



OCUFY

**Making healthcare more accessible and
efficient with a simple glance**

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Ocufy is a smart AR healthcare solution that seamlessly displays and logs patients' vitals, notes, and other information with a simple glance.

A prominent issue that plagues the healthcare industry, especially physicians, is the time spent on using electronic health record (EHR) systems, both for retrieving information and logging information (Exhibit 1). In the delivery of healthcare, time is a vital and limited resource. It contributes to health care costs and acts as a key element in patient-doctor relationships. Physicians spend, on average, half of their days (49.2%) on EHR and desk work (Exhibit 2). In addition, nurse practitioners spend an average of 33% of their work periods on EHRs, and studies show that this high level of technology usage leads to extreme levels of burnout and motivation loss (Exhibit 3). As for physicians, their burnout with EHR use has been significantly researched; high EHR usage significantly reduces available time to spend with patients and other tasks. In a study by Dr. Stewart Babbott referenced in Exhibit 4, physicians in the moderate and high EHR cluster reported more stress and lower satisfaction compared to the low EHR cluster. Even more, it was only within the high EHR cluster that time pressure was associated with significantly more burnout, dissatisfaction, and intent to leave (Exhibit 4).

Our solution, Ocufy, is an Augmented Reality application that enables healthcare providers to quickly and seamlessly access patient notes, diagnoses, and information in real time using facial recognition and tracking. By instantaneously recalling patient data, Ocufy reduces the time that healthcare providers spend scanning electronic health records, decreasing burnout. This efficiency also provides patients with extra time to consult their attending physician(s), increasing accessibility and potentially decreasing the cost of medical care. Additionally, new information and notes can be added and maintained instantly with an automatic voice transcribing feature. With a simple start phrase, such as "Start new log", users can add new notes and logs and end them with an end phrase, such as "End log". This creates virtual updates in a simple, "Post-It Note" format, which is automatically integrated with the patient's electronic health record. This digital scribe feature eliminates the needs for hand-written notes, as well as decreasing the time and effort that is required when manually updating individual records. Not

only does this feature increase physician time availability, but it also has the potential to improve patient and physician satisfaction and lower physician burnout rate (Exhibit 5). Even more, the application consolidates patients' vitals and machine readings and sends the application wearer an alert if the vitals or readings display worrying patterns, making healthcare more efficient and responsive. In short, by better optimizing physician time and improving efficiency and responsiveness, clinics and medical centers can better optimize scheduling, practical capacity of clinics and hospitals, and improve payment accuracy for services.

Ocufy starts its functionality when the "glasses" that a healthcare provider is wearing scans a patient's face. The scanned face matches up with one of the faces stored in the Ocufy database (the patient is added to the database through a photograph when they initially come to the waiting room), which is linked to the patient's electronic health record as well as their vital monitor if applicable. Using EchoAR, Ocufy pulls up the patient's EHR and vital scan in real time so the healthcare provider can view it while attending to the patient. If the healthcare provider wishes to make an update to the patient's EHR, any changes made will be automatically created as a 3d Model (that looks like a Post-It Note or added onto the clipboard) that will also show up next to the patient when using Ocufy.

While there exists some concerns over privacy and data protection, Ocufy has already designed security measures to be integrated. These measures include automatic log-out once the AR device, ideally AR glasses, are removed or rendered inactive. In addition, the log-in process revolves around Two-Factor Authentication and an optional object-based password where the users can designate a unique object to unlock their device, similar to facial recognition passwords. Furthermore, clinics and medical institutions can quickly "blackout" devices that are reported compromised, stolen, or missing. Lastly, these AR devices that use Ocufy pull data from a secure cloud database, which means that the data is never stored in the devices.

In the future, the Ocufy team hopes to continue digitizing and standardizing AR technology in health care, especially in replacing electronic health records systems, and transform the healthcare experience and industry to be more efficient, friendly, and modern.

