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The Value of the Clinical Narrative in Cancer Care

Session 65, March 6, 2018

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THE UNIVERSITY OF TEXAS
MDAnderson
Cancer Center



COMMITMENT

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Conflict of interest

Jerry Henderson, MD

Has no real or apparent conflicts of interest to report

Michael Clark

Has no real or apparent conflicts of interest to report

Agenda

- Learning objectives
- MD Anderson profile
- Capturing patient stories in cancer care
- Patient story examples in different medical record formats
- Outcomes
- Nuance profile and partnership with MD Anderson
- Evolution of speech recognition in healthcare
- Best practices

Learning objectives

- Describe the impact of the historical narrative to the cancer patient healthcare care experience
- Discuss emerging voice, data/image sharing and clinical intelligent technologies in capturing and preserving the unstructured patient story
- Recognize initiatives at MD Anderson, the country's leading cancer center, to enable the patient medical narrative in the EHR as a method to connect providers to patients and improve upon cancer care

MD Anderson profile

- Jerry Henderson, MD MBA
- Physician for 13 years at MD Anderson Cancer Center Emergency Center (one of a kind)
- Physician Informaticist to the CMIO, CIO and Associate CMIO
- Developed and implemented electronic documentation software for the ER, which was the documentation tool for about five years
- Led the clinical content and template design for conversion to Epic
- Assisted in the rollout of Nuance Dragon Medical for the institution
- Led the conversion of the existing free-text problem list to Epic using natural language processing



MD Anderson statistics for 2016

- **1,101** active clinical research protocols
- **\$736,193,430** spent on research
- **\$4.4 billion** total institutional revenue
- **50** buildings in the greater Houston area, with over 14 million square feet (1.3 million square meters)
- **19,973** employees
- **1,685** faculty members
- **27,761** hospital admissions
- **654** inpatient beds
- **1,363,008** outpatient clinic visits, treatments and procedures
- **12,005,766** laboratory medicine procedures
- **523,297** diagnostic imaging procedures

Located in Houston Texas, MD Anderson's mission is to eliminate cancer through innovative therapies working within a patient-centered multidisciplinary environment. We are the largest single cancer-focused facility in the free world.

Letter from grandma 26 years ago

July 11, 1991 12:30pm,

Dear Trevor, I hope I'm around when you open this! Because I will or would have been 79 years old! Today we had a total eclipse, and the next one is in the year 2017 so I thought this was such a special day in the first year of your life that I would make a note of it to you since you are too little to understand any of it. I wonder what you will be doing at the age of 26! I do know that you are the cutest baby ever and we love you lots and love having you over to stay with us, you are so much fun! I must get back to work now, I'm giving this to your mother this weekend to put away until 2017 when you are to open this.

Love you, grandma Betty

Letter from grandma 26 years ago

- **Age:**
 - Author: 79
 - Reader: 26
- **Event:** Eclipse, Total
- **Diagnosis:** Baby, Cutest (ever) 526.00
- **History:**
 - Stayed with us: Yes
 - Fun to be with: Yes
- **Follow up with:** Mother, 2017

What is the purpose of the medical record?



