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Alex Dubov, Liana Fraenkel & Elizabeth Seng

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Target Article

The Importance of Fostering Ownership During Medical Training

Alex Dubov, Yale University
Liana Fraenkel, Yale University
Elizabeth Seng, Yeshiva University

There is a need to consider the impact of the new resident-hours regulations on the variety of aspects of medical education and patient care. Most existing literature about this subject has focused on the role of fatigue in resident performance, education, and health care delivery. However, there are other possible consequences of these new regulations, including a negative impact on decision ownership. Our main assumption is that increased shift work in medicine can decrease ownership of treatment decisions and impact negatively on quality of care. We review some potential components of decision ownership in treatment context and suggest possible ways in which the absence of decision ownership may decrease the quality of medical decision making. The article opens with the definition of decision ownership and the overview of some contextual factors that may contribute to the development of ownership in medical residency. The following section discusses decision ownership in medical care from the perspective of “diffusion of responsibility.” We question the quality of choices made within narrow decisional frames. We also compare isolated and interrelated choices, assuming that residents make more isolated decisions during their shifts. Lastly, we discuss the consequences of decreased decision ownership impacting the delivery of health care.

Keywords: decision ownership, duty hours restriction, graduate medical education, medical decision making, shift work

In 2011, the Accreditation Council for Graduate Medical Education (ACGME) has made changes in residency regulations in an effort to reduce sleep deprivation, thereby increasing the quality of residency education, resident decision making, and consequently patient care. The four key components of new regulations included 80-hour week limits and no more than 16-hour duty shifts for first-year residents only. More senior residents could now work 24 hours with an additional 4 hours allowed for transition of care. In addition, the new regulations recommend no more than six consecutive night shifts and a continued minimum of 4 days off per month with an on-call frequency of no more than one every third night (Nasca, Day, and Amis 2010). Similar concerns about the volume of working hours and subsequent resident fatigue have resulted in various regulations in Europe, Canada, and Australia. In 1998, the Council of Europe enacted the legislation European Working Time Directive (EWTD), mandating working weeks of no longer than 48 hours for all public workers, including physicians and residents (Rodriguez-Jareño et al. 2014). This law took full effect in 2009 and implementation data are still limited. Denmark has a normal week of 37 hours and Norway averages 45 hours weekly. Sweden, Germany, Finland, and

Netherlands are compliant with the 48 hours regulation (Temple 2014). There is no national agreement on the resident work hour limit in Canada with the exception of Quebec, which has implemented 16-hour shifts and weekly hour limits (Dussault, Saad, and Carrier 2014). Australia has no consensus about the necessary realignment of resident duty hours (Temple 2014).

Several studies have sought to assess the impact of work hour regulations in the United States and Europe. For instance, while the United Kingdom is striving to achieve compliance with EWTD, the detrimental effects of hour regulation were documented in surgical fields. The studies report that while EWTD has not impacted the ability of surgical residents to acquire surgical technique, the regulations had significant impact on the development of their surgical judgment and clinical management skills (Hopmans et al. 2015). Similarly, another UK study found that 80% of consultant surgeons and 66% of surgical trainees felt that patient care and education had suffered as the result of introducing EWTD (Breen, Hogan, and Mealy 2013). The president of the Royal College of Surgeons declared, “To say the European Working time regulations have failed spectacularly would be a massive understatement” (Axelrod, Shah, and Jena 2013). In 2010 the

Address correspondence to Alex Dubov, Yale University, Center for Interdisciplinary Research on AIDS, 135 College Street Suite 200, New Haven, CT 06510-2483, USA. E-mail: oleksandr.dubov@yale.edu

National Health Service and the Secretary of State for Health requested an independent review to assess the educational and clinical outcomes associated with EWTD. The Temple (2014) report concluded that while definitive evidence of the effect of EWTD was lacking, the expert opinion indicating a negative impact of EWTD was compelling. The report describes expansion of shift work that further reduced interactions between trainees and attending physicians, diminished continuity of care, and lowered trainee quality of life. Ironically, similar results were reported in a German study titled "Less Work: More Burnout?" German researchers found that implementation of EWTD was not accompanied by reduced strain and risk of burnout for physicians. Rather, their data suggest greater intensification in work and higher risks of burnout (Richter et al. 2014).

