Health Information Technology Department
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In the name of God

Mashhad University of Medical Sciences

VARIABLES ASSOCIATED WITH COMPLETENESS OF MEDICAL RECORD DOCUMENTATION IN THE EMERGENCY DEPARTMENT

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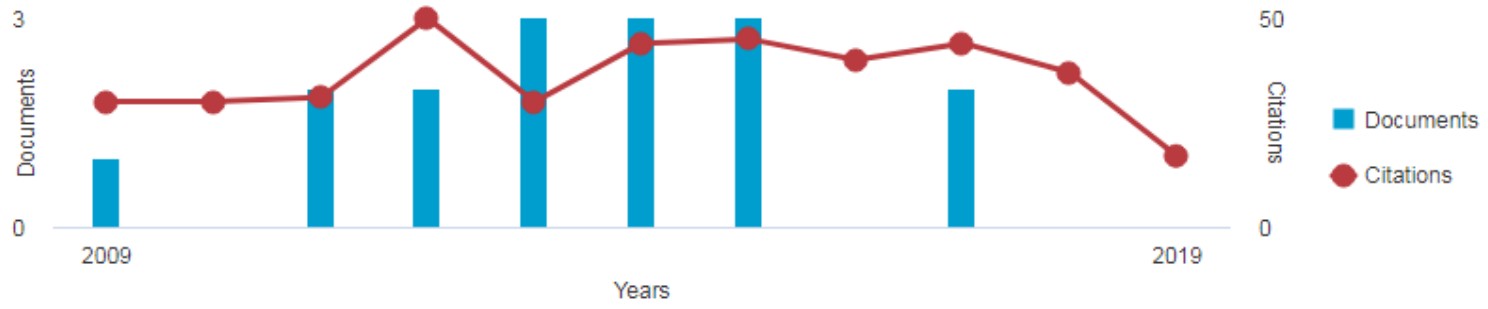

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INTRODUCTION

- The medical record can be defined as **documentation** that contains information about a patient's medical **history, symptoms, clinical findings, diagnoses, therapies** and **prognosis**. It serves **as a means** to track the progress of a patient through the healthcare system and allows **communication** between **healthcare providers**.
- In addition, the medical record is important **in medico-legal** settings and for **administration, education, research, health- care planning** and **budgeting**.

INTRODUCTION

- Despite its many functions, **documentation quality** is often **suboptimal**. Suboptimal documentation is evident across multiple healthcare disciplines including **nursing**, **pharmacy**, **inpatient** services, **outpatient** services and the **ED**.

INTRODUCTION

- For many patients, the ED medical record represents the beginning of the patient's journey through different settings. **Medical record entries** are **frequently copied** from **previous notes**. One study reported the **frequency of copied** notes to be as high as **82%**. This highlights the **importance** of **good quality** ED **documentaion**. However, the **time-pressured environment** and **high patient turn- over** are reported as reasons why documentation often **suffers** in the ED.

INTRODUCTION

- Other reasons include illegible handwriting, inaccuracy, incomplete information and poor concordance. A number of methods have been proposed to assess documentation quality. These include the PDQI and QNOTE tools, although neither has been validated in the ED setting nor adequately examine documentation completeness.

INTRODUCTION

- There is a paucity of reports on the potential impact of doctor, patient and environmental factors on documentation quality, especially in the ED. We aimed to determine the variables associated with completeness (an element of quality) of medical record documentation in the ED. These variables may inform intervenions aimed at improving documentation completeness in this setting.

METHODES

- We undertook a retrospective audit of electronic medical records (EMRs) of the Austin Hospital ED between February and May 2017, inclusive. The Austin Hospital is a tertiary referral, metropolitan centre and the ED has a mixed (adult and paediatric) annual census of approximately 85 000. The study was approved by the Austin Health Human Research Ethics Committee.

METHODES

Prior to the audit, we developed a 'Completeness Scoring Tool' in order to evaluate the completeness of documentation in the medical record. Twelve ED consultants were independently asked to nominate the five most important items of both medical history and physical examination that should be documented for each of four common presenting complaints: abdominal pain, cardiac chest pain, shortness of breath or headache. The most commonly nominated important items informed the development of the scoring tool (Box 1). If a medical record had all 10 of these important items recorded, it received a 'documentation score' of 10. If no item was documented, the documentation score was 0.

