



In Search of Common Ground in Handoff Documentation in an Intensive Care Unit

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Introduction

- Handoff
 - Frequent
 - Multiple points for potential communication break-down
 - Multiple disciplines
- Purpose of the handoff
 - To establish common ground
 - Conversations
 - Shared handoff documentation tools

Dayton, E, Henriksen, K. Communication failure: basic components, contributing factors, and the call for structure. Joint Commission Journal of Quality and Patient Safety 2007; 33:34-47

Horwitz, LI, Moin, T, Krumholz, HM, et al. What are covering doctors told about their patients? Analysis of sign-out among internal medicine house staff. Quality & Safety in Health Care 2009; 18:248-55



Problem

- Handoff in critical care
 - Intra-disciplinary process...but...critical information flow spans
 - Multiple disciplines and handoff documentation tools/artifacts (Benham-Hutchins, 2010)
 - Information complexity increases potential for communication breakdown and errors
- Proposed solutions within literature
 - Standardization
 - Unclear definition for handoff
 - Computer-based tools to support collaborative work
 - Should embed functionalities and infrastructure of paper they replaced (Xiao, 2005)
 - Standards based



Aim

 To understand the structure, functionality, and content of nurses' and physicians' ICU handoff artifacts to inform development of standards-based EHR handoff tools



Interdisciplinary Handoff Information Coding (IHIC) framework

- IHIC coding framework
 - Systematic Review of 36 nurse and physician handoff studies
 - 95 handoff information elements categorized in lists:
 - Interdisciplinary (46%)
 - Nursing (36%)
 - Physician (18%)
 - Continuity of Care Document (CCD) standard
 - Covered 80% of elements
 - Remaining 20% we developed "Hospital Handoff" Sections



IHIC Code Examples

CCD Section	Nurse only data	Physician only data	Interdisciplinary data
Functional	Neurological status	Physical exam findings	Patient's condition
Status	Cardiovascular status	Baseline status	• Plan of care trent
	Respiratory status		• Specialty specific key
	Gastrointestinal status		physiologic parameters
	Skin integrity		(e.g., critical care
	Activities of Daily Living		measurements, sepsis
			status, APACHE risk
			scale)



Methods

Setting

- 21 bed Cardiothoracic Intensive Care Unit (CTICU)
- Large urban medical center
- Used EHR for clinical documentation, not for handoff

Data Collection

- Observations
- Handoff artifacts used by nurses, resident physicians and physician assistants' (PAs)
 - Purposive sampling maximize variability by patient type/clinical status

Data Analysis - two-steps

- Artifact analysis (Nemeth 2005; Nemeth 2004; Hutchins 1995)
 - Structure and function
- Semantic coding using IHIC
 - Inter-coder reliability with physician informatician (30% of artifacts)



Results

- Observed a total of 9 changes of shifts
- 22 artifacts collected
 - 6 nurse admission Kardex
 - 8 nurse personal handoff sheets
 - 8 resident/PA handoff print-outs

Nurse Kardex



Events during surgery: Time spent on bypass, medications and blood products given, complications and necessary interventions Date and type of Cardiothoracic ICU Nurses' admission "Kardex" used during handoff

Date M. of Admin Money Franker, Alberryke to small feet many status. Alberryke surgery; surgeon -AICD SUDANT Back of nurses' SURGERY S/POHT & LVAD-Duraheart EXPLANT SURGEON and cardiologist to open eyo. Started pt. on Other admission "Kardex": MEDICATION/REACTION X-CLAMP TIME CIRC ARREST TIME ISOLATION PRECAUTION 1 Preceder drip. N & pate to 8 Org. Updates of SHIT Allergies and according to ABG results. ☐ NKDA 🐧 YES Would to 20 mith. VAS cath placed 106 kg Methy prednisslone 1000mg @ 1254 pm significant events reactions to Ofeneral. CVVH started HPI: SYMPTOMS -ONSET-DURATION/PMI written by each Platelets 12 Units; NSS 750 ml; LRS 1560 ml Hextend 2 dialysate flow note at 1800ml = NIDCH, EF 12-203, NYHA Past medical/ Contri May maintained, PRB (2 units FENTANYL- 1250mg Cryo - 10 wits Class IV CHF, SID Duraheart LVAD. nurse at end of shift + FFP 2 units open for Live MAP : Het 25.3 Hidazolan 10mg surgical history Polyaystic Kidney disease, gost, Chronic A-file, Family reported on status. SIP PPM/AICH, recurrent Problems & PICC fint, difficulty passing dilator site Abandon (RI) Cordis placement 4 in Mous & A MAP 130's - or grinnoung & eye opening Date Nights recurrent UTI. SIP OHT. and worst I cm proximal . - OZZIng TEE Post: OP LVEF >55%, Nrml LV, blood products given. icus & marp 130's fent any 1252 mg commands of 4 sedaman lestanted fent any 1252 mg commands of Test result after Mildly Dilated RV, & Dissection. · proporto (@ 25mg surgery Pre Incision antibiotic:/Time last given: . pr Lease sheaved for chest close RE-OP MEDS: Bactrim DS, Nexium, Counnalin, Medications Date 74-114 back to OR for chest clothere, no events, Pt Issinopril, Aspiring Allopurinol, Amiodarone, on Levo GYSVASO 4, EPI YMEG Arrived from OR C Citalopram, and Digoxiu. 12 u giver, an other proparets. New H. Meural Ct. Fluctuot MilriNONE 0.375MCG INSUlin Gunits Proposal 25mcg, and prior to surgery time lethifampin 600 @ 8:30AM. HADS E Same RAM + flows. PECHO trace TR, trace HR, & PI, & Ai. Precedex 6,7mcg. Bleeding from () II cordis site. Sidure placed. Procedures Date Tests Date Lines and invasive Iliter Albumin given CTScar Cordis (DI 4PRBC given Date MAMS 010HLLEATS X1 BULL POIT VOSVOITA SPUSSING TPAY2 TEE devices; date of 500 NS giva Pacing Wires AV Acidotic. - BE - 12 given fluid as Above. insertion Family contact Patient name, MRN, date echo done th Easy ☐ Hard ☐ Fiberopt information. of birth, date of admission, Date - Pay ENT attended PRIMARY RN: - CT head - Parietel infarct - since citter advance directive. attending physician - Pturke us was sollow

