

Finance and Time Use Implications of Team Documentation for Primary Care: A Microsimulation

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ABSTRACT

PURPOSE To estimate the conditions under which team documentation—having a staff member enter history, place orders, and guide patients—would be financially viable at primary care practices, accounting for implementation costs.

METHODS We applied a validated microsimulation model of practice costs, revenues, and time use to data from 643 US primary care practices. We estimated critical threshold values for time saved from routine visits that would need to be redirected to new visits to avoid net revenue losses under: (1) a clerical documentation assistant (CDA) strategy where a scribe assists with recordkeeping; and (2) an advanced team-based care (ATBC) strategy where medical assistants perform history, documentation, counseling, and order entry.

RESULTS Using a fee-for-service model, we estimated that physicians would need to save 3.5 (95% CI, 3.3-3.7) minutes/encounter under a CDA strategy and 7.4 (95% CI, 4.3-10.5) minutes/encounter under an ATBC strategy to prevent net revenue losses. The redirected time would be expected to add 317 visit slots per year under CDA strategy, and 720 under ATBC strategy. Using a capitated payment model, physicians would need to empanel at least 127 (95% CI, 70-187) more patients under CDA and 227 (95% CI, 153-267) under ATBC to prevent revenue losses. Additional patient visits expected would be 279 (95% CI, 140-449) additional visit slots per year under CDA and 499 (95% CI, 454-641) under ATBC.

CONCLUSIONS Financial viability of team documentation under fee-for-service payment may require more physician time to be reallocated to patient encounters than under a capitated payment model.

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INTRODUCTION

Team documentation—referred to as scribing—involves staff documenting in the health record during patient visits concurrently with a clinician focusing on face-to-face patient time.¹ Data from observational implementation studies²⁻¹⁰ and a randomized controlled trial¹¹ suggest that team documentation has the potential to improve clinician satisfaction and efficiency in primary care practices; yet the financial and time use implications, and generalizability to practices across the nation, remain unclear.

Two strategies have been used when adopting team documentation. The clerical documentation assistant (CDA) strategy involves a scribe assisting with recordkeeping.² The CDA—often a nonclinical staff member with college education who is contracted from a scribe company—documents a history, exam, and plan dictated by the physician during the encounter, to be reviewed and cosigned by the physician later. Other medically trained staff (medical assistants, nurses) perform room check-in, medication reconciliation, and clinical support services such as motivational interviewing and health coaching. The CDA may also stay behind each visit to perform an after-visit summary, limited care coordination, accompaniment of the patient to the laboratory or radiology service area, and simple patient education. Typically, 1 CDA is employed per physician.²

Alternatively, some practices have implemented an advanced team-based care (ATBC) strategy, which involves more than scribing functions.^{7,10} The ATBC strategy employs a medical assistant or nurse to accompany the patient from the beginning of their appointment to its conclusion. The medical assistant or nurse performs room check-in, measures vital signs, takes and documents an initial template-aided history, and updates past medical history including medication reconciliation. The medical assistant or nurse then exits the room to brief the clinician, and they both reenter the room where the medical assistant or nurse documents the exam and plan dictated by the physician, and places orders and referrals. After the clinician leaves, the medical assistant or nurse provides after-visit plan reinforcement, and possibly health coaching and follow-up scheduling. Generally, ATBC requires 2 medical assistants per physician, providing both clerical and clinical support.^{7,10}

The financial and time use implications of team documentation remain a critical and unresolved question. Here, we used data from a national sample of primary care practices to estimate how much more time efficiency and additional visit volume would be necessary to generate sufficient funds to cover the costs of team documentation. We estimated the increase in efficiency and visit volume necessary under a fee-for-service model and under a capitated payment model (increasingly adopted at practices nationwide).¹²

METHODS

Study Type and Data Sources

We used a previously validated microsimulation model of primary care practices to perform our analyses.^{13,14} Data (Table 1) for pre-implementation finances and time use were obtained from 643 internal medicine and family practices reporting to the Medical Group Management Association,¹⁷ including per-encounter gross and net revenues, staffing and overhead costs, patient encounters per physician, and time used per patient encounter. Changes in finances and time use were computed from multiple sources: (1) the costs of hiring and training for team documentation were based upon national training, wage, and benefit cost data for scribes¹⁵ and for medical assistants¹⁸; (2) the probability of scribe or medical assistant turnover per month, necessitating rehiring and retraining, was based on descriptive reports and retention surveys^{16,19,20}; and (3) increases in efficiency with time (reduced minutes per patient encounter per physician) including documentation and administrative

work time were varied over a broad range (from 0 to 15 minutes) inclusive of the wide range of prior observations.^{2,7,22} Data were expressed in 2017 US dollars.²³