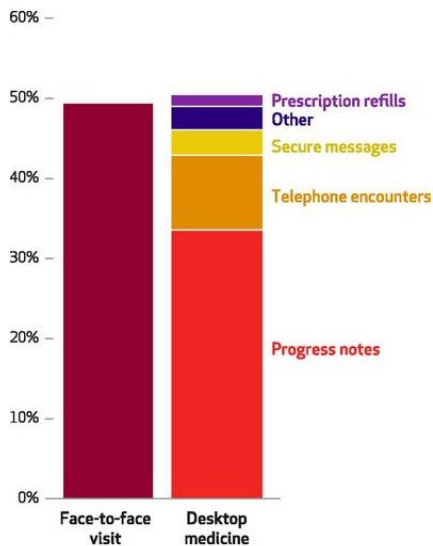
Exhibit 1 — Percentages of physician time spent on various activities

EXHIBIT 1

Average hours spent on various activities per physician per day, 2011-14

Activity	In clinic and remote access		Desktop medicine, in clinic				Desktop medicine, remote access			
			On day of visit		On other day		On day of visit		On other day	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
DESKTOP MEDICINE										
Progress notes	2.10	1.14	1.33	0.86	0.52	0.72	0.13	0.37	0.11	0.36
Telephone encounters	0.58	0.44	0.05	0.09	0.49	0.39	0.00	0.03	0.04	0.15
Secure messages	0.20	0.25	0.01	0.04	0.17	0.21	0.00	0.02	0.03	0.11
Prescription refills	0.10	0.13	0.00	0.02	0.09	0.12	0.00	0.00	0.01	0.05
Other	0.18	0.23	0.02	0.08	0.13	0.19	0.00	0.03	0.02	0.10
Subtotal	3.17	1.36	1.42	0.89	1.40	0.95	0.14	0.38	0.21	0.52
FACE-TO-FACE MEDICINE										
Amulatory care visits	3.08	1.65								
TOTAL TIME										
Total logged time	6.25	2.15								
Total scheduled time for visits	7.45	2.31								

Exhibit 2 Percentages of physician time spent on various activities, 2011-14



SOURCE Authors' analysis of access logs embedded in electronic health records of 471 physicians.

NOTE The activities in face-to-face medicine are explained in the [Exhibit 1](#) Notes.

Tai-Seale, M., Olson, C. W., Li, J., Chan, A. S., Morikawa, C., Durbin, M., ... Luft, H. S. (2017). *Electronic Health Record Logs Indicate That Physicians Split Time Evenly Between Seeing Patients And Desktop Medicine*. *Health Affairs*, 36(4), 655-662. doi:10.1377/hlthaff.2016.0811

Exhibit 2 — Physician Time Distribution During Office Hours

Table 4. Physician Time Distribution During Office Hours, by Task Category

Task Category, by Activity During Office Hours	Tasks, <i>n</i>	Mean Time to Complete Task, <i>s</i>	Tasks per Hour, <i>n</i>	Time Spent (95% CI), %	
				Total*	By Task Category
Direct clinical face time				33.1 (31.9-34.5)	
With patient	4483	93	10	-	27.0 (25.8-28.3)
With staff and others (patient not present)	2121	45	5	-	6.1 (5.7-6.5)
EHR and desk work				49.2 (47.8-50.6)	
Documentation and review	8623	69	20	-	38.5 (37.3-39.8)
Test result	1661	59	4	-	6.3 (5.8-6.8)
Medication order	622	59	1	-	2.4 (2.2-2.5)
Other order	610	52	1	-	2.0 (1.9-2.2)
Administrative tasks				1.1 (0.9-1.3)	
Insurance	191	49	<1	-	0.6 (0.5-0.7)
Scheduling	125	59	<1	-	0.5 (0.3-0.6)
Other tasks				19.9 (18.2-21.6)	
Closed to observation	163	524	<1	-	5.5 (4.5-6.5)
Other (aggregated)	969	183	2	-	5.2 (4.3-6.0)
Transit	2946	15	7	-	2.9 (2.8-3.0)
Personal	902	109	2	-	6.3 (5.6-7.1)

EHR = electronic health record.