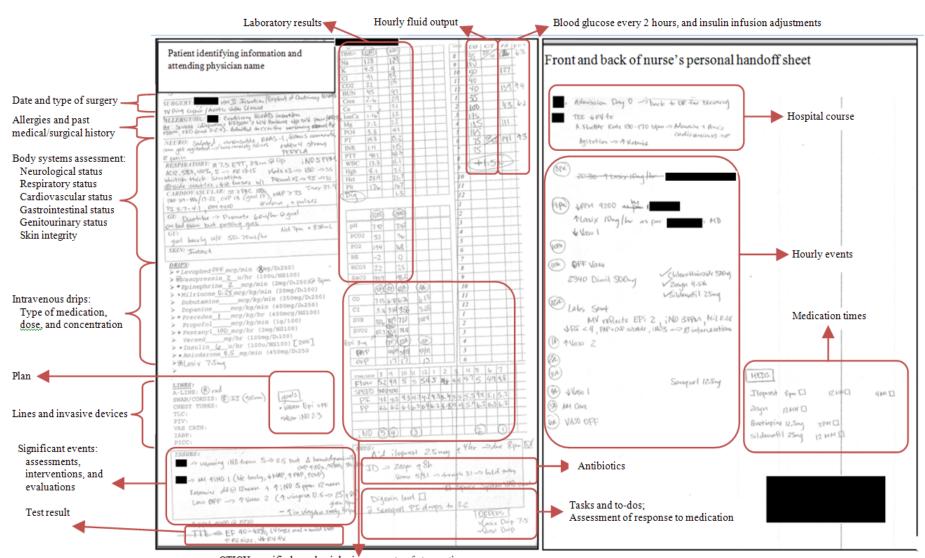
Intubation; Primary nurse

and code status

Patient's clinical state on admission to CTICU from surgery, may include update within hours

Nurse Personal Handoff Sheet

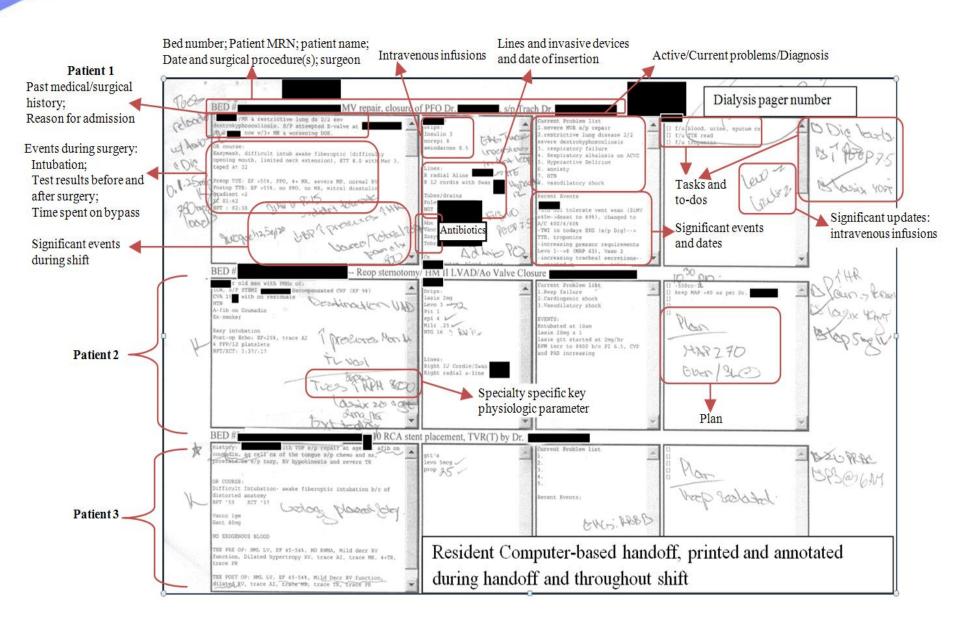




CTICU specific key physiologic parameters/interventions:
Pulmonary and cardiac pressure monitoring; Ventricular assist device hourly parameters