1. Communication tool



2. Medical-legal document



3. Billing and coding system



4. Regulatory compliance tool

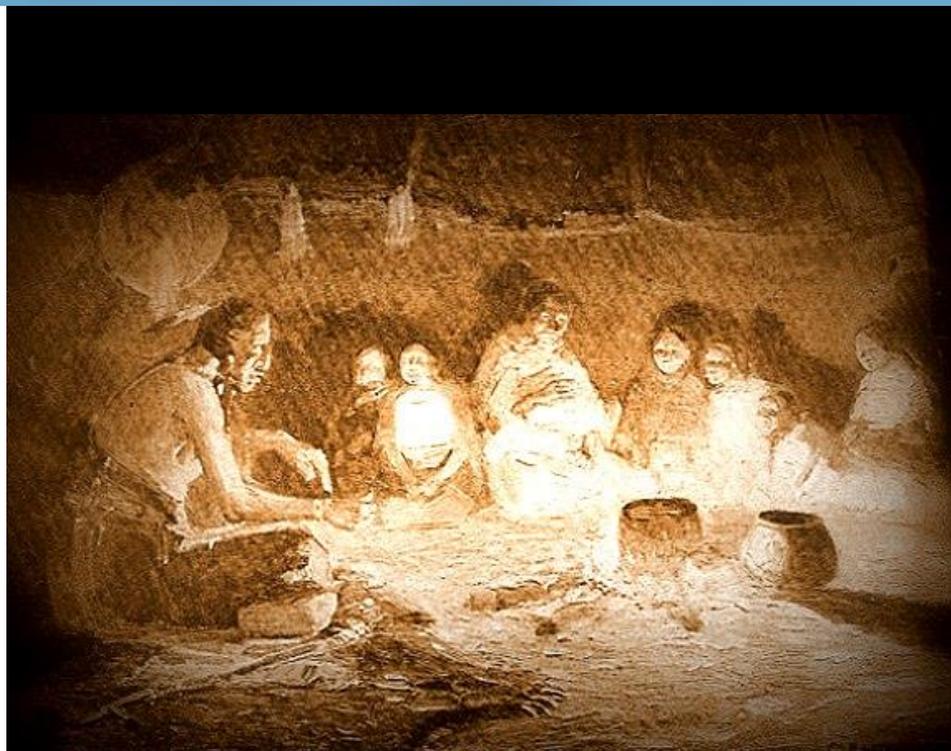


5. Data collection mechanism

Storytelling as an art form

- Primary method of passing on ideas for millennia
- As a skill for medical staff
 - Medical students
 - Nursing
 - Psychiatrists
 - HIMSS

Source: 'SIA MCKYE OVER COFFEE.' MONDAY MUSINGS: THE NATURAL ART OF STORYTELLING. Accessed February 02, 2018. <http://siamckye.blogspot.com/2013/01/monday-musings-natural-art-of.html>.



Importance of patient stories in cancer care

- Why does MD Anderson make patient stories a priority?
 - Patients become more than a number
 - Closes gaps in patient care
 - Connects discrete events in a meaningful way
 - Patient satisfaction
 - Provider satisfaction
 - Narrative story telling is particularly important in chronic diseases

How does MD Anderson capture the patient story?

- EHR
- Voice-to-text in clinic and at the bedside
- Voice-to-text in radiology/oncology imaging
- Provider and patient mobile technologies
- Open notes EHR portal
- Simulation training
- AI, clinical decision support tools

How do we use patient stories in cancer care?

History Overview Note

Arial 11 B I U A X

Insert SmartText

History of Present Illness:
 This is a lovely 75 year-old female with a history of small lymphocytic lymphoma initially diagnosed in 2005 from bilateral supraclavicular lymph node biopsies. She is a retired school-teacher and initially presented with fatigue and neck swelling. Her PCP diagnosed her anemia and suspicious of malignancy involving the cervical lymph nodes sent her to a local surgeon for biopsy. The patient was then referred to MD Anderson for treatment of SLL. Her initial therapy was complicated by sepsis and

Problem Histories

Malignant lymphoma - small lymphocytic

Add History...

Malignant lymphoma - small lymphocytic - History

Search for new event + Add Event Chemotherapy/Biotherapy/Hormonal Surgery Biopsy Radiation Progression

Relapse/Recurrence No Evidence of Disease (NED)