* Total sums to 103.3% because the Work Observation Method by Activity Timing platform allows recording of 2 tasks done in parallel. Multitasking results in overlapping time records, which are additive. Thus, the total task time is >100% of the total time observed.

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Sinsky, C., Colligan, L., Li, L., Prgomet, M., Reynolds, S., Goeders, L., ... Blike, G. (2016). *Allocation of Physician Time in Ambulatory Practice: A Time and Motion Study in 4 Specialties*. *Annals of Internal Medicine*, 165(11), 753. doi:10.7326/m16-0961

Exhibit 3 — Relationship of EHR with Satisfaction, Clerical Burden, and Burnout

TABLE 3. Relationship of EHR, CPOE, Patient Portal Use and Method of Documentation With Satisfaction, Clerical Burden and Burnout^a

Factor	Satisfied ^b clerical directly related to patient care (No. [%])	P value	Satisfied ^b clerical indirectly related to patient care (No. [%])	P value	Burnout (No. [%])	P value
Use EHRs		<.001		<.001		<.001
Yes	1880/5329 (35.3)		1308/5312 (24.6)		3056/5340 (57.2)	
No	472/971 (48.6)		306/971 (31.5)		434/974 (44.6)	
Use CPOE		<.001		<.001		<.001
Clinic only	369/1169 (31.6)		257/1158 (22.2)		648/1162 (55.8)	
Hospital only	566/1490 (38.0)		392/1488 (26.3)		886/1496 (59.2)	
Both clinical and hospital	691/2153 (32.1)		440/2147 (20.5)		1273/2163 (58.9)	
Not at all	475/1015 (46.8)		332/1018 (32.6)		461/1021 (45.2)	
Not applicable to my specialty	252/490 (51.4)	NA	193/489 (39.5)	NA	229/488 (46.9)	NA
Use an electronic patient portal		.001		<.001		.49
Yes	547/1645 (33.3)		336/1636 (20.5)		923/1647 (56.0)	
No	1796/4644 (38.7)		1273/4637 (27.5)		2562/4654 (55.0)	
Method of documentation		.005		.11		.02
Dictate and use transcription service	364/928 (39.2)		244/927 (26.3)		492/932 (52.8)	
Self-enter: voice recognition software	296/909 (32.6)		204/909 (22.4)		535/908 (58.9)	
Self-enter: handwritten or typed	1482/3882 (38.2)		999/3868 (25.8)		2154/3884 (55.5)	
Someone else (eg, scribe) enters for me	109/277 (39.4)		79/276 (28.6)		154/282 (54.6)	
Other	97/297 (32.7)		84/296 (28.4)		146/296 (49.3)	

^aCPOE = computerized physician order entry; EHR = electronic health record; NA = not applicable.
^bAgree or strongly agree that the amount of time spent on clerical tasks in this dimension is reasonable.

Shanafelt, T. D., Dyrbye, L. N., Sinsky, C., Hasan, O., Satele, D., Sloan, J., & West, C. P. (2016). *Relationship Between Clerical Burden and Characteristics of the Electronic Environment With Physician Burnout and Professional Satisfaction*. *Mayo Clinic Proceedings*, 91(7), 836–848. doi:10.1016/j.mayocp.2016.05.007

Exhibit 4 — Associations between workplace characteristics and physician outcomes by EHR clusters

Table 3 Associations between workplace characteristics and physician outcomes by EMR cluster