Outcomes

To calculate the increase in efficiency and visit volume necessary for team documentation to avoid net revenue loss in a fee-for-service environment, 2 primary outcomes were estimated: (1) the number of minutes of physician time that would need to be saved per encounter, including both in-visit and out-of-visit time (eg, order entry, laboratory follow-up), and (2) the number of additional visit slots that would need to be opened to prevent loss of net revenue, accounting for the duration of visits and per-visit revenue at each clinic, and additional physician time (Table 1). We dedicated 50% of time saved for additional visit slots,²⁴ as the remaining time occurs away from normal office hours (eg, documentation at home) or is lost to between-visit activities (eg, transition time, phone calls) and therefore cannot be converted to additional visit volume. We distributed the additional encounters with a 2:1 ratio of urgent care encounters to routine follow-up encounters, and accounted for the no-show rate for such visit slots (Table 1).²¹

To estimate the increased patient volume needed for team documentation to avoid net revenue loss under a capitated payment environment, we computed 2 outcome metrics: (1) the number of additional patients that would need to be added to a provider's

Table 1. Input Data for the Model

Parameter	Mean (95% CI)
CDA strategy	
Scribe annual wage plus benefit cost ¹⁵	\$26,741 (\$21,879-\$38,896)
Probability of turnover of scribes, per month ¹⁶	8.3% (6.3%-10.4%)
ATBC strategy	
MA FTE per full-time MD before ATBC (increased to 2.0 FTE per full-time MD after ATBC) ¹⁷	0.73 (0.44-0.97)
MA annual wage plus benefit costs ¹⁸	\$41,360 (\$34,122-\$48,598)
Probability of turnover of MAs, per month ²⁰	1.1% (0.8%-1.4%)
Both strategies	
Visits per day by full-time MD ¹⁷	17.5 (14.03-4.2)
Days per year worked by full-time MD ¹⁷	220 (208-232)
Revenue per visit ¹⁷	\$102 (\$91-\$113)
Visit duration, min ¹⁷	24.4 (18.3-30.5)
Proportion of visit no-shows among new visits ²¹	6% (3.5%-11.5%)
Payments per patient per month under capitation ¹²	\$19.43 (\$16.65-\$27.76)
Visits per patient per year under capitation ¹⁷	2.2 (2.0-2.4)

ATBC = advanced team-based care; CDA = clerical documentation assistant; FTE = full-time equivalents; MA = medical assistant; MD = doctor of medicine.

Note: Dollar values are in 2017 US dollars adjusted for inflation based on the Consumer Price Index.

panel (since payment occurs per empaneled patient per month), and (2) the number of additional visit slots that would need to be opened for these newly empaneled patients. We used estimates for the range of payment per patient per month under capitation that would provide the same annual gross revenue as the fee-for-service environment in the pre-team–documentation setting (to ensure fair comparisons with fee-for-service),¹² and visit frequency per patient at each clinic to estimate associated utilization (Table 1).

By estimating additional visit slots that would be opened under both fee-for-service and capitated payment, a comparable metric of new workload to achieve net revenue neutrality was calculated for both payment types. All outcomes were estimated for the first year of implementation, and annually for each subsequent year. Outcomes were first computed for the CDA strategy, then separately for the ATBC strategy.

