Development of Primary Diagnosis Selection Model by SNOMED-CT Mapping of Clinical Terms - Relative to urology surgery patients

Kyung Lan Hong | SAMSUNG MEDICAL CENTER

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Abstract

- Primary Diagnosis is the final diagnosis after medical examination and the most important condition to made to need hospital treatment.
- Primary Diagnosis is also a variable that determines evaluation of various medical institutions, accurate statistical calculation and determines advanced general hospital assessment, inpatient classification system of medical quality assessment.
- This study aims to develop a primary diagnosis selection model to control the error diagnosis in advance, in addition to just giving the correct diagnosis for clinicians by overhauling the standard terminology master through the agreement of the Seoul National University's Four Hospital Terminology Standardization Committee and by mapping with SNOMED CT.

Background

- Leader of the Medical Record Team of Seoul National University Hospital. Ph.D. of Health policy and Management

Topic

- This study standardized clinical terms used in the urology department and coded them into SNOMED-CT through the agreement of the members of the Seoul National University's Four Hospital Terminology Standardization Committee composed of term professors and health information managers and urologists in four hospitals.
- First of all, the terminology of diagnoses and surgical names were standardized and were coded as SNOMED CT.
- Also, it confirmed by the urologist and the key attributes of the discharge summary to confirm the primary diagnosis that can be entered for each surgical name and developed the primary diagnosis selection model.

Key Words

- SNUR-Terms, Draft SNUR-Ezcodes, Final SNUR-Ezcodes, Primary Diagnosis, Initial Diagnosis, Error Diagnosis, SNOMED-CT

1. SNUR-Terms : A standard set of clinical terms was derived by standardizing clinical terms used in the urology department
2. Draft SNUR-Ezcodes, Final SNUR-Ezcodes : A code that can be derived from primary diagnosis of urology.
3. Initial Diagnosis : The first primary diagnosis written by the clinician on the discharge summary.
4. Error Diagnosis : The inconsistent diagnosis when compared to initial diagnosis and Final SNUR-Ezcodes.

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Research STEP 4

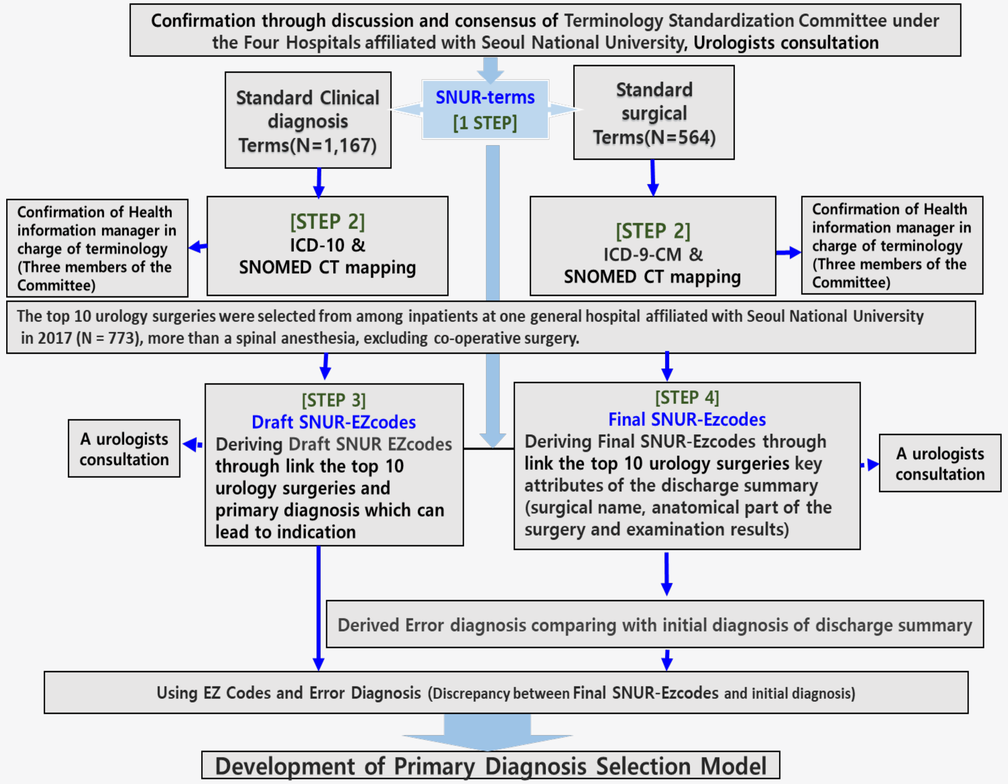
- **[STEP 1] SNUR-Terms :** A standard set of clinical terms was derived by standardizing clinical terms used in the urology department through the agreement of the members of the Seoul National University's Four Hospital Terminology Standardization Committee composed of term professors and health information managers and urologists in four hospitals.