Predictors	EMR level	Stress	Burnout	Satisfaction	Intent to leave
Time pressure for visit	High	0.194 (-0.033, 0.420)	0.285* (0.111, 0.458)	-0.200* (-0.363, -0.036)	0.295* (0.171, 0.420)
	Moderate	0.054 (-0.180, 0.287)	-0.520 (-0.282, 0.179)	-0.127 (-0.347, 0.094)	0.026 (-0.298, 0.350)
	Low	-0.046 (-0.645, 0.553)	0.210 (-0.474, 0.893)	-0.127 (-0.616, 0.363)	-0.148 (-0.460, 0.165)
Time pressure for examination	High	0.167* (0.040, 0.295)	0.214* (0.078, 0.349)	-0.185* (-0.335, -0.036)	0.208* (0.033, 0.384)
	Moderate	0.059 (-0.240, 0.359)	-0.137 (-0.379, 0.104)	-0.107 (-0.331, 0.117)	-0.081 (-0.279, 0.117)
	Low	0.105 (-0.187, 0.397)	0.414 (-0.027, 0.856)	-0.053 (-0.592, 0.487)	0.001 (-0.190, 0.192)
Work control	High	-0.292* (-0.420, -0.165)	-0.284* (-0.430, -0.138)	0.434* (0.308, 0.560)	-0.333* (-0.464, -0.202)
	Moderate	-0.120 (-0.358, 0.119)	-0.073 (-0.213, 0.066)	0.349* (0.161, 0.536)	0.056 (-0.233, 0.346)
	Low	-0.344* (-0.627, -0.061)	-0.571* (-0.990, -0.153)	0.348* (0.027, 0.669)	0.464* (0.224, 0.703)
Quality	High	-0.124 (-0.277, 0.029)	-0.318* (-0.426, -0.210)	0.350* (0.227, 0.473)	-0.342* (-0.444, -0.240)
	Moderate	-0.193* (-0.352, -0.034)	-0.063 (-0.283, 0.156)	0.346* (0.190, 0.503)	-0.149 (-0.443, 0.144)
	Low	-0.367* (-0.726, -0.009)	-0.341 (-0.740, 0.057)	0.143 (-0.126, 0.412)	0.046 (-0.493, 0.586)
Communication	High	-0.102 (-0.262, 0.059)	-0.178* (-0.337, -0.019)	0.277* (0.145, 0.409)	-0.093 (-0.206, 0.020)
	Moderate	-0.180 (-0.376, 0.015)	-0.189* (-0.314, -0.064)	0.251* (0.103, 0.399)	-0.264* (-0.517, -0.011)
	Low	-0.081 (-0.275, 0.112)	0.069 (-0.125, 0.263)	-0.004 (-0.231, 0.222)	0.016 (-0.302, 0.334)
Trust	High	-0.144* (-0.280, -0.007)	-0.302* (-0.431, -0.174)	0.433* (0.300, 0.565)	-0.323* (-0.465, -0.181)
	Moderate	-0.196* (-0.343, -0.049)	-0.119 (-0.289, 0.052)	0.352* (0.212, 0.492)	-0.353* (-0.532, -0.174)
	Low	-0.267 (-0.740, 0.206)	-0.385* (-0.675, -0.096)	0.347* (0.085, 0.609)	0.224 (-0.162, 0.611)
Cohesive	High	-0.097 (-0.246, 0.051)	-0.163* (-0.279, -0.047)	0.324* (0.208, 0.441)	-0.166* (-0.291, -0.041)
	Moderate	-0.050 (-0.234, 0.133)	0.061 (-0.162, 0.283)	0.128 (-0.123, 0.379)	-0.120 (-0.379, 0.140)
	Low	-0.271 (-0.744, 0.202)	-0.211 (-0.654, 0.233)	0.134 (-0.216, 0.484)	0.032 (-0.558, 0.623)
Leadership	High	-0.196* (-0.343, -0.050)	-0.255* (-0.397, -0.112)	0.315* (0.191, 0.439)	-0.428* (-0.560, -0.297)
	Moderate	-0.066 (-0.219, 0.087)	-0.106 (-0.251, 0.040)	0.238* (0.103, 0.372)	-0.032 (-0.277, 0.213)
	Low	-0.133 (-0.522, 0.257)	-0.462* (-0.732, -0.192)	0.430* (0.110, 0.751)	0.375* (0.018, 0.732)

*p<0.05.