Simulations

CDA Strategy

The CDA strategy was simulated by calculating the costs to hire and train a scribe and potential new revenue from increased physician productivity attributable to the scribe. Costs, based on published case studies of CDA implementation, included the cost of hiring 1 scribe per full-time physician and a paid training period. The training period included 2 weeks of paid training with a scribe agency and an additional 2 days per week for 2 weeks in the clinic. During in-clinic training, the physician saw only 50% of the usual patient load while being shadowed by the scribe, which resulted in lost visit revenue (Table 1, Figure 1).²² After training, there was a 6-month introductory period of regular daily work during which the scribe accompanied the clinician but did not affect the clinician's time spent per encounter (no productivity benefit, based on prior pilot data).^{2,7,22} Following the introductory period (Figure 1), was the simulated maintenance period in which the scribe could potentially reduce time required per encounter for each clinician (a productivity benefit). The amount of time reduction was varied widely to find the level of time saved that avoided net revenue loss. During the introductory and maintenance periods, opportunity costs (lost visit revenue) were calculated for a weekly hour-long meeting of the clinician, scribes, and practice manager for quality improvement. Also, benefit and overhead costs for the additional staff member were computed based on existing cost estimates per documentation assistant (including workspace, information technology, and associated costs).¹⁷ During each simulation month, turnover of scribes was simulated with a binomial probability function, based on prior estimates of the probability of turnover

(approximately 8.3% monthly),¹⁶ which was assumed to require a repeat of the above sequence of activities, starting with a new hire and training period.

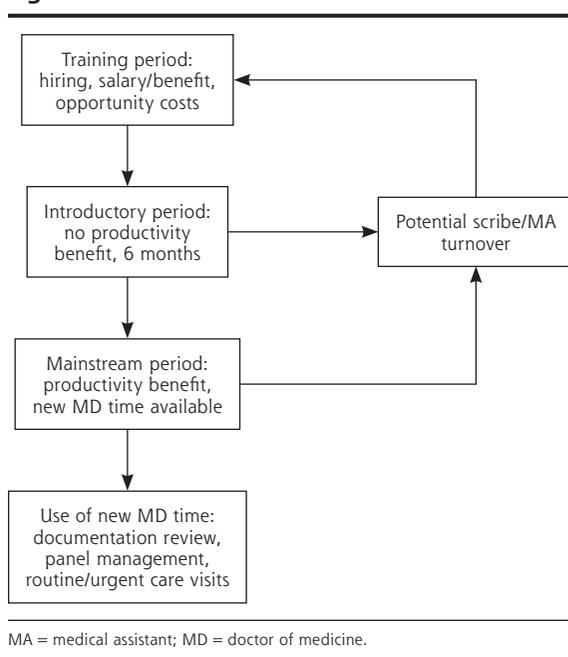
ATBC Strategy

The ATBC strategy was simulated by calculating the costs to hire and train medical assistants and potential new revenue from increased clinical productivity attributable to the assistants. Cost estimates were based on increasing the number of medical assistants from the existing number per practice in the national data sample (mean 0.73 per full-time physician, 95% CI, 0.15-1.20)¹⁷ to 2 full-time medical assistants per full-time physician, and providing each of the medical assistants with 1 week of paid training (staggered to avoid understaffing). As with the CDA strategy, the training period included 2 days a week for 2 weeks at a one-half patient schedule, followed by 6 months of introductory period work without productivity gains, and then by maintenance period work with productivity gains based on observations from ATBC pilot implementation programs.²² Turnover of trained medical assistants was simulated using a binomial probability function, based on prior estimates of the probability of turnover (approximately 1.1% monthly),^{19,20} which was much lower than scribes, as scribes are often college students or recent graduates planning on pursuing further education.

Sensitivity Analyses

In the first sensitivity analysis, if team documentation strategies produced additional benefits in avert-

Figure 1. Model used for all simulations.



ing physician burnout, an increase to net revenue was estimated. The CDA or ATBC strategy simulations reversed recent increases in burnout (associated with documentation) and associated reductions in physician productivity (estimated as 1.1% [95% CI, 1.0%-1.2%] fewer work days per physician per year).^{11,25-27} The net revenues were calculated if the reduced physician productivity was fully reversed by team documentation.

In the second sensitivity analysis, variations in outcomes were calculated across states, accounting for variations in salary and benefit costs, practice costs, and reimbursement (Supplemental Table 1, available at <http://www.annfam.org/content/16/4/308/suppl/DC1/>). In additional sensitivity analyses (Supplemental Appendix, available at <http://www.annfam.org/content/16/4/308/suppl/DC1/>) we varied the duration of the introductory period before efficiency gains, and a theoretical increase in wages corresponding to an equal reduction in the rate of turnover.

In all scenarios, repeated Monte Carlo sampling was performed 10,000 times from the distributions of each input variable (Table 1), to produce mean and 95% confidence interval (CI) estimates for outcomes. Modeling was performed in R (version x.y.z, R Project for Statistical Computing), with code for replication provided at <https://sdr.stanford.edu>.