One of the unintended consequence of the new work regulations is a significant increase in the amount of time that residents participate in shift work. Residents' decisions regarding patient care are strikingly different under the shift-work mentality from those made under conditions of continuity. For instance, a randomized study of 43 interns at Johns Hopkins Hospital concluded that trainees in the "16-hour duty" group admitted fewer patients and followed them up for shorter continuous periods. The study also documented the "strikingly low satisfaction of both nurses and residents with quality of care provided by '16-hour duty' group" (Desai et al. 2013). Similarly, a qualitative study by Nevin and colleagues documented internal medical resident perceptions of graduate medical education following implementation of the 2011 ACGME rules. All 128 residents participating in this research reported that the 2011 hour limitation had fostered an environment of "shift-work mentality" and decreased ownership of patients. The residents were inclined to think less about "This is my patient. I really want them [sic] to get better," and more about "Okay, it's time for me to go home." The quality of their decision making under conditions of shift work has changed as well. One resident explains: "The thinking process is basically taken out of the equation [because more admissions are done by the night float]. It's like somebody's already worked up, thought about it [a patient case], and he sees it a certain way, and that just corrupts the whole process, because now you don't have to go through [exploring a differential diagnosis]" (Nevin et al. 2014).

This article asserts that increased shift work in medicine has resulted in decreased ownership of treatment decisions and lower quality of care. Residents are expected to take increasing ownership of patient care as they progress through their training. A large body of research in a variety of fields stresses the important influence of ownership on human motivation, attitudes, and behavior. The state of ownership promotes feelings of responsibility or stewardship, increases willingness to assume personal risk or make personal sacrifice, and enhances self-image. People may experience feelings of possession in the absence of formal claims of ownership and they can feel ownership

toward non-physical objects such as ideas or artistic creations. Building on these observations, we propose that fostering decision ownership among medical residents is a critical component of training.

DEFINITION OF DECISION OWNERSHIP

When medical residents have a sense of decision ownership, they become personally invested in clinical decisions made for their patients. Decision ownership is the cognitive-affective phenomenon in which a medical practitioner develops a sense of responsibility over decisions about care for a particular patient and personal investment in this decision-making process. The possessive nature of medical decision ownership differentiates it from other similar attitudes such as responsibility or commitment.

As a cognitive-affective state, decision ownership includes both intellectual and emotional components. The state of ownership reflects personal thoughts and beliefs regarding a particular decision (cognitive), as well as feelings of efficacy and competence (emotional) (Pierce, Kostova, and Dirks 2001). On the cognitive level, a resident will feel comfortable making autonomous decisions in care for the patient. She will not see herself as just a medication prescriber, but will be actively involved in all aspects of patient care, being thorough, proactive, and responsible. This assumption of responsibility for a decision may lead to feelings of ownership as a result of one's self-investment in it (time to discern, energy, care, concern). On the affective level, a resident may feel an affective connection between self and the treatment decisions made in a particular case ("this is MY decision," "that was MY idea"). Such statements include both affective and cognitive information based on factual beliefs and affective judgments.

Feeling of decision ownership is tied to the individual need for efficacy as a health care provider. Some scholars claim that ownership has an instrumental function and that the motivation to own is rooted in the desire to interact effectively with one's environment (Pierce, Kostova, and Dirks 2003). In addition, familiarity with the medical and social history of a patient results in higher ownership. Ownership arises from relationships, and the more knowledge about the patient a resident has, the stronger will be that resident's connection and ownership of that patient's care. Any time something is owned, greater care, attention, and energy are poured into it. Therefore, feelings of decision ownership are induced by efficacy beliefs, familiarity with the medical history of a patient, and self-investment into the given decision.

A growing number of studies from various disciplines (management, psychology, philosophy, consumer behavior) describe the importance of ownership and its impact on attitudes, motivation, and behavior. These studies demonstrate the relationship of ownership with commitment, involvement, integration, and cooperation (Vandewalle, Van Dyne, and Kostova 1995). When employees in an

organization have ownership, they tend to engage in positive behaviors driven by a sense of responsibility, including the realm of decision making (Mayhew et al. 2007). People evaluate things more favorably when they own them. Therefore, it is possible to expect that people will be more satisfied with their work when they feel psychological ownership over it (Avey et al. 2009). Ownership is also associated with a sense of responsibility, stewardship, and desire to protect the target of ownership (Pierce, Rubenfeld, and Morgan 1991). Organizational psychology describes correlation between extrarole behavior and ownership, as well as between ownership and organizational citizenship (Van Dyne and Pierce 2004).