METHODES

BOX 1. *History and examination items that comprise the documentation completeness scoring tool*

Presenting complaint	History items	Examination items
Abdominal pain	Past history	General appearance
	Duration	Local tenderness
	Location	Peritonism
	Bowel motions	Distension
	Vomiting	Bowel sounds
Cardiac chest pain	Past history	General appearance
	Duration	Lung auscultation
	Nature	Heart auscultation
	Precipitating/ exacerbating factors	Jugular venous pressure
	Associated symptoms	Peripheral oedema
Shortness of breath	Past history	Lung auscultation
	Duration	Heart auscultation
	Fever	Jugular venous pressure
	Cough	Peripheral oedema
	Associated pain	Accessory muscle use
Headache	Past history	General appearance
	Duration	Meningism
	Site	Cranial nerve exam
	Fever	Peripheral neurological exam
	Associated symptoms	Eye exam

METHODES

- The reproducibility of the scoring tool, when used by different assessors, was examined. Training was provided for the assessors in the use of the MEDTRAK® and CERNER®systems.
- A random sample of 20 patients was selected from the 1200 patients who met the study entrance criteria. The four assessors independently scored the documentation completeness of these patients. Their mean documentation scores were 5.5, 5.7, 5.8 and 5.9.

METHODES

- Patients were eligible for **inclusion** if they were **aged 18 years or more** and presented **in May–July 2013 or May–July 2016**, inclusive, with one of the four presenting complaints of interest. They were **excluded** if they **self-discharged** before being assessed by an ED doctor, were **reviewed by another team** (not an ED doctor), or had previously been **enrolled in the same 3 month period**. They were also excluded if their medical record or demographic details were missing or if they had no ED doctor notes (the patient was seen by **a nurse practitioner** or **physiotherapist**).
- From each year's list, **600 eligible patients** (**150** patients for each of the four **presenting complaint groups**) were **randomly** selected, using the **Excel** randomisation function.

METHODES

- In both the **MEDTRAK®** (introduced in 2001) and **CERNER®** (introduced in 2014) **ED information systems**, all medical records were typed into the computer **directly** by the **treating doctor**. No records were handwritten. A single investigator extracted all data from the medical records. These data included **presenting year, day** and **time, patient age** and **gender, triage category, pain score, preferred language, interpreter requirement, discharge destination, presenting complaint, doctor gender** and **designation**.

METHODES

- Following data collection, a sample of 10% of enrolled patients was randomly selected and their medical record scored by a second assessor. Any discrepancy in completeness scores between the original and second assessors was rechecked against the definitions document to inform the final scoring. Scores between any two assessors were concordant in 82.5% of cases. In all but one of the discordant cases, the assessor scores differed by 1. For the other case, the scores differed by 2.

METHODES

- Data were entered into an Excel spreadsheet without identifying information. All patients were assigned a study ID number. A password protected master list linking the patient's name and UR number to the study ID number was generated to enable a subsequent data extraction accuracy exercise.
- The primary outcome of the study was documentation completeness as measured by the scoring tool (range 0–10). Secondary outcomes included a comparison of completeness between the presenting complaint and doctor subgroups, and history and examination item completeness.

METHODES

- Most analyses were descriptive, for example, mean (SD), proportion (95% CI). Multivariate regression was employed to determine which doctor, patient or environmental variables were associated with the documentation completeness score. Intercooled Stata 6.0 for Windows 98/95/NT (Stata Corporation, Col- lege Station, TX, USA) was employed for all analyses (level of significance 0.05).

RESULT

- There were few differences in the following variables: presenting year, patient gender, presenting complaint and doctor gender. There was a higher proportion of weekday than weekend presentations and a lower proportion of presentations during the time 00.00–07.59 h and among patients aged over 80 years. Most patients spoke English and did not require an interpreter. There were also small differences in the number of interns and residents compared to registrars and consultants. Presentations that were classified as triage category 3 were most common. Additionally, there were slightly fewer patients with mild and severe pain (as opposed to moderate pain) and fewer who were transferred to the short stay ward.