RESULTS

CDA Strategy

If no time was saved by implementation of the CDA strategy, the net cost to practices would be \$33,637 (95% CI, \$26,091-\$43,534) in year 1 and \$29,518 (95% CI, \$23,422-\$37,302) in each subsequent year, after considering salary, overhead, training, turnover, and opportunity costs.

Using a fee-for-service model we estimated that, after the first year, team documentation would need to save 3.5 minutes/encounter (including time with and away from the patient) to avoid net revenue loss with a CDA strategy (Table 2). Redirected time would be expected to add 317 visits per year (8% increase), given the duration of visits at each clinic, to avoid net revenue loss. If a practice wanted to avoid net revenue loss during the first year of implementation, then the CDA strategy would need to save 8.9 minutes/encounter, corresponding to 351

additional visits, during the maintenance period of year 1 (Table 2).

Using a capitated payment model, after the first year, physicians would need to empanel at least 127 more patients to avoid net revenue loss with a CDA strategy. Given the typical utilization rate per patient, this would be expected to add 279 visits per year, a 7% increase (Table 2). If a practice wanted to avoid net revenue loss during the first year of implementation, then at least 144 more patients would need to be empaneled and 317 visits added that year (Table 2).

ATBC Strategy

If no time was saved by implementation of the ATBC strategy, the net cost to practices would be \$57,402 (95% CI, \$56,399-\$57,985) in year 1 and \$52,949 (95% CI, \$51,131-\$53,677) in each subsequent year, after considering salary, overhead, training, and opportunity costs.

Using a fee-for-service model we estimated that, after the first year, physicians would need to save and redirect 7.4 minutes/visit (including time with and away from the patient) with an ATBC strategy to avoid net revenue loss from team documentation (Table 2). Redirected time would be expected to add 720 visits per year (19% increase) given the duration of visits at each clinic. If a practice wanted to avoid net revenue loss during the first year of implementation, then the ATBC strategy would need to save 18.5 minutes/encounter, corresponding to 755 additional visits, during the maintenance period of year 1 (Table 2).

Using a capitated payment model, after the first year, physicians would need to empanel at least 227

Table 2. Simulation Results to Ensure No Loss of Net Revenue From a Team Documentation Strategy^a

Strategy	Time Period	Changes to Workload Under Fee-for-Service	
		Minutes to be Saved Per Encounter	Additional Visit Slots to be Opened
CDA	Year 1	8.9 (8.6-9.2)	351 (294-441)
	Subsequent years	3.5 (3.3-3.7)	317 (268-394)
ATBC	Year 1	18.5 (11.5-25.5)	755 (633-949)
	Subsequent years	7.4 (4.3-10.5)	720 (604-904)
Changes to Workload Under Capitation			
Strategy	Time Period	New Patients to be Added Per FT Physician	Additional Visit Slots to be Opened
CDA	Year 1	144 (78-218)	317 (156-523)
	Subsequent years	127 (70-187)	279 (140-449)
ATBC	Year 1	246 (174-282)	541 (3486-77)
	Subsequent years	227 (153-267)	499 (454-641)

ATBC = advanced team-based care; CDA = clerical documentation assistant; FT = full-time.

^aData presented as mean (95% CI).

more patients to avoid net revenue loss with an ATBC strategy. Given the typical utilization rate per patient, this would be expected to add 499 visits per year, a 13% increase (Table 2). If a practice wanted to avoid net revenue loss during the first year of implementation, then at least 246 more patients would need to be empaneled and 541 visits added that year (Table 2).

Sensitivity Analyses

In the first sensitivity analysis, if the CDA or ATBC strategies mitigated productivity losses associated with physician burnout, then overall net revenue would increase by \$5,533 (95% CI, \$3,081-\$9,342) per year after year 1. This would reduce the visit slots after year 1 to 267 (95% CI, 237-316) with the CDA strategy and 652 (95% CI, 570-770), with the ATBC strategy in a fee-for-service environment. In a capitated environment, visit slots would be reduced to 235 (95% CI, 124-360) under CDA and 452 (95% CI, 428-546) under ATBC.