Ownership may also lead to negative outcomes, especially when this feeling is challenged by others. For example, ownership may preclude cooperative behavior. Similarly to an overly possessive child, people may refuse to share the target of ownership with others or feel the need to retain exclusive control over it (Brown and Robinson 2011). At times people may become too preoccupied with the target of their ownership and will continue to invest in it even when it has a detrimental effect on others. According to Pierce, the loss of or separation from our possessions can lead to “shrinkage of our personality” (Pierce, Kostova, and Dirks 2001). When people are separated against their will from the target of ownership (eg. terminated employee), they may engage in destructive behavior. Ownership may lead to territoriality which in turn may lead to anger and reactionary defenses when a perceived infringement occurs (Brown, Crossley, and Robinson 2014). Feeling of ownership may also motivate people to selectively adopt others’ suggestions for change (Baer and Brown 2012). For instance, a primary care provider and an oncologist may disagree on the need to offer chemotherapy to an end-stage cancer patient. The oncologist who has been involved in that patient’s fight against cancer may have a difficult time focusing on palliative needs of her patient even when chemotherapy is clearly causing more harm than good. She may become territorial and defensive, and would not accept the advice of the primary care doctor to focus on palliative care.

ANTECEDENTS OF DECISION OWNERSHIP

The psychology of possession describes three criteria to develop ownership—the need to be in control (efficacy), the opportunity to know the target of ownership intimately (familiarity), and the investment of personal time, energy, and effort (self-investment). There is a causal relationship between the amount of control a resident has over a particular clinical case and the degree of decision ownership in that case. Furthermore, the longer a resident knows the patient and the deeper is the relationship between them, the greater is the degree of decision ownership that will be manifested by the resident. Finally, the more a resident invests herself into a clinical case by investing her time, ideas, and

psychological/intellectual energy, the more she feels ownership over decisions resulting from this investment. Given these three reasons for decision ownership, the following section explores some contextual factors that may lead to the development of ownership in medical residency.

Responsibility

Decision ownership is a feeling on the part of residents that they have a responsibility to make decisions that are in the long-term interest of their patients. Conventional wisdom suggests the link between responsibility and ownership. Ownership causes people to defend their rights and to protect or enhance the object (i.e., to be responsible). Philosopher Paul Ricoeur describes the similarity between ownership and responsibility when he defines responsibility as the capacity to accept one’s own actions, to have ownership over them and consequently to answer for them and bear their consequences (Ricoeur 2000). Residents who feel more ownership are more likely to be proactive in recommending testing or treatment alternatives when assuming care for a new patient and are better prepared to justify their decisions. These residents will not only hold others responsible, but they will also have a higher degree of personal responsibility.

Recent studies demonstrate that increased responsibility for patient care, stemming from ownership, intrinsically motivates medical residents to learn. For instance, one study (Schultz, Delva, and Kerr 2012) found that providing care for patients over time enhanced physicians’ diagnostic and therapeutic competence. When residents perceive themselves as being the final decision maker in a clinical scenario, they will be more motivated to learn, and therefore be better positioned to make better decisions for their patients (Bruning, Schraw, and Ronning 2004). On the other hand, lack of personal responsibility and ownership negatively influences motivation and learning.

The moral sense of responsibility, derived from the cognitive concept of ownership, can be experienced on personal, professional, and social levels. Residents can experience responsibility on a personal level, such as being responsible toward their own conscience in providing care to a specific individual. Residents can also experience responsibility toward their colleagues to maintain patterns of conduct and professional obligations. Furthermore, residents must also consider the needs of society in their clinical decision making, particularly with respect to resource allocation. Thevenot (2001) posits that the process of learning to become a responsible physician often engages only two out of three levels of responsibilities: professional and social.

Responsibility and ownership are two distinct concepts. Responsibility may serve as both an antecedent and an outcome of ownership. The assumption of responsibility for a patient may lead residents to develop feelings of ownership as the result of their self-investment in care for that particular patient. Residents will invest their time, energy, care, and concern and ultimately will feel ownership over patients’ care. Responsibility can also be viewed as the

outcome of ownership. Residents who feel ownership of their patients will experience a sense of concern and responsibility for those patients. Therefore, assumption of responsibility for a patient results from ownership. Pierce, Kostova, and Dirks (2003) have suggested that responsibility and ownership should be viewed separately but there may be a reciprocal relationship between the two constructs, such that responsibility impacts psychological ownership, which in turn influences a sense of responsibility.