9/2005	Initial Diagnosis Lymph nodes (left and right supraclavicular), biopsies (6/22/05): SMALL LYMPHOCYTIC LYMPHOMA/CHRONIC LYMPHOCYTIC LEUKEMIA.
10/2005	Cancer Staged Bone marrow, left, biopsy, SMALL LYMPHOCYTIC LYMPHOMA/CHRONIC LYMPHOCYTIC LEUKEMIA, INTERSTITIAL AND NODULAR GROWTH PATTERN, COMPRISING 50% OF THE MARROW CELLULARITY
5/2006	Chemotherapy/Biotherapy/Hormonal PCR x 9 on protocol 2004-0818.
9/2006	Partial Remission/Response Bone marrow, right iliac crest, RESIDUAL SMALL LYMPHOCYTIC LYMPHOMA/CHRONIC LYMPHOCYTIC LEUKEMIA, NODULAR AND INTERSTITIAL PATTERNS, REPRESENTING APPROXIMATELY 5% OF THE CELLULAR ELEMENTS.
2/2009	Relapse/Recurrence Lymph node, portocaval, core biopsy: CHRONIC LYMPHOCYTIC LEUKEMIA/SMALL LYMPHOCYTIC LYMPHOMA WITH PROMINENT PROLIFERATION CENTERS BMA/Bx: <5% SLL.
3/2009	Chemotherapy/Biotherapy/Hormonal AMG-655 with velcade on protocol 2007-0906.
5/2009	Biopsy Bone marrow, left, core biopsy, CHRONIC LYMPHOCYTIC LEUKEMIA / SMALL LYMPHOCYTIC LYMPHOMA; NODULAR AND INTERSTITIAL PATTERN; REPRESENTING APPROXIMATELY 20% OF MARROW CELLS (TOTAL MARROW CELLULARITY IS 40%)
7/2009	Chemotherapy/Biotherapy/Hormonal Protocol 2006-1002, SAR-3419 for 3 cycles.
12/2009	Chemotherapy/Biotherapy/Hormonal protocol 2008-0494 of PCI 32765 (ibrutinib)
1/2010	Complete Remission/Response BMA/Bx negative.

Delete History (All Events) Restore Save

Source: MD Anderson

How do we use patient stories in cancer care?

Source: MD Anderson

Summary Handoff

History, Thor O
G9, Bed 12 Emergency Medicine

▼ History of Present Illness

Arial 9 B I U A ✕ [Icons] More ▼

This is a pleasant 62 year old male with a history of lung cancer s/p radiation therapy now with chest pain. The patient is at risk for radiation induced CAD. Also the patient has DM II on insulin. The patient has a history of STEM 4 years ago treated with coated stents. The patient's chest pain responds well to nitrates, but cardiac enzymes remain negative.

▼ Situation Awareness & Contingency Planning

Arial 9 B I U A ✕ [Icons] More ▼

For chest pain give nitrates. If patient becomes unstable overnight call Dr. Thrombus from Cardiology. She is aware of the case.

▼ Overnight Events

Arial 9 B I U A ✕ [Icons] More ▼

Patient did well overnight and is currently NPO for possible cardiac catheterization tomorrow

▼ Synthesis by Receiver

✓ Close ✕ Cancel

How do we use patient stories in cancer care?

Electronic Health Record (EHR)

Transfer Notes

 Create Note in NoteWriter   Create Note  Go to Notes  Refresh

Example: A patient story in a template

Patient is a 66 y.o. female presenting with **diarrhea and vomiting**.

History provided by: **Patient**

Diarrhea

Quality: **Watery**

Severity: **Severe**

Number of episodes: **Too many to count**

Onset quality: **Gradual**

Duration: **72 hours**

Timing: **Constant**

Relieved by: **Nothing**

Worsened by: **Nothing tried**

Ineffective treatments: **None tried**

Risk factors: **recent chemotherapy**

Risk factors: **no abdominal mass, no stem cell transplant, no radiation treatment, no immunosuppression, no hx of C Diff, no recent antibiotic use, no sick contacts, no suspicious food intake and no travel to endemic areas**

Associated symptoms: **abdominal pain and vomiting**

Associated symptoms: **no arthralgias, no chills, no recent cough, no diaphoresis, no fever, no headaches, no myalgias, no URI, no dysuria, no incontinence, no anorexia and no rectal pain**

Abdominal pain:

Location: **Generalized**

Quality: **Aching**

Pain scale: **superficial muscular tenderness.**

Onset quality: **Gradual**

Duration: **3 days**

Timing: **Constant**

Progression: **Waxing and waning**

Chronicity: **New**

Vomiting:

Quality: **Stomach contents**

Number of occurrences: **Too many to count**

Severity: **Severe**

Duration: **48 hours**

Timing: **Constant**

Progression: **Unchanged**

Vomiting

Associated symptoms: **abdominal pain and diarrhea**

Associated symptoms: **no constipation, no fever, no chills, no headaches, no arthralgias, no myalgias, no cough and no URI**

The same example in prose

This pleasant 66-year-old female who is getting treated for pancreatic cancer with chemotherapy complains of not being able to keep anything down for the past 3 to 4 days. She also tells me that she has abdominal pain and diarrhea. She has been receiving **FOLFOX** chemotherapy, and her last dose was one week ago which correlates well with the onset of her symptoms. She denies any recent fever.