In a second sensitivity analysis, variations in personnel, practice cost, and revenue across states were found to produce variations in required efficiency gains under either CDA or ATBC strategy. The state requiring the highest time and visits to avoid loss of net revenue was Alaska which required 4.4-9.8 minutes saved/encounter in a fee-for-service model and empanelment of 159-299 new patients with a capitation model. The state requiring the lowest time and visits to avoid loss was Rhode Island (which required 2.6-4.8 minutes saved/encounter in fee-for-service and empanelment of 95-148 new patients under capitation; Supplemental Table 2, available at <http://www.annfam.org/content/16/4/308/suppl/DC1/>). The variations were primarily driven by labor costs.

Additional sensitivity analyses showed relative insensitivity of the results to changes in the introductory period before productivity gains, and to trade-offs between salary and turnover rate (Supplemental Table 3, available at <http://www.annfam.org/content/16/4/308/suppl/DC1/>).

DISCUSSION

We observed that the financial viability of team documentation under fee-for-service payment model may require more physician time to be reallocated to patient encounters than under a capitated payment model. The mechanistic reason for this finding is that team documentation would have to focus on providing efficiency to redirect time for additional visits to cover documentation costs in the fee-for-service environment. In contrast, a capitated practice would need to empanel new patients to pay for the team documenta-

tion costs and fewer additional visits would be needed for the new patients. Hence, capitation-based systems may require less efficiency or external financing to support team documentation, and could leave more time for physicians to use for wellness, quality improvement, or other activities. Additionally, we found that the CDA strategy would require less time saved from encounters than the ATBC strategy, due to labor cost differences; about 3.5 minutes/encounter would need to be saved under CDA to avoid net revenue losses, compared with 7.4 minutes/encounter saved under the ATBC strategy. The time saved comes from the patient encounter and time away from patients (time spent documenting or following-up results, for example). The most well-controlled study to date indicated that 10 minutes/encounter was typically saved in internal medicine practices in a CDA-type model (Table 1),² but actual time saved across a broader group of practices using either model should be evaluated in a larger population of clinics. Both team documentation strategies, however, would require a large increase in visit volume, between 7% and 19%, to achieve net revenue neutrality, which may not be possible to sustain and should be critically accounted for in planning. Even higher visit volumes would be expected if net revenue neutrality is a goal for practices in the first year of implementation.

There are important limitations to our work. We could not account for financial benefits that might accrue due to improved continuity experienced by patients or higher patient satisfaction, which has not been consistently reported in studies to date.¹¹ Models cannot estimate quality outcomes, which are better assessed through randomized trials or pilot studies, but have not been observed empirically to date. Models are better suited to identify the boundaries of possible economic outcomes, as trials and pilot studies generally do not have a representative set of practices.

Future research may assist in identifying how the distribution of responsibilities for scribes and medical assistants can be optimized to maximize efficiency, quality, and satisfaction for both physicians and patients. It is critical to appreciate that physicians may not wish to direct any improved efficiency toward new encounters or additional empanelment, but instead use that time entirely for wellness, quality improvement, or other activities. In that case, our results provide an estimate of the financial support necessary to introduce team documentation even in the absence of increased efficiency.

Our study provides estimates for both start-up and longer-term benchmarks of time use for practices considering either the CDA or ATBC strategy, and informs ongoing discussions about how payment reform can affect the potential for team-based care. The longer-

term financial viability of team documentation under fee-for-service payment would depend on how much saved physician time is reallocated to patient encounters and this must be balanced against using the saved time to contribute to physician well-being. Our results suggest that a capitated payment environment may better contribute to the financial viability and benefits of team documentation.

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Key words: documentation; scribes; electronic medical record; billing; time use