Continuity

Many voices in the literature point out that limited work hours have negatively influenced resident education by decreasing the number of cases residents attend to during their shifts. People develop a feeling of ownership toward an object through a relationship and interaction with the object. The more knowledge one has about an object, the stronger is the relationship/association with the object, and consequently, the stronger is the feeling of ownership. When residents are familiar with the hospital course of their patients, they are in a better position to recognize and react to changes in patients' conditions, thus demonstrating more ownership. Howard Markel described the connection between ownership and familiarity as follows: "Learning how to be a doctor is a far cry from doing shifts in a factory. You need to be there for long periods of time to see the progress of an illness" (Markel 2002). Similarly, the statement from the American College of Physicians (1989) echoes the concern that a shift-work mentality, as opposed to conditions of continuity, may undermine development of an individual sense of responsibility for patient care:

The College believes that learning to assume responsibility for other human beings' lives and well-being is perhaps the single most important task of clinical training. The hallmark of physicians' responsibility to their patients is continuity. Failure to provide for continuous care represents abandonment, which is morally unacceptable, professionally unethical, and legally proscribed. (657–663)

Decision ownership resulting from continuous care benefits patients in multiple ways. Continuity enhances the patient-provider relationship, which can lead to more effective communication (Mainous et al. 2001) and higher patient satisfaction (Saultz and Albedaiwi 2004). Studies show that patients were more at ease in talking to physicians about their symptoms under the conditions of continuity (Saultz and Lochner 2005). Continuity of medical care has also been associated with fewer hospital and intensive care days, lower percentages of emergent hospitalizations, and improvement in the receipt of preventive services (Haggerty et al. 2003). Furthermore, ownership of care increases patient self-efficacy, presumable via an improved patient-provider relationship.

Commitment

Commitment is an attitude through which residents identify goals of treatment for an individual patient and then invest themselves in the process of treatment. Residents must feel ownership of their patients in order to develop a sense of commitment. Committed residents are more willing to give of themselves to contribute to the wellbeing of their patients. The organizational behavior literature differentiates between in-role and extrarole behaviors. In-role behaviors are the bare minimum competence and skills necessary to perform as a physician. In contrast, extrarole behavior involves not only clinical competence, but also an active commitment to be an advocate for their patients' care and well-being. Extrarole behaviors encompass willingness to go above what is normally expected from a physician in order to provide compassionate and dedicated medical care in accordance with patients' personal values. This extrarole behavior or personal commitment to a patient's wellbeing is conditioned on feeling a sense of ownership for the decisions made for each patient.

Researchers have viewed commitment as being composed of the three conceptually distinct but empirically related components, namely, affective, normative, and continuance commitment. Affective commitment ("want to") refers to the residents' emotional/empathetic attachment to their patients, leading to a higher level of involvement in their care. Normative commitment ("ought to") refers to residents' feelings of obligation to continue to provide a high standard of care. Continuance commitment ("need to") refers to the extent to which a resident wants to remain the primary provider for a patient because of the costs associated with leaving. These three different commitment motives (i.e., want to, ought to, need to) are intensified by the feeling of ownership. Furthermore, lack of decision ownership may decrease not only personal commitment to an individual patient, but also commitment to the goals and objectives of residency. When a resident feels ownership of her decisions, it gives meaning to her actions and empowers her to grow as an independent professional, as opposed to being someone who merely implements treatment plans developed by others (Bruning, Schraw, and Ronning 2004).

LACK OF OWNERSHIP—FURTHER IMPLICATIONS

Having a shift-work mentality and lack of decision ownership during residency can lead to diffusion of responsibility; short horizons with focus on short-term benefits; and less chance of making interrelated choices, which are associated with optimal long-term patient care.

Diffusion of Responsibility

Lack of ownership induced by the shift-work mentality in medical residency may foster diffusion of responsibility. Diffusion of responsibility refers to the observation that the mere presence of other people in a situation makes one feel less personally responsible for the events that occur in

that situation (Darley and Latane 1968). Analogously, if an unidentified provider will take over her patient tomorrow, a resident may reason not to invest in her decisions as much as she would if she were following the case. If there is no way to identify her personal contribution, she may not be motivated to do her best and will tend to shift her responsibility onto some unspecified “other” (West 2000). Reducing diffusion of responsibility through identification of an individual effort may lead to an increased investment in decisions and better quality of care. In the current system, residents may find themselves unwitting bystanders whose decisions are not visible and have no identifiable beginning, middle, and end. Instead, they have to decide in an evolutionary manner, not knowing who else will be involved in this decision later and owning just a small part of the decision process.