RESULT

TABLE 1. *Regression analysis of variables on documentation scores*

	n (%)	Documentation score, mean (SD)	Univariate analysis			Multivariate analysis		
			Effect	95% CI	*P*	Effect	95% CI	*P*
Presenting year								
2016	600 (50)	6.5 (1.7)	0			0		
2013	600 (50)	6.4 (1.8)	−0.1	−0.29 to 0.10	0.35	−0.06	−0.35 to 0.13	0.54
Presenting day								
Weekday	902 (75)	6.4 (1.8)	0			0		
Weekend	298 (25)	6.4 (1.7)	−0.07	−0.30 to 0.16	0.54	−0.16	−0.38 to 0.06	0.16
Presenting time								
00.00–07.59 h	237 (20)	6.6 (1.6)	0			0		
08.00–15.59 h	565 (47)	6.3 (1.8)	−0.29	−0.56 to −0.03	0.03	−0.09	−0.34 to 0.17	0.50
16.00–23.59 h	398 (33)	6.5 (1.9)	−0.13	−0.41 to 0.15	0.36	−0.01	−0.28 to 0.26	0.94
Patient age (years)								
18–39	320 (27)	6.4 (1.6)	0			0		
40–59	343 (29)	6.4 (1.7)	−0.07	−0.34 to 0.20	0.61	−0.06	−0.32 to 0.20	0.65
60–79	340 (28)	6.4 (1.8)	−0.07	−0.34 to 0.20	0.61	0.001	−0.29 to 0.29	0.995
80+	197 (16)	6.7 (1.8)	0.22	−0.09 to 0.54	0.16	0.29	−0.06 to 0.65	0.10
Patient gender								
Male	488 (41)	6.4 (1.8)	0			0		
Female	712 (59)	6.4 (1.7)	−0.02	−0.23 to 0.18	0.82	0.13	−0.19 to 0.21	0.90
Presenting complaint								
Abdominal pain	300 (25)	6.6 (1.6)	0			0		
Cardiac chest pain	300 (25)	6.5 (1.8)	−0.05	−0.32 to 0.21	0.74	0.23	−0.12 to 0.60	0.20
Shortness of breath	300 (25)	6.5 (2.0)	−0.11	−0.39 to 0.17	0.44	0.12	−0.25 to 0.49	0.52
Headache	300 (25)	6.2 (1.6)	−0.38	−0.66 to −0.10	0.01	−0.35	−0.63 to −0.08	0.01
Triage category								
1–2	335 (28)	6.3 (1.7)	0			0		
3	638 (53)	6.5 (1.8)	0.15	−0.08 to 0.39	0.19	0.27	0.002 to 0.53	0.048
4–5	227 19)	6.3 (1.8)	−0.13	−0.31 to 0.28	0.93	0.3	−0.06 to 0.65	0.10
Preferred language								
English	1079 (91)	6.4 (1.7)	0			0		
Other	121 (9)	6.5 (1.9)	0.08	−0.23 to 0.41	0.63	−0.31	−0.81 to 0.18	0.22
Interpreter required								
No	1122 (94)	6.4 (1.8)	0			0		
Yes	78 (6)	6.7 (1.8)	0.26	−0.14 to 0.66	0.2	0.54	−0.05 to 1.13	0.07
Pain intensity at triage								
None (pain score 0)	347 (29)	6.4 (2.0)	0			0		
Mild (1–3)	230 (19)	6.5 (1.8)	0.05	−0.24 to 0.34	0.73	0.26	−0.06 to 0.58	0.11
Moderate (4–7)	449 (37)	6.5 (1.7)	0.05	−0.20 to 0.29	0.71	0.35	0.03 to 0.67	0.03
Severe pain (8–10)	174 (15)	6.4 (1.5)	−0.04	−0.35 to 0.28	0.81	0.36	−0.05 to 0.77	0.08
Discharge destination†								
Home	545 (45)	6.5 (1.8)	0			0		
Short stay unit	271 (23)	6.4 (1.7)	−0.12	−0.38 to 0.13	0.36	−0.002	−0.26 to 0.25	0.99
Inpatient ward	383 (32)	6.4 (1.7)	−0.09	−0.32 to 0.14	0.45	−0.11	−0.35 to 0.14	0.39
Doctor gender								
Male	684 (57)	6.3 (1.8)	0			0		
Female	516 (43)	6.7 (1.7)	0.39	0.19 to 0.59	<0.01	0.16	−0.04 to 0.35	0.11
Doctor designation								
Intern	156 (13)	7.2 (1.6)	0			0		
Resident	192 (16)	7.0 (1.4)	−0.22	−0.57 to 0.13	0.22	−0.23	−0.58 to 0.13	0.21
Registrar	544 (45)	6.5 (1.6)	−0.74	−1.01 to −0.44	<0.01	−0.72	−1.02 to −0.42	<0.01
Consultant	308 (26)	5.6 (1.9)	−1.66	−1.98 to −1.34	<0.01	−1.62	−1.95 to −1.29	<0.01

†*n* = 1199.