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References

- Morawski K, Childs-Roshak J, Weitberg A. Scribes: re-writing the story on patient and provider experience. *Healthc (Amst)*. 2017;5(3):95-97.
- Reuben DB, Knudsen J, Senelick W, Glazier E, Koretz BK. The effect of a physician partner program on physician efficiency and patient satisfaction. *JAMA Intern Med*. 2014;174(7):1190-1193.
- Koshy S, Feustel PJ, Hong M, Kogan BA. Scribes in an ambulatory urology practice: patient and physician satisfaction. *J Urol*. 2010;184(1):258-262.
- Sinsky C, Colligan L, Li L, et al. Allocation of physician time in ambulatory practice: a time and motion study in 4 specialties. *Ann Intern Med*. 2016;165(11):753-760.
- Bank AJ, Obetz C, Konrardy A, et al. Impact of scribes on patient interaction, productivity, and revenue in a cardiology clinic: a prospective study. *Clinicoecon Outcomes Res*. 2013;5:399-406.
- Arya R, Salovich DM, Ohman-Strickland P, Merlin MA. Impact of scribes on performance indicators in the emergency department. *Acad Emerg Med*. 2010;17(5):490-494.
- Misra-Hebert AD, Rabovsky A, Yan C, Hu B, Rothberg MB. A team-based model of primary care delivery and physician-patient interaction. *Am J Med*. 2015;128(9):1025-1028.
- Yan C, Rose S, Rothberg MB, Mercer MB, Goodman K, Misra-Hebert AD. Physician, scribe, and patient perspectives on clinical scribes in primary care. *J Gen Intern Med*. 2016;31(9):990-995.
- Anderson RJ. Optimizing the role of nursing staff to enhance physician productivity: one physician's journey. *Fam Pract Manag*. 2013;20(4):18-22.
- Anderson P, Halley MD. A new approach to making your doctor-nurse team more productive. *Fam Pract Manag*. 2008;15(7):35-40.
- Gidwani R, Nguyen C, Kofoed A, et al. Impact of scribes on physician satisfaction, patient satisfaction, and charting efficiency: a randomized controlled trial. *Ann Fam Med*. 2017;15(5):427-433.
- Basu S, Phillips RS, Song Z, Bitton A, Landon BE. High levels of capitation payments needed to shift primary care toward proactive team and nonvisit care. *Health Aff (Millwood)*. 2017;36(9):1599-1605.
- Basu S, Landon BE, Song Z, Bitton A, Phillips RS. Implications of workforce and financing changes for primary care practice utilization, revenue, and cost: a generalizable mathematical model for practice management. *Med Care*. 2015;53(2):125-132.
- Basu S, Phillips RS, Bitton A, Song Z, Landon BE. Medicare chronic care management payments and financial returns to primary care practices: a modeling study. *Ann Intern Med*. 2015;163(8):580-588.
- Salary: Medical Scribe. Glassdoor. https://www.glassdoor.com/Salaries/medical-scribe-salary-SRCH_KOO,14.htm. Updated Apr 25, 2018. Accessed Aug 31, 2017.
- Rich N. The impact of working as a medical scribe. *Am J Emerg Med*. 2017;35(3):517.
- Medical Group Management Association. *DataDive*. Washington, DC: MGMA; 2014.
- Kenexa IBM. *CompAnalyst Market Data*. Armonk, NY: IBM Corp; 2013.
- American Medical Group Association. *2013 Physician Retention Survey*. Alexandria, VA: American Medical Group Association; 2014.
- Reducing Medical Practice Staff Turnover | Physicians Practice. <http://www.physicianspractice.com/staff/reducing-medical-practice-staff-turnover>. Published Mar 1, 2013. Accessed Aug 30, 2017.
- Woodcock EW, Medical Group Management Association. *Mastering Patient Flow: Using Lean Thinking to Improve Your Practice Operations*. Englewood, CO: Medical Group Management Association (MGMA); 2007.
- Team Documentation - STEPS Forward. STEPSforward.org. <https://www.stepsforward.org/modules/team-documentation>. Accessed Aug 30, 2017.
- United States Department of Labor; Bureau of Labor Statistics. Inflation Calculator CPI. https://www.bls.gov/data/inflation_calculator.htm. Accessed Oct 9, 2017.
- Gisla J, Arif K. Advanced practice clinicians: a model for physician support. Presented at the American Medical Group Association annual conference; April 3-5, 2014; Grapevine, Texas.
- Shultz CG, Holmstrom HL. The use of medical scribes in health care settings: a systematic review and future directions. *J Am Board Fam Med*. 2015;28(3):371-381.
- Shanafelt TD, Dyrbye LN, West CP, Sinsky CA. Potential impact of burnout on the US physician workforce. *Mayo Clin Proc*. 2016;91(11):1667-1668.
- Shanafelt TD, Mungo M, Schmitgen J, et al. Longitudinal study evaluating the association between physician burnout and changes in professional work effort. *Mayo Clin Proc*. 2016;91(4):422-431.