A recent article published in the *Annals of Internal Medicine* discusses a case of a 70-year-old patient with a history of spinal stenosis, chronic alcohol abuse, and vitamin B12 deficiency. He was admitted to an urban teaching hospital for evaluation of generalized weakness and poor appetite. A single, undetected oversight multiplied and compounded over time; as a result, this patient’s tuberculosis remained undiagnosed, with fatal consequence (Gandhi 2005). Throughout this case, several opportunities to diagnose tuberculosis occurred, with multiple systems breakdowns that rendered a fatal delay. The author writes that shift work played an important role in this case, resulting in diffused responsibility, which may lead residents to assume that someone else is going to follow up on a test result. There were no clear lines of responsibility for follow-up needed to prevent misunderstandings.

As a patient moves among specialized services within a hospital, and as shifts of residents come and go, there are numerous episodes in which control of, or responsibility for, the patient passes from one health professional to another. If, for instance, a biopsy is performed on a polyp on colonoscopy, is the gastroenterologist, pathologist, or primary care physician responsible for following up on the pathology? Similarly, who has responsibility for “holdover” patients admitted in the afternoon and handed over to a night float resident who covers most of the medical services that night? The night resident will not see this patient unless the nurse pages her. In the morning, this patient, or rather his record, will be handed over to the primary team. In such a system of “holdover” patients, responsibility is diffused among a number of residents.

Short Horizons and Difficult Choices

Decreased ownership may lead residents to focus on short-term benefits and disregard future losses. In some treatment situations, the course of action that is most desirable over the long run may not be the best course of action in the short term. The problem of short-termism has been long discussed by researchers in psychology and economics. Economists (Marginson and McAulay 2008) point out that many corporations are unwilling and/or unable to

make investments that are needed for the future but that come with the price of foregoing short-term profits. Psychologists discuss the concept of intertemporal choice associated with a tendency to see small rewards now as much more desirable than a bigger reward down the road (Loewenstein and Thaler 1989). The immediate relevance of short-term treatment decisions is often necessarily prioritized in patient care, even though future-oriented thinking is an important characteristic of optimal treatment choices.

Residency represents a period of transition when medical students are taking on a new identity of being a doctor. Even though this change is desired, it still requires adjustment in the identity of the resident. The negative consequences of identity change will be limited when residents are able to make connection with their future professional self. In addition to knowing how they can treat their patients, they should develop a sense of how they want to treat their patients, or a connection to their future professional self (Atance and O’Neill 2001).

A recent study (Hershfield, Cohen, and Thompson 2012) demonstrated that lack of continuity with one’s future self leads to less ethical behavior when this behavior entails rewards in the present. People with less connection to their future selves are prone to make unethical business decisions, endorse inappropriate negotiation strategies (lies or bribes), lie or cheat for monetary rewards, and make false promises, compared to people with more connection to their future selves. Additionally, people who feel similar to their future selves demonstrate more empathy, are less likely to consider the perspective of short-term gains, and are more likely to think about the long-term negative consequences of their actions in the present, compared to people who feel dissimilar to their future selves.

The current model of medical residency programs require future doctors to work within narrow time frames of one’s shift, focusing their attention on a short horizon of decisions and actions. In the context of the literature just reviewed, one might question the quality of their decision making when provided the absence of connection with the future outcomes of their decisions. Within these short horizons, the treatment decision-making process of residents will necessarily be focused on short-term benefits, increasing the likelihood that a resident may disregard potential negative outcomes that another provider may manage days or months later in the patient’s course of treatment. Indeed, Reed and colleagues found a worsening of residents’ sense of accountability to patients and society, and an increase in placing one’s own needs above the needs of the patient since increase of shift work associated with duty-hour regulations (Reed et al. 2007).