Example: Patient story using auto command

Mrs. **History** is a **78** y.o. **female** with history of **new diagnosis of high grade serous adenocarcinoma of the peritoneum**. Dr. **Patience** had a discussion with the patient and her family regarding treatment. I have reviewed Lab/Imaging/Path. The results of all laboratory and/or radiographic studies were reviewed at length with the patient. The patient was provided with copies of these reports. The patient was instructed to report to the ER in the event of any acute issues.

Moments later the patient arrived in the ER with a blood pressure of 88/95 and pulse of 115.

What was the real the story?

Note template design at MD Anderson



Six core note types created



All note templates were built using one of these core designs



Clinicians on the design team demanded free text for storytelling

H&P template

Patient Thor O. History
MRN: 555555

Admitting Service: General Internal Medicine
Attending: Dr. Minny Patience
Age: 73

Friday, September 19, 2014

Chief Complaint: Collapse

History of Present Illness:

Patient is a 44-year-old male with lung cancer. He is currently receiving treatment with Pemetrexed, carboplatin, and bevacizumab chemotherapy. He began with shortness of breath 24 hours ago. His wife reports that he was getting out of the shower at the time and appeared exhausted and "red". She could hear him wheezing audibly and the patient collapsed to the floor. He was brought to the ED and found to have Thoracic outlet syndrome. He was admitted to the inpatient service for radiation therapy.

Review of Systems:

1. Shortness of breath
2. Collapse

Current medications:

1. Metoprolol 50mg po bid.
2. Hydrochlorothiazide 25mg po daily
3. Lasix 20mg po daily
4. Senokot-S, 2 tablets po bid.

Allergies:

1. Shellfish allergy - throat swelling.

Past Medical History:

1. Hypertension
2. Congestive heart failure
3. Mantle Cell Lymphoma

Past Surgical History:

1. Appendectomy 1974.

Progress note template

Patient: Thor O. History **Age:** 73
MRN: 555555 **Hospital Day:** 8

Tuesday, September 30, 2014

Chief Complaint: Pain in the right leg.

Interval History: Patient is recovering from radiation therapy for Thoracic outlet syndrome quite well. Last night he developed some left leg pain and we will investigate further.

Review of Systems:

- 1 Shortness of breath
- 2 Left leg pain

Exam:

BP- 98/47, **P-** 103, **RR-** 16, **Temp-** 36.8C, **SP02-** 88% on Room Air

General: Toxic Appearing. Pale.

Neuro: Oriented x 3. **Drowsy.**

Eyes: PERRL.

HEENT: Dry Mucus Membranes.

Cardiovascular: Regular rhythm. Tachycardia.

Lungs: **Rhonchi.**

Lymphatics: No peripheral edema.

Abdomen: Abdomen soft. Non-tender.

GU: No suprapubic tenderness.

Skin: Warm. Dry. No rashes present.

Musculoskeletal: Neck supple.

Zubrod- Score 4

Discharge summary template

Patient: Thor O. History **Age:** 73
MRN: 272275 **Hospital Day:** 8
Attending: Dr. Minny Patience

Date/Time of Admission: *Friday, September 19, 2014 01:10am*
Date/Time of Discharge: *Thursday, October 2, 2014 12:15pm*

Reason for Hospitalization: Thoracic outlet syndrome

Care, Treatment, and Services Provided:

This gentleman was admitted to the hospital after experiencing shortness of breath and collapse at home. He was found to have classic outlet syndrome and was treated with radiation therapy hospital. He responded quite well and symptoms resolved. During hospital visit he developed lower extremity swelling which was evaluated by ultrasound and found to be negative. The patient will be discharged home and will follow up and clinic within seven days.

Procedures Performed During the Hospital Stay:

- 1 CT thorax with contrast 9/19/2014.
- 2 Chest x-ray, two views 9/19/2014.
- 4 Radiation therapy 9/22/2014.
- 3 Lower extremity ultrasound 9/30/2014.

