ (– Workload) ☺

☺ (+ Resilience Score) 1ˢᵗ ⟺ 155ᵗʰ (– Resilience Score) ☹

Code	W	RS	Group	Mon	Ant	Res	Lea
RA13	121ˢᵗ	29ᵗʰ	-W +RS	51ˢᵗ	31ˢᵗ	22ⁿᵈ	20ᵗʰ

The higher the ranking of the actor in the learning network, the lower their overall workload.

Results

"I get two schedules: one for the second-year residents and another for third-year residents. I have a teaching goal. So, we put in these schedules exams that residents are interested in learning how to do. Then on Mondays and Wednesdays, I work according to the residents' demands, I revise their interpretation on the exams beforehand, and when they do not have many exams to interpret, I use the ones that are available at the service interpretation list." – Radiologist **(RA13)**

"When we come to work in a big center like this, we come a little raw, so to speak, and without experience – all of that, but you can count on professors, on highly qualified people, right? And they make sure to teach you so that you do the right thing... Which makes it easier to do a proper report, a diagnosis, right? If you do a decent exam, an easy one... When it gets to the other end (Radiologists), they are sure of what they are doing." – Radiology Technician **(RT67)**

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Results

"We are always exposed to the emergence of new technologies. And now we have received two new ultrasound devices that have new functions, […], it makes it possible to do new exams, so there is a phase for you to learn how to use that. [...], but new technologies are always something that requires you to go study, to review new protocols, so they are always things that require some adaptation, so… I would say that it is very common in the daily life of radiology." – Radiologist (RA13)

"I read a lot of stuff focused on self-knowledge, self-development, like that. I read a lot of biographies. My reading style is more focused on this, so that I can learn and evolve. Also, I think this helps me, substantially, because this mental preparation comes indeed from there, from anticipating what lies ahead." – Radiologist (RA13)

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Results

Example of how data from the interviews were analysed

Code	Social Interaction	Type of social interaction	Actors involved	Impacted workload dimensions	Resilience abilities deployed	Contextual factors
NT56	The telephone call, during the pre-exam, to an assistant physician to clarify any doubts about the patient.	Informal	Nursing Technician (night shift); External professionals	Mental Demand; Temporal Demand; Effort	All	Need to contact an assistant physician in order to gather additional information about the patient.

Code	Coping strategies to handle the workload
NT56	Taking the service courses and be up to date with them – e.g., drugs, catheter courses, otherwise asking someone for help.

Conclusions

❑ The relationships between resilient health care and workload are non-trivial;

    ❑ Although the overall workload and the overall resilience scores have no correlation, there are correlations between the variables that compose those aggregate indicators;

❑ Social networks (i.e., monitoring, anticipating, responding, and learning) matter to the workload;

❑ We identified several resilient strategies to cope with the workload, but they are likely not to be sufficient when used in isolation.

Conclusions

Possible practical implications of this study (still tentative, data analysis is under way):

❑ Is the actors' position in the network compatible with their competences and organizational support?

   ❑ E.g., are all central actors really able to provide reliable information in a timely manner to their co-workers?

   ❑ E.g., how can we release the burden from some high in-degree actors? Is it possible to make information available through dashboards or other visual devices?

❑ Is it possible to identify effective workload coping strategies adopted by some actors? If yes, can we train other actors to adopt similar practices?

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Thank you!

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