Interrelated Decisions

Ownership is more likely to occur when consequences of many choices are taken into account, rather than in a condition when each choice is made in isolation. Lack of decision ownership is similar to fighting one battle at a time without a guiding strategy. During their shifts, residents

make more isolated decisions and are unlikely to have the opportunity to make interrelated choices in the ongoing care of a patient. Isolated decisions are problematic because their consequences can rarely be fully appreciated. When a resident makes these choices without thinking about their cumulative effects, that resident may make a number of apparently good choices that will collectively lead to a bad outcome. Social psychology describes this choice pattern as choice bracketing (Read et al. 1999), or making choices (e.g., today's treatment) within narrow versus broad decisional frames (e.g., the patient's overall course of care) (Langer and Weber 2001). When choice frames are narrow, fewer alternatives are contemplated. Broad choice frames encourage consideration of a greater number of alternatives and their consequences, which in turn leads to better outcomes (Wedell and Böckenholt 1994).

A recent study that surveyed 151 pediatric program directors notes that under the new regulations residents who work shifts may not see the evolution of disease processes as they admit patients and sign them out to a new team shortly after admission. Residents may also think that "they can leave tasks to the day team or night team also caring for the patient, which compromises communication with families, timeliness of appropriate treatment, and the development of critical skills in professionalism and responsiveness to patient needs that supersedes self-interest" (Drolet et al. 2013, 823). In his new book on medical residency in the United States, *Let Me Heal*, Ludmerer describes the increase in isolated decisions resulting from the ACGME hour regulations as follows:

Surgical residents frequently had to leave in the middle of an operation or before they could render postoperative care. Medical residents often had to go home before the results of important test had returned, so the stress test ordered on last night's patient had to be interpreted and acted on by someone unfamiliar with the patient. House officers frequently had to hand off critically ill patients—with diabetic ketoacidosis or hypertensive emergencies for example—to someone who did not know the patient before the patient had been adequately stabilized. (Ludmerer 2014, 309)

Isolated decisions made under the shift-work mentality can also lead to greater risk-seeking behavior (Redelmeier and Tversky 1992). Making isolated decisions about unrelated illness episodes in the care for a particular patient may lead residents to focus on a single desired outcome that is not attainable, realistic, or optimal for the patient's overall course of care. Additionally, isolated choices made under the shift-work mentality may be associated with lack of desire for improvement in decision making, whereas interrelated decisions tend to be associated with a desire to improve decision making (Loewenstein and Prelec 1993). Thus, residents may be more likely to attempt to improve their decision-making skills in a condition of continuity compared to shift-work mentality. For example, one study found that when allowed to make a string of choices, participants were able to spread pleasant and unpleasant tasks

equally, instead of having to suffer through a cluster of difficult tasks as did those who made isolated choices (Read et al. 1999). Thus, conditions of continuity within residency encourage an aggregate perspective of interrelated choices, which allows for the expected benefits and burdens of a medical strategy to be distributed evenly over the course of treatment. Residents making isolated treatment choices will likely be less satisfied with their choices and less committed to their decisions.

To summarize, advantages of making interrelated choices include consideration of multiple goals, rather than the most salient goal at the moment; different alternatives, rather than the first available option; and the full range of short- and long-term outcomes, rather than the hoped for course of events.

AN ALTERNATIVE TO THE CURRENT SYSTEM

A recent study published in the *Canadian Medical Association Journal* concludes that "shorter shifts for medical residents don't appear to be making big improvements in doctors' fatigue levels or in patient care" (Parshuram et al. 2015, 328). The study involved 47 residents in two adult teaching hospitals, who were randomly assigned to 12-, 16-, and 24-hour shifts over 2-month rotations. Over the study period, there were 971 admissions to the intensive care unit (ICU), totaling 5894 patient days. Eight preventable adverse events affected seven patients. Seven events happened over the course of 12-hour shifts. Four of the eight preventable adverse events, all during 12-hour shifts, were in patients with prolonged hospital stays. These results suggest that shorter shifts may have unintended consequences and may need to be replaced with longer shifts. Shorter shifts destroy the individual patient-provider relationship and result in more frequent "handoffs" that impact both education and patient care. Residents learn to work until time is up, rather than until their work is done. To counter this mentality, the daily shift length limits may need to be replaced with the weekly average hours and call frequency limitations. Even though this approach may result in longer shifts, it can still be justified by the restoration of continuity of care. When the focus of residency programs shifts from work-hour caps to measures of resident workload (e.g., admissions per intern), this may inadvertently increase continuity and decrease weekly/monthly average hours (Goitein and Ludmerer 2013).

