

## The Effect of Staff Shortage on Product Design

Interview with Bo Saxberg

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CR: Shortages of skilled medical professionals (RNs, LPNs, and technologists) have been written about for years. What are the consequences of shortages in skilled medical professionals?

BS: The staff shortage issue is becoming more acute. It goes in cycles: some years ago we had too many docs and too many pharmacists; now there are too few. I think the problem stems from the short term view of provider organizations. They should take a long look at the market when planning for resources. Now we are getting the baby boomer wave and the planned staffing level is not sufficient. Supply cannot match demand.

In addition, the baby boomers seek better quality and improved outcomes. These two drivers are challenging to satisfy and are important stressors to the system. They also contribute to significant resource constraints.

Staff shortages impact operations in three ways:

1. Increased overall cost of operation. Reports demonstrate the increased cost of labor. Staff must be paid more. A compounding effect to the wage increase is the fact that women have more job opportunities than ever before. The nursing job, which is female dominated, is less attractive to women who tend to opt for jobs with better pay and with better hours. In response to this stressor, providers are starting to recruit nurses from overseas.
2. Quality of Care. We do not know how to measure quality. We lack clear quality indicators. US healthcare is like the automotive industry of the 70's: things will change when we become transparent on quality and cost. JD Powers triggered a massive change in the American automotive industry when it pointed out quality deficiencies and when vendors reacted, embracing quality rules such as those from Deming. We will see the same happening in healthcare.
3. Patient satisfaction. Staff shortages can have a negative impact on the patient experience, perceived as an indicator of the quality of service. Patients need to talk to nurses or doctors in a timely fashion, for example.

The potential adoption of DSS (Decision Support Systems) may de-scale the role and responsibilities of care professionals. DDS represent opportunities and threats. How can we take a less trained individual and make that person more efficient and skillful by providing better, more timely and relevant information? DSS offer the promise of dramatically increasing human performance in selected areas.

Providers may have to increase their training costs and change their pathway implementations to provide DSS at the point of care. Inpatient prescriptions are starting to reflect a de-scaling model. In some cases, nurses can order prescriptions.

Since provider organizations face staffing shortages, they must learn how to deal with scarce resources, and consider a different model for care delivery, akin to a process line for assigning adequate resources.

The practice of medicine remains ancient, old fashioned and unpredictable. The real question is: Are we going to use our healthcare professionals differently and better?

CR: Relying on your experience and observation, let us explore how provider organizations cope with staff shortages? Do they learn to operate well with fewer highly skilled individuals?

BS: Yes, there are increasing numbers of care-giver layers. For example, many organizations have physician assistants (PAs). The concept is to save money by shifting care activities from one professional layer to a lower one. Defining the boundaries between the layers is the key question. Should a PA, for example, be considered as between a nurse and a physician?

There is no standard model for hospital workflow. There is no easy recipe that describes the use of the different healthcare workers because each organization is unique with its specific workflow requirements.

Overall, increasing the number of professional layers minimizes cost. However, physician and nursing societies resist such changes because they want to protect their role and prerogatives in patient care. Their push back will be short lived because of the high demand for care. The real issue will be the after-boomer wave when contraction will occur; the justification of a multi-layer organization of care professionals may no longer exist.

CR: Do they have a systematic strategy for the better use of technology (IT, smart devices such as PDAs)? Do they expect technology and medical devices to be more pro-active, intelligent, user-friendly, etc.?

BS: The conceptual boundaries are much easier to define with your first question. DSS or online EMR is the answer. The workflow benefits are evident.

Your second question gets trickier. Provider organizations may not create a clear position on the use of “smarter or more automated devices”. We know that technology exists for more efficient and flexible displays (real-time I/O on devices brings richer information on smaller screens). There are devices, such as defibrillators, that are capable of understanding their purpose and context of use (self-awareness). With better patient identifiers, such as RF-IDs, we can help device users avoid mistakes, and prevent misuse. Devices may prescribe dosages, for example. For injectors, a fixed dosage can be set by injection session based upon previous results or injections. Whether it is defibrillator or a syringe pump, devices can become smarter. Even in surgery, visual overlays can be used to provide guidance. And most of those actions can be documented in a patient record for future retrieval.

Ultimately, if you look at the two extreme end points of the user spectrum, there is surgical sub-specialist on one end, and the patient on the other. If healthcare follows the model of other industries, such as e-commerce for purchasing an airline ticket, the patient will become responsible for his/her care choices; the patient will be empowered to take control of their own care pathways and management decisions. For example, nosocomial infection is really a serious problem in hospitals. Post surgical, home based care management equipment could be designed to support patient recovery at home, including vital sign monitoring, blood testing, and even injection/dosing requirements. It's telemedicine on steroids.

The de-scaling of care layers plus the adoption of smart devices and DSS will occur not just because of resource constraints, but also because there is an audience that accepts change. A broad group of providers and patients are actually asking for a better model.

CR: Focusing on medical technology and devices specifically, early indicators suggest that equipment OEMs are designing medical equipment to behave more like a Mac-computer: hiding the complexity from the user, making their operation more standardized and intuitive, and even offering heuristic-driven protocols that validate the procedure based on input patient information, best practices, etc. Do you agree with this observation?