EMR, electronic medical record.

Exhibit 4 (continued) — Mean scores for stress, burnout, satisfaction, and intent to leave by EHR function clusters

Table 2 Variance in physician’s adjusted mean scores for stress, burnout, satisfaction, and intent to leave scales by EMR function clusters

Variable	High function cluster: 46 clinics, 207 physicians	Mod function cluster: 22 clinics, 98 physicians	Low function cluster: 24 clinics, 74 physicians	Contrast high versus mod cluster	Contrast high versus low cluster	Contrast mod versus low cluster
	Mean (SE) 95% CI	Mean (SE) 95% CI	Mean (SE) 95% CI			
Stress score	3.26 (0.07) (3.13 to 3.39)	3.44 (0.10) (3.24 to 3.64)	2.97 (0.19) (2.59 to 3.35)	p=0.15 ES=-0.18	p=0.14 ES=0.23	p=0.03 ES=0.35
Burnout score	2.18 (0.06) (2.05 to 2.30)	2.32 (0.10) (2.12 to 2.51)	2.03 (0.09) (1.84 to 2.21)	p=0.24 ES=-0.15	p=0.25 ES=0.17	p=0.08 ES=0.32
Satisfaction	3.68 (0.05) (3.58 to 3.79)	3.61 (0.08) (3.44 to 3.78)	4.11 (0.16) (3.79 to 4.44)	p=0.47 ES=0.08	p=0.01 ES=-0.39	p=0.006 ES=-0.45
Intent to leave	2.00 (0.09) (1.82 to 2.19)	2.05 (0.15) (1.76 to 2.34)	2.09 (0.26) (1.57 to 2.61)	p=0.80 ES=-0.03	p=0.75 ES=-0.05	p=0.87 ES=-0.02

Means adjusted for physician age, sex, specialty, hours worked weekly, and number of years with EMR system.
EMR, Electronic medical record; ES, effect size.

Babbott, S., Manwell, L. B., Brown, R., Montague, E., Williams, E., Schwartz, M., ... Linzer, M. (2014). *Electronic medical records and physician stress in primary care: results from the MEMO Study*. *Journal of the American Medical Informatics Association*, 21(e1), e100–e106. doi:10.1136/amiajnl-2013-001875

Exhibit 5 — Impact of Medical Scribes to Physician and Patient Satisfaction

Table 3. Physician Satisfaction, Unadjusted Results

Characteristic	Scribe Present Median Score (IQR) ^a	Scribe Not Present Median Score (IQR) ^a
Overall satisfaction	6 (6-7)	5 (4-6)
Face time with patients	6.5 (6-7)	5 (4-7)
Charting time	6 (6-7)	4 (3-5)
Chart quality	6 (6-7)	5 (5-6)
Chart accuracy	6 (6-7)	6 (5-7)

IQR = interquartile range.

^a Responses scored on a scale from 1 to 7 where 1 indicates least satisfaction, and 7 indicates most satisfaction.