The efforts to limit resident work hours have not been matched by limitations on resident workload. Over the past 20 years teaching hospitals have seen a 46% increase in admissions and a concurrent increase in intensity of care per admission (Goitein and Ludmerer 2013). Hour limitations mean that residents end up spending less time with each patient in order to keep up with an increased workload. While there have been many efforts to reduce resident fatigue and increase patient safety by limiting duty hours, less attention has been given to determining

the levels of workload necessary for residents to become well trained and to provide safe patient care. Recognizing the risks associated with high resident workload, the Mayo Clinic implemented a maximum patient census of 14 patients and a unit-based admission process in which patients and care teams are consolidated within hospital units. As a result, they saw a significant decrease in residents' duty hour violations, improvements in resident workload, and increased conference attendance. The Mayo model can serve as an example of changing focus of a program from work-hour caps to measures of work load (Thanarajasingam 2012).

There are many factors that contribute to resident fatigue and patient safety. While longer shifts are described as a proxy for fatigue, it is important to consider the many other contributors, including resident work load and work compression, sleep and ability to nap at work, circadian rhythm disruption, and other individual circumstances (Anagnostopoulos et al. 2015). Similarly, an Institute of Medicine (IOM) report describes other factors that affect residents fatigue and patient safety, such as "a work and learning environment with insufficient staffing and heavy workload, inadequate supervision, mental health, level of skill and knowledge, complexity of the patient's clinical condition, communication breakdowns between team members, language barriers with patients, and inherent system failures" (Institute of Medicine 2009, 210–211). Recognizing the various factors that contribute to both resident fatigue and patient safety, there is a need to develop pilot projects that would consider a range of tools and scheduling systems to help ensure continuity, ownership, and patient safety. Surgery and intensive care units (ICUs) are examples of procedural disciplines that have special educational needs related to the need to balance busy inpatient services, delivering emergency care at unpredictable hours, and technical mastery that would benefit from innovative programs to preserve access to key learning opportunities and ensure continuity of patient care in the context of work hour regulations (Fabricant et al. 2013).

Another recent study suggests that limiting the number of continuous hours worked by medical trainees failed to increase the amount of sleep each intern got per week, but dramatically increased the number of potentially dangerous handoffs of patients from one trainee to another. The number of patient handoffs increased from three for those working 30 hours to as high as nine for those working 16-hour shifts. There is a consensus that the greater the number of handoffs, the greater is the risk for medical errors. In order to mitigate these risks, the study calls for increased supervision and training in handoffs (DeRienzo et al. 2012). Experts suggest that handoff-related risk can be managed by structuring a sign-out process (Bump et al. 2011). There is a need to improve the sign-out process in order to ensure that every resident who takes care of a patient feels responsible for that patient's care. Often, information about key overnight changes in patient clinical course is not relayed from departing to arriving residents up until the very moment of morning sign-out. As a result,

a night provider may continue caring for a deteriorating patient till the sign-out time, while a day resident may pre-round on stable patients. We suggest increasing the use of verbal sign-outs in order to make it an active process that takes an appropriate amount of time. It has been demonstrated that written sign-outs are not updated even when important patient care changes occurred. Furthermore, verbal sign-outs will include anticipatory guidance for predicted patient events. This guidance is often omitted from written sign-outs, which leads to duplicated work and delays in care (Horwitz, Moin, and Green 2007).

Improving the system of handovers will not necessarily solve the problem of ownership, unless the sign-out process is reconceptualized as a bridge to continuity. Arora, Reed, and Fletcher (2014) suggest that this reconceptualization needs to include change in a number of elements of a sign-out process, including quality of information transferred, more professional responsibility for both leaving and receiving parties, and a different understanding of coverage. Continuity during a sign-out process may be achieved through a better scheduling aimed to maximize the provision of care by the primary team members who have firsthand knowledge of patients. Continuity will be increased when "double handoffs" are avoided. Double handoffs occur when neither departing nor receiving parties have primary knowledge of the patient (Chang et al. 2010). Continuity will be achieved if attending physicians are sensitive to comments such as "this is not my patient" or "I am just covering" and will make sure that each member of the team accepts professional responsibility for their patients. While personal continuity and ownership may not be achievable, attending physicians should emphasize team continuity and ownership by making sure most handoffs occur within primary teams, that they instill a heightened sense of responsibility among all team members, and that each handover becomes a learning opportunity. Often, more senior residents will supervise handovers and provide feedback and guidance. Fostering this team continuity may decrease the sense of clinical uncertainty when the responsibility is transferred to individuals with no primary knowledge of a patient (Van Eaton, Horvath, and Pellegrini 2005).