BS: Yes, it reflects the professional market reality. Product and market differentiation depend upon simplifying user interfaces and supporting device use by lesser trained individuals.

At J&J, such product innovation was high on the agenda. We did it for functional reasons not just for aesthetics. Professionally used products were actually co-developed with providers. Physicians and care professionals actually prescribed the design and functionalities. I am not just talking about better display or better GUI, but also the actual feel of the product's use. In the consumer market, a similar co-development process was even more evident.

CR: In the light of this observation, which product design benefits should OEMs focus on for:

1. User empowerment (permit less skilled user perform more complex tasks)
2. User efficiency (make the user more time efficient)
3. Better Outcomes: avoid malfunction, self-trouble shooting, etc.

BS: I think OEMs vendors should look at all this within the context of the adoption cycle. So they need to target #2 first (make the existing sophisticated user more efficient first) and then consider #3 but NOT at the expense of #2. Care professionals fight for better outcomes if the device does NOT slow them down. Time is KEY!

Over time, #1 should be addressed. As provider organizations gradually invest in workflow changes, vendors can start to focus on #1. Technology

alone cannot change the workflow, so vendors have to wait for workflow change to occur before offering a new category of devices relying on different workflow paradigm.

After the workflow changes have occurred THEN it changes the priority of device requirements. I know some provider organizations that have already de-scaled the way they approach a specific pathway by relying upon a telemedicine program. A new workflow typically requires the involvement of new users—most likely less skilled—whose product requirements are different. In such situations, it would be a mistake to design the product based upon the old paradigm and the old class of users.

The bottom line is that vendors can no longer sell technology boxes. They MUST understand the clinical workflow and the contextual use of their product. Vendors must be pro-active and segment their target market by clinical workflow.

CR: If OEMs indeed continue to develop smarter, more automated, and user-centric devices, what potential pitfalls do you see for the:

Product liability (shifting the risk from the user to the device)

Too much delegation to untrained staff

Poor use of existing talent.

BS: Product liability is a key issue. Anytime you create a “smart” device or an IT solution, FDA steps in and takes a hard look. It is certainly true for DSS and any intelligent software. This adds complexity in the product development process.

The issue is not limited to the shift of liability; there is also the shift of training cost from the providers to the equipment vendor. The question is the vendor’s level of sensitivity to risk and cost, and what does the vendor want to do?

For example, with prescription writing available on PDAs, who takes responsibility for the prescription? The system has more intelligence, enabling a less skillful user to make decisions, but the liability to the vendor has increased. The risk-to-benefit ratio has to weigh improved care responsiveness against the risks of error. The same can happen with defibrillators; the untrained user can use the product. What happens in case of malfunction? It comes back to the level of quality as manufacturers: what do they know about their own quality process, and what can they manage in terms of liability exposure?

Product liability is about risk stratification: the type of clinical application, the degree of liability exposure, and the vendor’s knowledge of how its product will be used and in what context or clinical pathway.

Points #2 and #3 equate to the provider liability, awareness of use policy and what care activity providers want to shift from one professional layer to the next. The vendor will actually drive that to some extent. User qualification will be described by the vendor of the device. There may be user certification programs for the device use. Eventually de-scaling of the care layers will occur by the device use and controlled by the vendor.

CR: Do provider organizations actually ask for better designed products to achieve the above?

BS: I think vendors are ahead of care organizations. Providers have not gone through the necessary re-engineering of their care pathways and workflow. So I think it will be a vendor-led gradual change.

Vendors should focus on the sophisticated users first because they are the first line adopters. Vendors could then look at solutions to facilitate the re-engineering changes.

CR: What is the payer’s perspective and interest in that debate; i.e, would they implement incentive programs to foster adoption?

BS: Payers do not want to get involved in re-engineering processes. They would pay for performance improvement at a given cost and quality level. If the market becomes more transparent for cost and quality, and if a provider says “I can lower the cost for the same quality”, payers will support the process changes. The problem is that activity-based costing models have been embraced by too few organizations. Unlike the automotive industry where cost and quality is known at every single step of the process line, payers do not see that cost-modeling. As a poor substitute, they are forced to rely solely on quality indicators.

The change impetus will come from innovative providers deploying new technologies to change workflow. These leaders will come to payers and propose a contract based upon cost and quality terms.

- CR: Even if staff shortage is resolved, are the trends in product development described likely to achieve sought-after care quality and outcomes?
- BS: Everything depends on the time horizon. It is hard to say if the changes will occur regardless of staff shortage. I think the big trend is the training and education issue: it will be device and workflow specific. There will need to be more flexibility, eventually just-in-time training models.

Healthcare providers can learn from other industries in terms of training and education. I think vendor-led initiatives will occur for market differentiation reasons. Vendors are better positioned to champion workflow changes because they have a longer term view due to R&D and manufacturing planning, and can truly influence healthcare transformation. Providers are too entrenched in their short-term needs or views and have a hard time to look at changes strategically.

The bottomline: Vendors will shape workups, pathways, training, and user certification. Vendors and providers will continue to co-develop products.



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