RESULT

- The designation of the doctor was significantly associated with documentation completeness. As seniority increased, documentation completeness decreased. Doctor gender was associated with completeness in the univariate but not the multivariate analyses.
- Patients with triage category 3 or in moderate pain had slightly higher documentation scores when compared to their respective reference subgroups. However, the differences between the mean scores between the groups were not clinically significant (0.2 and 0.1, respectively).

RESULT

- Patients in the headache subgroup had slightly lower scores than the abdominal pain subgroup. However, the differences in the mean scores for these complaints (<1) were not clinically significant. The presenting year, day and time, patient age and gender, triage category, pain score, preferred language, interpreter requirement, discharge destination were not associated with documentation completeness.

RESULT

- The most poorly documented history items were precipitating/exacerbating factors of chest pain and fever in headache, both of which were documented less than 55% of the time (Table 3). The most poorly documented examination items were abdominal distension, jugular venous pressure and eye examination, where each item was documented less than 30% of the time.

RESULT

TABLE 3. *History and examination items recorded in the medical record*

Complaint	History items, *n*† (%)		Examination items, *n*† (%)	
Abdominal pain	Past history	267 (89.0)	General appearance	151 (50.3)
	Duration (onset)	283 (94.3)	Local tenderness	278 (92.7)
	Location	267 (89.0)	Peritonism	96 (32.0)
	Bowel motions	233 (77.7)	Distension	42 (14.0)
	Vomiting	204 (68.0)	Bowel sounds	152 (50.7)
Cardiac chest pain	Past history	273 (91.0)	General appearance	134 (44.7)
	Duration (onset)	292 (97.3)	Lung auscultation	258 (86.0)
	Nature	202 (67.3)	Heart auscultation	237 (79.0)
	Exacerbating factors	99 (33.0)	Jugular venous pressure	77 (25.7)
	Associated symptoms	259 (86.3)	Peripheral oedema	117 (39.0)
Shortness of breath	Past history	288 (96.0)	Lung auscultation	274 (91.3)
	Duration (onset)	269 (89.7)	Heart auscultation	192 (64.0)
	Fever	184 (61.0)	Jugular venous pressure	85 (28.3)
	Cough	206 (69.0)	Peripheral oedema	139 (46.3)
	Associated pain	186 (62.0)	Accessory muscle	97 (32.3)
Headache	Past history	269 (89.7)	General appearance	130 (43.3)
	Duration (onset)	292 (97.3)	Meningism	115 (38.3)
	Site	222 (74.0)	Cranial nerve exam	185 (61.7)
	Fever	280 (54.7)	Peripheral neuro exam	186 (62.0)
	Associated symptoms	130 (93.3)	Eye exam	23 (7.7)

†*n* = number of times an item was documented out of a maximum of 300 for each presenting complaint in 300 patients.

RESULT

- For each presenting complaint, a maximum of **1500 history** and **1500 examination items** could have been documented (**5 items** × **300 patients**). For each of the presenting complaint groups, documentation of **examination** items was **significantly less than history items.**

RESULT

TABLE 2. *Difference in proportions of documented history and examination items*

Complaint	History items n† = 1500	Examination items n† = 1500	Difference in proportions % (95% CI)	*P*
Abdominal pain, *n* (%)	1254 (83.6)	719 (47.9)	35.7 (32.5, 38.9)	<0.001
Cardiac chest pain, *n* (%)	1125 (75.0)	823 (54.9)	20.1 (16.7, 23.5)	<0.001
Shortness of breath, *n* (%)	1133 (75.5)	787 (52.5)	23.1 (19.7, 26.5)	<0.001
Headache, *n* (%)	1227 (81.8)	639 (42.6)	39.2 (36.0, 42.4)	<0.001

†n = 5 important items/patient × 300 patients = 1500 items should have been documented.

DISCUSSION

- This study demonstrates that seniority of the doctor is significantly and negatively associated with completeness of the ED medical record, a component of documentation quality.This finding is consistent with other reports.
- Chong et al examined the effect of an EMR system on documentation quality and reported that senior doctors performed more poorly on a template EMR system than junior doctors. Soto et al examined variables affecting documentation quality and reported that more senior physicians were less likely to document drug allergies or immunisation status.