Finally, decision ownership stems from the assumption of responsibility. This assumption of responsibility is the main factor that transforms residents into capable practitioners. However, responsibility is not readily transferred from attending physicians to their interns. It is rather given in a graded manner where more experienced residents are entrusted by their attending with a greater amount of responsibility. It is not easy to decide when a resident is ready for unsupervised patient care. If this decision is taken too early, it may impact patients' safety, increase liability, and increase the cost of care. Lack of independent decision making may negatively impact a resident's ability to achieve competence (McLaren et al. 2013). Graded increase in responsibility leads to ownership of patient assessment, clinical judgment, resulting care, and patient outcomes. New residents appreciate

nearly everything they can learn from their attending. However, with time they not only need but also actively seek autonomy in their competency development. Attending physicians should ensure the proper environment that will enable residents to make their own discoveries. Clinical supervision requires adjusting these conditions as the resident's capacity changes. This transfer of ownership and responsibility should be implemented in the practice of attending physicians (Sklar 2013).

There are a number of practical ways to transfer ownership and responsibility from an attending to an intern. For surgery residents, the literature suggests that attending surgeons should allow senior residents to complete cases independently by the attending surgeons being in the operating room (OR), but not scrubbing until required or at the request of the resident. This way, the resident will have the ability to make his or her own decisions. The recent study confirms that this approach results in improved learning and better patient outcomes, and that having the faculty present did not compromise autonomy or decision-making ability (Teman et al. 2014). Another possibility to improve ownership is biweekly or monthly feedback directly from the attending physician or surgeon. This process allows the resident to receive feedback, and when necessary allows the resident to improve his or her skills in the OR and on the wards (Saxon and Juneja 2013). Furthermore, the literature suggests refining clinical rotation curricula to implement longer rotations (6 to 8 weeks) and to incorporate more apprenticeship-like experiences in order to enable familiarity and trust of residents that is essential to promoting resident autonomy (Torbeck et al. 2015). Resident autonomy, or progressive independence in patient care, is a core tenet of clinical training highlighted by the ACGME. One of the ACGME requirements is that residents demonstrate increasing autonomy over the course of training, developing progressive responsibility and leadership skills under faculty guidance (Accreditation Council for Graduate Medical Education 2015). An ongoing faculty guidance in the context of increasing autonomy allows for better learning outcomes without compromising patient safety.

CONCLUSION

A lack of residents' decision ownership affects physicians and patients. Many voices in the literature point out that limiting work hours has negatively influenced resident education by decreasing in the number of cases residents attend to during their shifts (Blanchard, Amini, and Frank 2004). We further posit that decreased ownership also decreases the quality of resident training and ultimately the care delivered to patients (Faulkner and McCurdy 2000). Decision ownership acts as an intrinsic motivator for residents to master clinical skills and become competent doctors. Mastering of clinical skills is two-dimensional: It involves horizontal integration, or developing competency by linking learning experiences in clinical settings, and vertical integration, or linking of scientific evidence to clinical problem

solving. Ownership of decisions is crucial for both of these aspects, giving residents opportunities for integrating important educational themes and providing them with more possibilities for connections with patients.

We suggest several ways of fostering ownership in medical residency. Given the increased amount of handoffs and resulting errors, we recommend making residents' schedules more flexible by allowing longer work shifts, but limiting weekly average hours and reducing their workload. Longer shifts will allow residents to follow the progression of a disease, while risks of fatigue will be offset by the reality of knowing the patients. Limits on weekly average hours and call frequency will serve as additional safeguards of residents' well-being. In order to mitigate handoff-related risks we call for a more structured sign-out process that will include anticipatory guidance for predicted patient events. As the sign-out language is often vague, open-ended, and unstructured, there is a need for improvement in written sign-outs or increased use of verbal sign-outs. Finally, it is important for attending physicians to promote autonomous decisions by residents with proper support and supervision. Autonomy and perceived responsibility are critical elements of ownership and residents' preparation for independent practice. While the focus should remain on patient safety, we need to ensure that we are adequately preparing our residents to assume ownership of patient care in their future practice. ■

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