Consults Performed During the Hospital Stay:

- 1 Pulmonary Medicine consult requested

Condition at Discharge: Stable

BP- 98/47 **P-** 103, **RR-** 16 **Temp-** 36.8C **SP02-** 88% on Room Air

Updated Medication List

- 1 Avelox 400mg. Take 1 tablet orally daily for 7 days. Dispense 7 (Seven)
- 2 Albuterol 90 micrograms/spray MDI, 2 puffs inhaled q 6 hours prn shortness of breath, dispense one un
- 3 Hycodan®, take 5mL po q 4 hours prn cough. Dispense one 180mL bottle.
- 4 Lovenox 60mg, inject 60mg subcutaneously q 12 hours, dispense 14 (fourteen)., no refills.

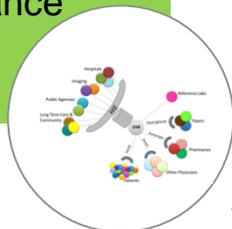
The outcomes at MD Anderson

- HIMSS Level 6
- Physicians are able to tell patient stories
- Patients are empowered to participate
- Physicians are engaged and more efficient
- Gaps in care are eliminated; handoffs improved
- Improved turnaround time has accelerated the pace of care and eliminated transcription

Remember the original purpose & 1:Many

1. Communication tool

2. Medical-legal document
3. Billing and coding
4. Regulatory compliance
5. Data collection



Improving the narrative and AI moves the patient story from *'accurate'* to *'right'* for all stakeholders

AI, when applied, enables appropriate communication as a byproduct of the physician's documentation to interested constituents #2-#5 ...while liberating the provider to deliver accurate documentation that's 'right' for ALL interested stakeholders

- Timely
- Efficiently
- In workflow

Learning Objective #2 - Explore emerging voice, data/image sharing and clinical intelligent technologies in capturing and preserving the unstructured patient story

Moving from “accurate” to “right”

First time right, in a provider’s workflow

“Nuance has been using machine learning as the core of its technologies since its inception and **harnesses artificial intelligence in their core platform** for not only accurate speech-to-text, but also content extraction. That's **going to drive the next revolution** where we begin to have autonomous agents analyzing features and building patient records.”

– Dr. John Frenzel, CMIO, MD Anderson Cancer Center

How AI scales and improves Computer-Assisted Physician Documentation' (CAPD)

CAPD-capturing the narrative with embedded AI of more than **300 million patient stories** each year



Clinical approach, content and expertise



Deeply embedded and **integrated with EHRs**



45+

of Sites

- Growing monthly with Enterprise wide deployments



1,500+

of active Providers



20,000+

Avg. # of encounters processed per month



75-78%

Avg. Physician Acceptance Rate

Sample AI outcomes

36% ↓ Average reduction in CDI/Coding queries by using embedded AI measured from several clients



Physicians spend on average 15 minutes reviewing a query

14% ↑ Increase in Comorbidity and Complication capture measured with embedded AI

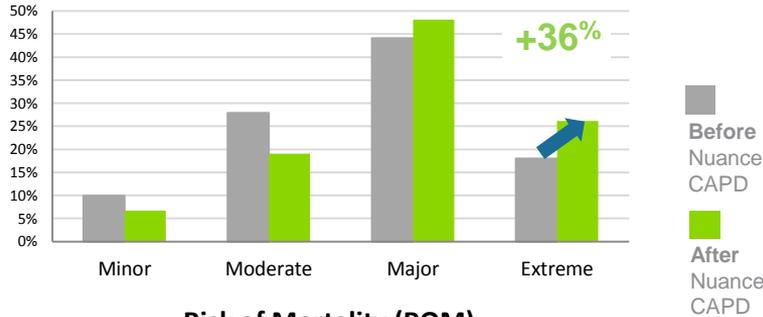
Note: AI can add a Major Comorbidity and Complication or a Comorbidity and Complication, which affects DRG, but in some cases there is not a change to DRG or reimbursement as other conditions have already placed the patient into the appropriate DRG
Results noted above are not on top of an existing CDI program and were focused on physicians with a high number of queries.