DISCUSSION

- It may be that interns are more diligent and record more information, including lists of negative findings. Interns usually see fewer patients and may spend more time on documentation. Moreover, they may have better typing and computer skills that allows them time to record more information. All doctors in our ED see new patients. However, senior doctors have more responsibilities, including managing patient flow, supervision of junior doctors and medical students, management plans, administration and teaching. These may limit their time available for more complete documentation.

DISCUSSION

- Although we did **not find** an **association** between **doctor gender** documentation completeness, **Soto et al**, showed that **female physicians** have **better smoking history** documentation **than males** and that **female paediatricians** are more likely to **document drug allergies.**
- They also reported that documentation completeness **varied** with **specialisation of the doctor**. As our study was confined to the ED setting, we were unable to investigate this variable. However, it is logical to assume that with different specialties, the focus of the history and examination is skewed to the **specialty of interest.**

DISCUSSION

- Daphtary et al, using the PDQI9 tool, reported no association between documentation quality and the time of presentation to a pediatric intensive care unit (ICU). This was consistent with our findings where time and day of presentation were not associated with documentation completeness. Conversely, another ICU study showed that transcription of laboratory results was more accurate when recorded in the morning.

DISCUSSION

- Documentation of **headache items** was slightly **less complete** than the other presenting complaint subgroups. **In particular**, the **eye examination** was the least well documented. As the **examination items** for this **complaint are more time consuming than the other complaints**, this may have contributed to this finding. Overall, in each patient subgroup, **history items** were **more frequently documented**. This may reflect the perception that history is often **more important** than examination in **patient assessment**.

LIMITATION

- Only electronic records on MEDTRAK and CERNER were assessed and they may not be representative of other EMR systems. We examined only ED documentation so our findings may not be relevant to other healthcare settings, for example, inpatient or outpatient encounters. Furthermore, the findings are only applicable to the four common presenting complaints examined. Also, the completeness scoring tool was designed specifically for this study and has not been used or validated elsewhere. However, when used by different assessors for the same records, the score reproducibility was good.

LIMITATION

- The tool was comprised of items as determined by 12 emergency physicians and their responses often varied. As such, they may not have been the most important items within a medical record.
- Our study did not capture other measures of quality such as accuracy and reliability and did not address whether documentation quality affects quality of care. Finally, as a single centre study, the external validity of the findings may be questionable.

CONCLUSION

- **Registrar** and **consultant** documentation is **less complete** than that of **interns**. **History items** are **better documented** than **examination items** for each of the four presenting complaints. **Headache items** were documented **slightly less well** than those for the **other presenting complaints**. Further research should determine the extent of medico-legal and patient care implications of poor documentation and whether the documentation of senior doctors needs to be improved.

Thanks for Your Attention

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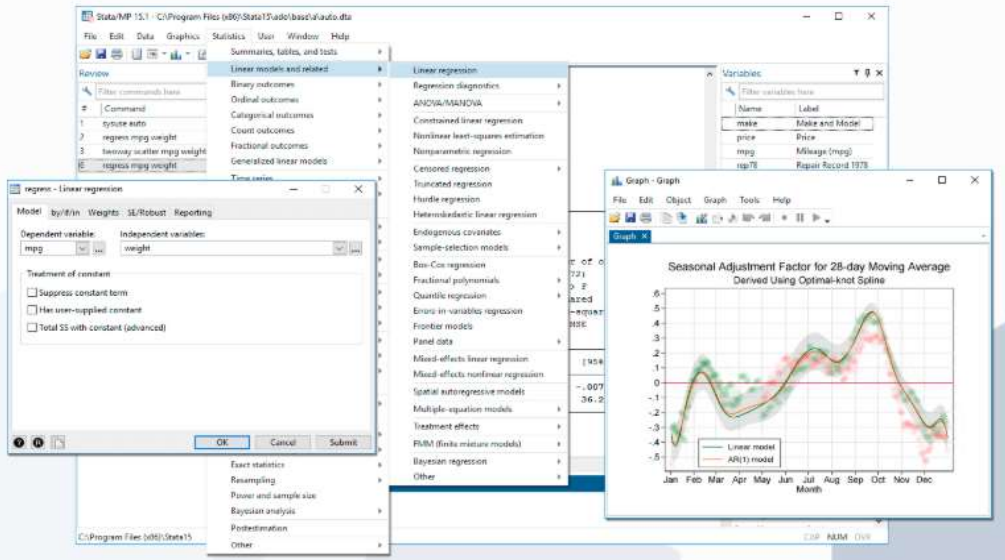