Table 5. Patient Satisfaction, Adjusted Results

Outcome	OR	95% CI	P Value
Physician explains things to me			
Scribe	0.82	0.48-1.40	.468
Physician 1, new interaction ^a	0.81	0.48-1.36	.429
Physician 2	0.40	0.22-0.71	.002
Physician 3	1.54	0.72-3.32	.266
Physician 4	0.97	0.50-1.87	.920
Physician listens to me			
Scribe	0.88	0.49-1.58	.681
Physician 1, new interaction ^a	0.75	0.42-1.32	.319
Physician 2	0.64	0.36-1.11	.113
Physician 3	2.63	1.18-5.87	.018
Physician 4	1.58	0.82-3.04	.717
Physician cares about me			
Scribe	1.15	0.67-1.97	.609
Physician 1, new interaction ^a	0.66	0.38-1.13	.130
Physician 2	0.39	0.22-0.69	.001
Physician 3	2.19	0.96-5.00	.061
Physician 4	0.79	0.43-1.47	.459
Physician encourages me to talk			
Scribe	1.07	0.63-1.80	.808
Physician 1, new interaction ^a	0.58	0.35-0.97	.037
Physician 2	0.39	0.22-0.68	.001
Physician 3	2.09	0.95-4.60	.068
Physician 4	0.68	0.38-1.23	.202
Physician spends enough time with me			
Scribe	1.12	0.70-1.79	.642
Physician 1, new interaction ^a	0.92	0.06-1.50	.725
Physician 2	0.53	0.33-0.85	.008
Physician 3	3.20	1.57-6.53	.001
Physician 4	1.55	0.90-2.68	.116
I would recommend this physician			
Scribe	1.06	0.60-1.89	.825
Physician 1, new interaction ^a	0.59	0.34-1.04	.066
Physician 2	0.34	0.18-0.62	.001
Physician 3	1.79	0.76-4.19	.183
Physician 4	0.75	0.38-1.47	.405

OR = odds ratio.

Note: Model B.

^a First interaction between scribe and physician.

Table 1 Physician Satisfaction with Workplace Measures, Doctor–Patient Relationship, and EHR Use (N = 6)

Measure	Agree or strongly agree, N (%) [*]	
	Pre-scribe, N (%)	Post-scribe, N (%)
Workplace satisfaction measures		
Feeling rushed during visits	6 (100)	0 (0)
Too much time during visits spent working on computer	5 (83)	0 (0)
Satisfied with clinic workflow	2 (33)	6 (100)
Calm atmosphere in primary work area [†]	0 (0)	2 (33)
No or little burnout [‡]	5 (83)	5 (83)
Doctor–patient relationship measures		
Satisfied with quality of patient interactions during visits [§]	5 (83)	6 (100)
Satisfied with quality of communication with patients	4 (67)	5 (83)
Able to explain things to patients in a way that is easy for them to understand	6 (100)	5 (83)
Able to listen carefully to patients	5 (83)	5 (83)
Spending enough time with patients	4 (67)	5 (83)
Able to involve patients in making decisions about their care	5 (83)	5 (83)
Concern about looking at the computer screen more than at the patient	3 (60)	0 (0)
EHR use measures		
Optimal sufficiency of time for documentation	1 (17)	6 (100)
Satisfied with EHR use	1 (17)	5 (83)
Satisfied with amount of time spent documenting clinic encounters	0 (0)	4 (67)
Satisfied with quality of documentation	4 (67)	5 (83)
< 1 post-clinic hour spent on documentation per half-day session [¶]	2 (33)	4 (67)

^{*} Responses are on a five-point Likert scale (strongly disagree to strongly agree), unless otherwise indicated

[†] Results represent physicians who reported one or two on the scale of one (calm) to five (hectic, chaotic)

[‡] Results represent physicians who reported one or two on the scale of one (“I enjoy my work, I have no symptoms of burnout”) to five (“I feel completely burned out and often wonder if I can go on. I am at the point where I may need to seek help”)

[§] Pre-pilot survey answer choices ranged from one (very dissatisfied) to five (very satisfied). Post-pilot survey answer choices were changed for ease of survey administration to one (strongly disagree) to five (strongly agree). Results represent physicians who reported “satisfied” and “very satisfied”

^{||} Results represent physicians who reported four or five on a scale of one (poor) to five (optimal)

[¶] Results represent physicians who reported < 1 h on a scale of 0 to > 8 h

Gidwani, R., Nguyen, C., Kofoed, A., Carragee, C., Rydel, T., Nelligan, I., ... Lin, S. (2017). *Impact of Scribes on Physician Satisfaction, Patient Satisfaction, and Charting Efficiency: A Randomized Controlled Trial. The Annals of Family Medicine, 15(5), 427–433. doi:10.1370/afm.2122*

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