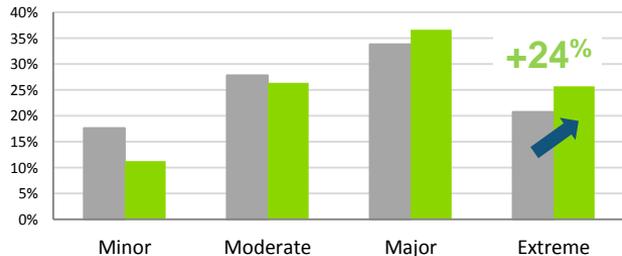
AI delivering unmatched outcomes

More accurate documentation and improved hospital quality ratings

Severity of Illness (SOI)



Risk of Mortality (ROM)



Quality and Compliance

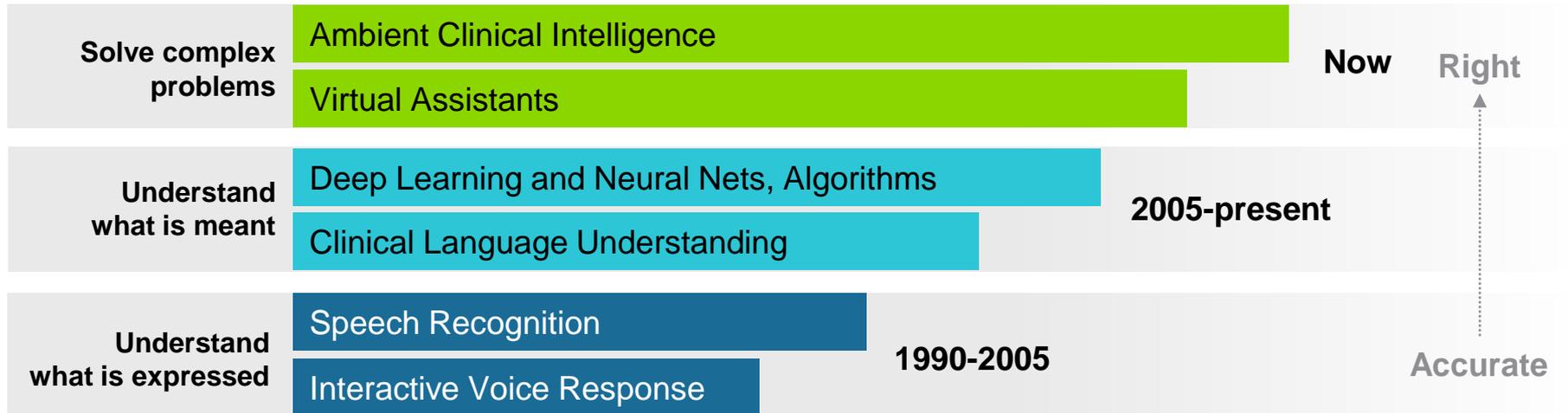
- Overall shift in capture of SOI and ROM from Minor/Moderate to Major/Extreme
- **36% improvement** in capture of Extreme SOI
- **24% improvement** in capture of Extreme ROM

Clinician Satisfaction

*“As a physician, I think the **real value of the solution is that it’s not disruptive**. If you are going to ask a question to clarify something ask me when I’m in the note, not an hour or a day later. If I’ve moved on, the question is an interruption in my day”*

-- Dr. Ehab Hanna, CMIO, Universal Health Services

Evolution of AI in healthcare



Fact Extraction

Structures and auto-populates key clinical data in an EHR

<p>Progress Note</p>	<p>Clinical Facts</p>
<p>5 clinical facts found</p>	<p>Diagnoses</p>
<p>SUBJECTIVE: Patient states that she is feeling worse today OBJECTIVE: Vital signs: BP 90/40, P 112, T 38.5, R 24 General: Slightly increased lethargy and GCS of 13-14 Chest: Bilateral wheezing and egophony. CXR shows bilateral infiltrates Cardiovascular: Normal heart sounds, no murmurs appreciated Labs: MRSA positive. 24% bands. Creatinine 2.1. Glucose 290, Serum bicarbonate 12, Potassium 4.0 ASSESSMENT: MRSA pneumonia. Type II uncontrolled diabetes mellitus requiring insulin with diabetic nephropathy with DKA. Evidence in this patient's visit record supports a diagnosis of Severe Sepsis. PLAN: Continue medical therapy with IV Vancomycin. 1 L fluid bolus with more aggressive monitoring and continue insulin</p>	<p>Diagnoses from Note (3 items)</p> <ul style="list-style-type: none"> • MRSA Pneumonia • Type II Diabetes Mellitus Uncontrolled with Diabetic Nephropathy • Severe Sepsis <p>Diagnoses already present</p> <ul style="list-style-type: none"> • Pneumonia <p>Medications</p> <p>Medications from Note (2 items)</p> <ul style="list-style-type: none"> • Vancomycin IV • Insulin <p>Allergies</p> <p>Allergies from Note (0 items)</p> <ul style="list-style-type: none"> • There are no allergies in this note. <p>Current Allergies/Contraindications</p> <p>Penicillin</p>