- [STEP 2] :This SNUR-Terms was mapped to ICD and ICD-9-CM and SNOMED-CT by the health information managers of the Four Hospital Terminology Standardization Committee including the SNOMED CT mapping method.
  [Operation of Urology + Primary Diagnosis set]

- [STEP 3] The **Draft SNUR-Ezcodes :** The top 10 urology surgeries were selected from one general hospital affiliated with Seoul National University in 2017, and **the Primary Diagnosis** corresponding to the indication of Top 10 urology surgeries were derived through the confirmation of one urology specialist at the hospital.

- [STEP 4] The **Final SNUR-Ezcodes : The Primary Diagnosis** of 773 inpatients corresponding Top 10 urology surgeries were derived with the key attributes of the discharge summary(surgical name, anatomical part of the surgery and examination results) through the confirmation of one urology specialist at the hospital. The List of Final SNUR-Ezcodes.
  [Operation of Urology + Primary diagnosis derived with the key attributes of the discharge summary set]
  * Post Top 1 surgery, TUR-B only as a sample and mismatch reason analysis

Research schematic diagram



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RESULTS

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- [Step 2] Mapping Method of Standard Clinical terms to SNOMED-CT

Variables		Frequency (%)
1. Direct Mapping		839(71.9)
2. Post-Coordination		239(20.5)
3.General Mapping	3-1. General Mapping, Broader	75(6.4)
	3-2. General Mapping, Narrower	14(1.2)
4. Not Mapping		0(0.0)
Total		1,167(100.0)

- [Step 2] Mapping Method of Standard Surgical terms to SNOMED-CT

Variables		Frequency (%)
1. Direct Mapping		470(83.3)
2. Post-Coordination		85(15.1)
3. General Mapping	3-1. General Mapping, Broader	7(1.2)
	3-2. General Mapping, Narrower	2(0.4)
4. Not Mapping		0(0.0)
Total		564(100.0)

- Reason for Error primary diagnosis input for Top 1 surgery (TUR-B)

Variables		Frequency (%)
1. Diagnostic mapping not consistent with main surgery	1-1. a one-time operation	7(9.9)
	1-2. two-time operation	0(0.0)
2. Unidentified as a result		21(29.6)
3. Outpatient diagnosis input		42(59.2)
4. Postoperative diagnosis not changed		0(0.0)
5. Broad diagnosis Input		1(1.4)
Total		**71(100.0)**

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[Step 3]

- The List of Draft SNUR-Ezcodes (Operation of Urology + Primary Diagnosis set)

Rank	Name of Operation	Draft EZcodes	Name of Draft SNUR-EZcodes
1	**TUR-B (Transurethral Resection of Bladder Tumor)**		
		C67	Malignant Neoplasm of Bladder
		D090	Carcinoma In Situ of Bladder
		N32	Other Bladder Disorder
		D414	Neoplasm of Uncertain or Unknown Behavior of Bladder
2	**Ureterolithotomy, Ureteroscopic**		
		N201	Calculus of Ureter
		N202	Calculus of Kidney with Calculus of Ureter
		N13	Obstructive and Reflux Uropathy
2	**RIRS(Retrograde Intrarenal Surgery)**		
		N200	Calculus of Kidney
		N202	Calculus of Kidney with Calculus of Ureter
4	**Prostatectomy, Radical**		
		C61	Malignant Neoplasm of Prostate
5	**Transobturator Tape Insertion**		
		N393	Stress Urinary Incontinence
		N3941	Mixed Incontinence
6	**TUR-P(Transurethral Prostatectomy)**		
		N40	Hyperplasia of Prostate
		C61	Malignant neoplasm of Prostate
		D414	Neoplasm of Uncertain or Unknown Behavior of Bladder
7	**Nephrolithotomy, Flexible Ureteroscopic**		
		N200	Calculus of Kidney
		N202	Calculus of Kidney with Calculus of Ureter
8	**Hydrocelectomy**		
		N43	Hydrocele and Spermatocele
9	**HPS(High Performance System)**		
		N40	Hyperplasia of Prostate
10	**Nephroureterectomy**		
		C66	Malignant Neoplasm of Ureter
		C65	Malignant Neoplasm of Renal pelvis

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[Step 4]

- The List of Final SNUR-EZcodes (Operation of Urology + Primary diagnosis derived with the key attributes of the discharge summary set)
  ※ **Error diagnosis :** : The inconsistent diagnosis when compared to initial diagnosis and Final SNUR-Ezcodes.