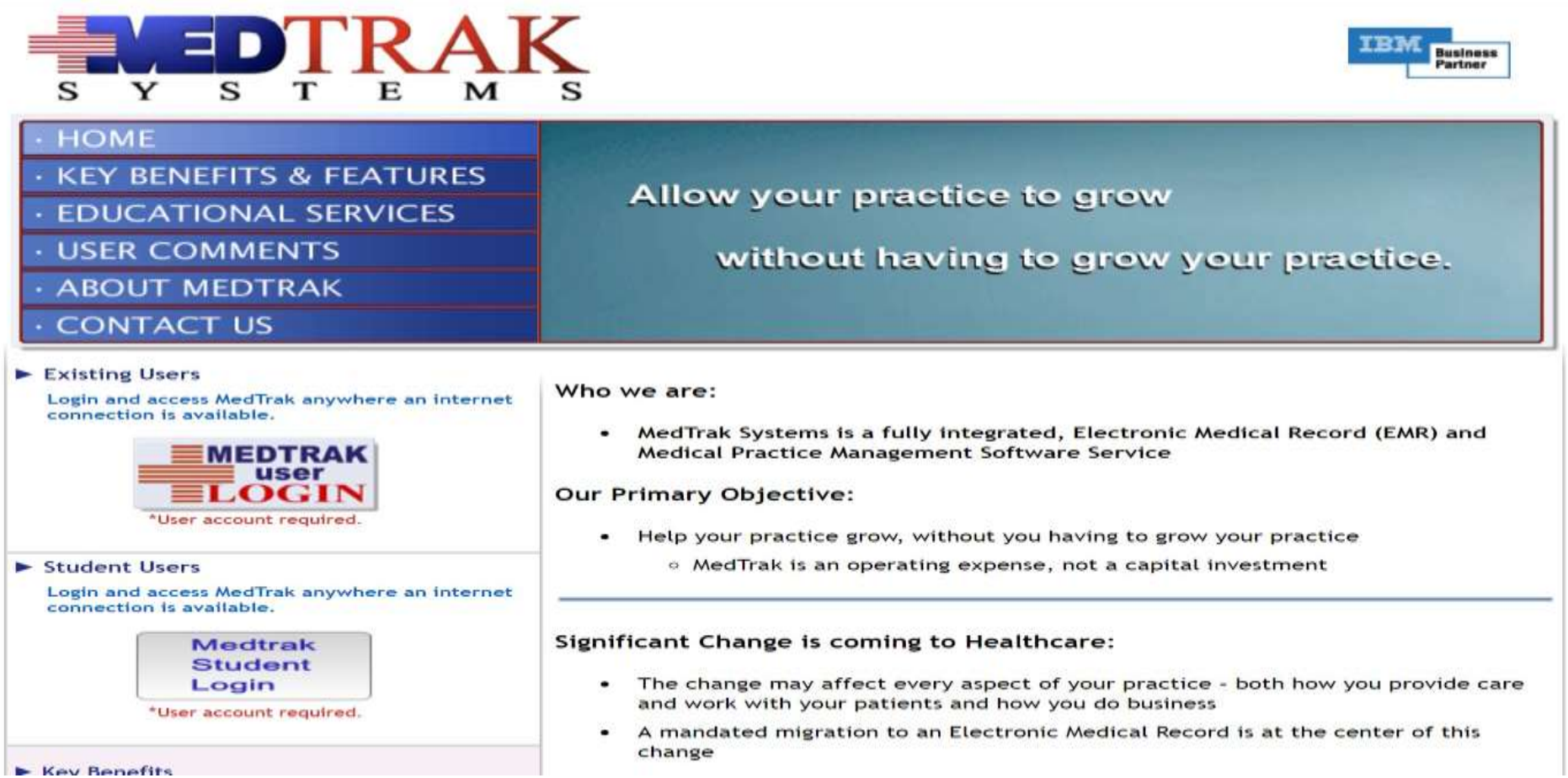
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QNOTE: an instrument for measuring the quality of EHR clinical notes

- **PDQI**:Preliminary development of the physician documentation quality instrument