Resident/PA Handoff Print-out Research & Development





Results: Artifact Structure and Functionality

- Highly structured
 - Predefined structure and "norms" for organizing data
- Functionality
 - Consistent use for nurses and residents/PAs
 - Main cognitive adjuncts
 - Discarded after shift
 - Used to copy data into EHR
 - Summarization significant events
 - Highlighted temporal information



Artifact Content – IHIC coding

- 827 data elements on 22 artifacts
 - 52 unique IHIC codes
 - 92% (757/827) elements were interdisciplinary
 - Inter-coder reliability 83%
- Nurse Kardexes
 - 309 elements => 301 interdisciplinary and 8 nursing
- Nurse personal sheets
 - 261 elements => 204 interdisciplinary and 57 nursing
- Resident/PA print-outs
 - 257 elements => 252 interdisciplinary and 5 physician



Interdisciplinary Elements consistently Present in Physician and Nurse Artifacts

- Antibiotics
- Intravenous infusions
- Lines and invasive devices
- Significant events during last shift/overnight
- Specialty specific key physiologic parameters/interventions
- Clinicians involved in case
- Hospital course/summary/current history

- Past medical/surgical history
- Patient age
- Patient name
- Patient sex
- Patient's hospital MRN
- Plan
- Reason for admission/transfer
- Tasks/To-dos
- Test/procedure results



Mapping to CCD

- CCD sections
 - 70% (573/827) elements
- Hospital Handoff sections developed for IHIC framework
 - 30%(254/827) elements
 - Admission demographics
 - Hospital course
 - Past medical/surgical history
 - Consultations
 - Fluid Balance
 - Education
 - Updates
 - Anticoagulation status



Discussion

- Paper-based handoff artifacts
 - Non-technical, yet sophisticated and structured system
 - Physical location of data was important
 - High degree of interdisciplinary content
 - IHIC coding confirmed mapping to discipline specific lists
- Coordinate work beyond "tasks"
 - Annotations => critical thinking (Gurman, 1998; MacKay, 1999)
 - Nurses circled and annotated electrolyte and blood glucose values
 - 1. Acknowledgment of the critical value
 - Unambiguous statement = medication given for that particular critical value
 - 3. Captured the temporal nuances of patient data
 - e.g. Potassium over-dosing errors



Discussion

- Handoff and interdiciplinary communication highly variable (Dayton, 2007)
 - Common paper structures may be leveraged to better ensure continuity of care and coordination

- Computer-based tools
 - Further organize and coordinate work beyond paper-based system
 - Structured narrative
 - Patient-centered
 - Role of paper-printouts and mobile devices



Limitations

- 1 setting CTICU
- Further work is needed to determine the generalizability



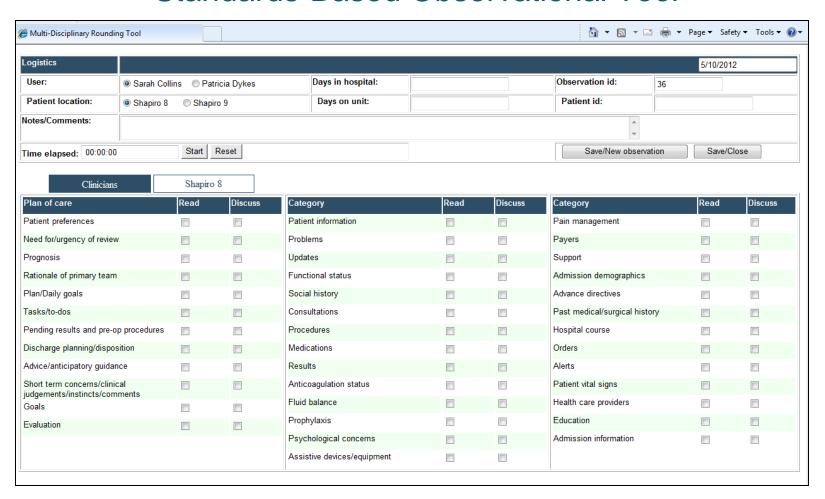
Conclusions

- Management of handoff content
 - Leveraged for patient-centered care
 - Customized for specialty settings
 - Structured narrative (Johnson, 2008)
 - Transitions of care standards from other settings
- Ongoing work
 - Validate IHIC coding in other settings
 - Multidisciplinary rounds
 - Mapping to HL7vMR



Follow-up study: Multidisciplinary Rounds

Standards-Based Observational Tool





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Thank you!

Questions?

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