Clinical facts are extracted from the narrative, tagged to appropriate terminology, and presented in the workflow

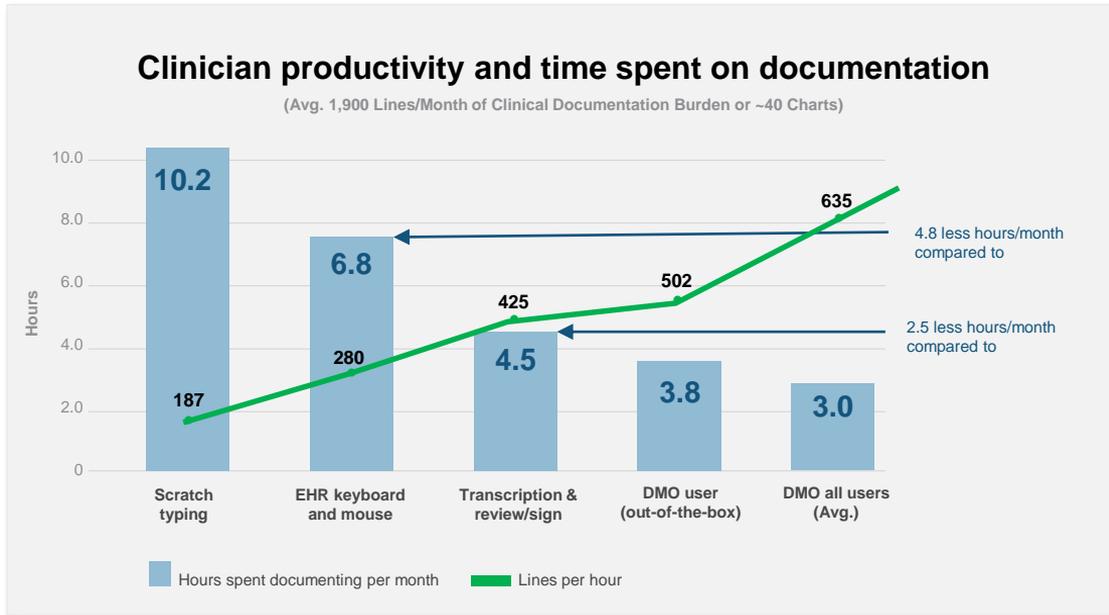
Automatic adjudication identifies and resolves conflicts or duplicates with existing items on problem list

Physicians can instantly review/add diagnoses, medications, and allergies, to the problem list, hospital problem list, current visit diagnosis list, past medical history, and other lists

The impact of services

- How services drive success
- Why services are critical and why it is important to wrap services around technology
- How services drive adoption, usability, and outcomes
 - Better provider experience
 - Optimized and utilized EHR
 - Quality integrity
 - Financial integrity

How speech improves the narrative



Speech improves the narrative

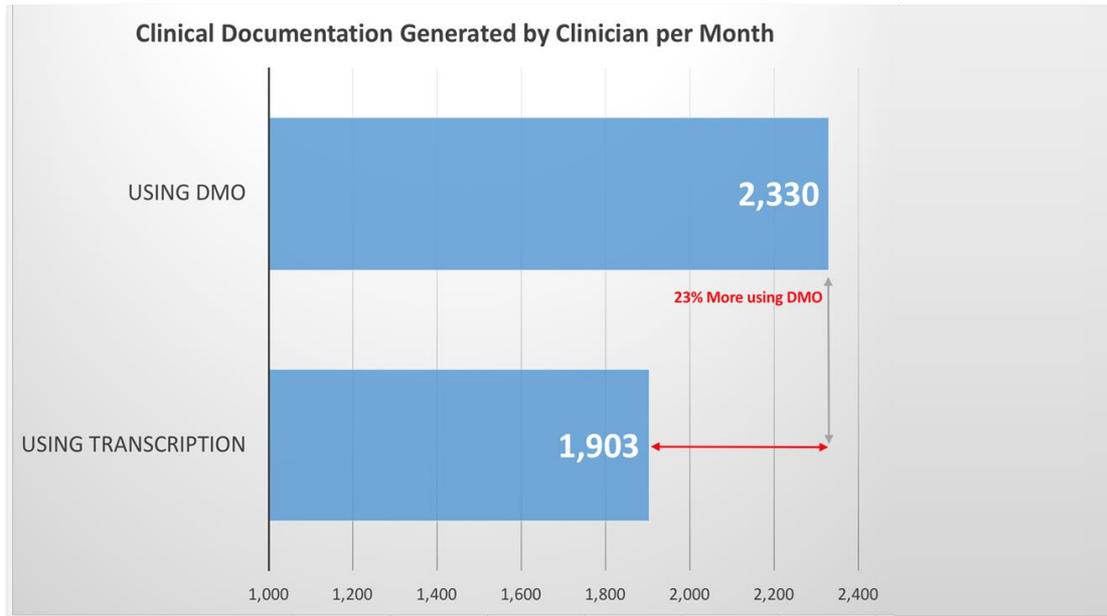
- Physicians spend less time actually documenting, while producing more “lines per hour”
- From ‘scratch typing/ keyboard entry’ to ‘speech’ reduces time by on avg. to 3 hours/month
- Actual ‘lines/hour’ from 187 to 635 LpH 3x increase

Sample size

- DMO - 83K clinicians, 194M transactions
- Transcription - 2B transactions
- Typing - ratatype.com

Source: EHR – NCBI, Journal of Graduate Medical Education study at New York Methodist Hospital and Epic PEP reports.

How speech improves the narrative



Speech improves the narrative

- ‘Speech’ v. ‘Transcription’– the speech narrative demonstrates a larger narrative
- 23% more clinical documentation generated through speech v. traditional transcription

Provider survey on benefits of speech

Over 2,000 physicians surveyed on what's important when it comes to speech as an input

- 'easier to capture complete patient story'
- 'improves quality of documentation'
- 'easier to document in the EHR'
- 'improves overall experience with the patients'

Clinicians agree that Dragon Medical...	Overall Rating 1 (Strongly Disagree) to 5 (Strongly Agree)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	% Agree + Strongly Agree
 Makes it easier to <u>capture complete patient story</u>	4.59	58%	34%	7%	1%	0%	92%
 Helps improve <u>quality of clinical documentation</u>	4.44	54%	35%	10%	1%	0%	89%
Enables documentation in a <u>timely manner</u>	4.57	58%	33%	7%	1%	0%	91%
 Makes it easier to <u>document patient care in the EHR</u>	4.60	57%	35%	7%	1%	0%	92%
 Helps improve overall <u>experience with patients</u>	3.70	41%	33%	22%	2%	0%	74%
Helps reduce frustration/burnout caused by EHR/admin burdens	3.94	43%	36%	18%	3%	0%	79%
Satisfied with <u>accuracy of Dragon</u>	4.58	53%	38%	7%	1%	0%	92%
Satisfied with overall <u>performance of Dragon</u>	4.59	53%	39%	7%	0%	0%	92%
 Training received helps improve <u>efficiency with Dragon</u>	4.85	71%	26%	3%	0%	0%	97%
Would <u>recommend Dragon Medical</u> solutions to a friend or colleague	<i>Yes / No % of Clinicians who said Yes >>></i>						97%

Source: Nuance Communications user surveys

Best practices

- Enable the patient narrative with voice recognition technology in the EHR
- Engage patients in the narrative at the point-of-care
- Identify gaps in care. Bridge the growing gap between structured, evidence-based patient information and practice
- Look for ways to embed patient narrative with AI to identify gaps in care
- Expand the role of the radiologist; eliminate transcription
- Seek to improve documentation and include narrative notes
- Conduct simulation training with physician and patients
- Continuous education and training

Questions?

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