Rank	Final SNUR-EZcodes	Error diagnosis		Frequency (Discrepancy rate %)
1	**TUR-B(Transurethral Resection of Bladder Tumor)**			
	C67	**Malignant Neoplasm of Bladder**		38(53.5)
		N32	**Other Disorders of Bladder** Top-level Error diagnosis	**22**
		R31	Unspecified Hematuria	9
		D090	Carcinoma In Situ of Bladder	3
		C61	Malignant Neoplasm of Prostate	2
		C64	Malignant Neoplasm of kidney, except Renal pelvis	1
		C65	Malignant Neoplasm of Renal pelvis	1
	D090	**Carcinoma In Situ of Bladder**		23(32.4)
		N32	**Other Disorders of Bladder** Top-level Error diagnosis	**10**
		C67	Malignant Neoplasm of Bladder	8
		R31	Unspecified Hematuria	4
		C65	Malignant neoplasm of Renal pelvis	1

Rank	Final SNUR-EZcodes	Error diagnosis		Frequency (Discrepancy rate %)
1	**TUR-B(Transurethral Resection of Bladder Tumor)**			
	D414	**Neoplasm of Uncertain or Unknown Behavior of Bladder**		4(5.6)
		N32	**Other Disorders of Bladder** Top-level Error diagnosis	**3**
		C67	Malignant Neoplasm of Bladder	1
	N30	**Cystitis**		3(4.2)
		C67	Malignant Neoplasm of Bladder	2
		N40	Hyperplasia of Prostate	1
	N32	**Other Disorders of Bladder**		3(4.2)
		R31	**Unspecified Hematuria** Top-level Error diagnosis	**2**
		N40	Hyperplasia of Prostate	1
	Subtotal(%)			**71(100.0)**
Total Discrepancy(N)				**120**

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DISCUSSION

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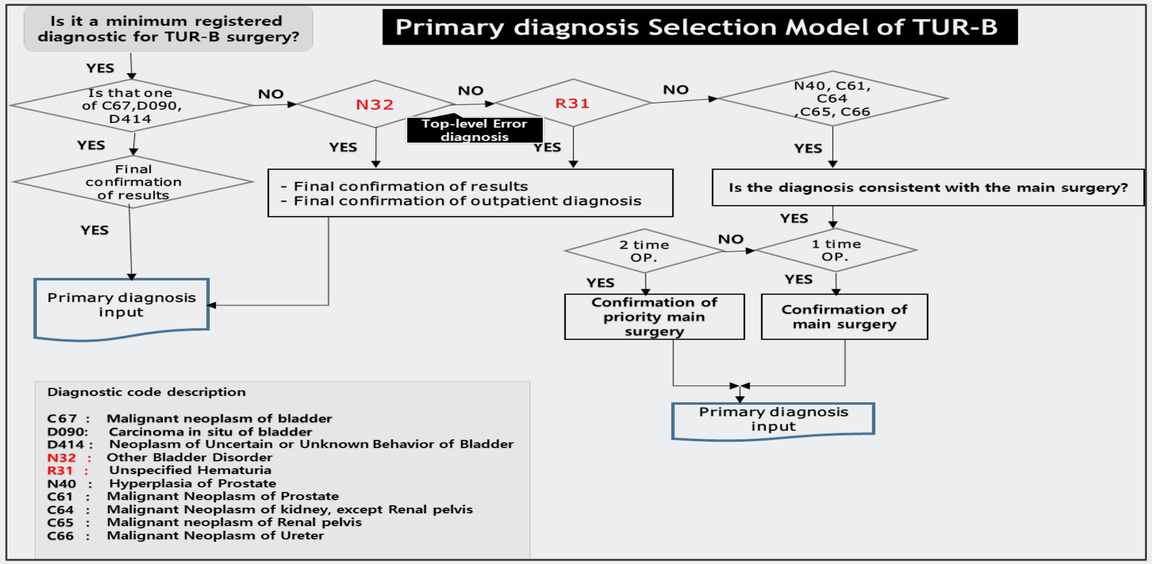
Development of Primary diagnosis Selection Model

- The clinical terms of urology were standardized to map to SNOMED CT and to derive inputable primary diagnosis..
- This study developed the primary diagnosis selection model to pre-control the error diagnosis and to present algorithms that can be given the correct primary diagnosis.



Successful Practices

- This study includes the Standardization Committee of four Hospitals affiliated with Seoul National University that use the same EMR.
- And if new terms need to be created and modified, the terms are continuously maintained through the voting process, which goes through the committee's confirmation.

Conclusions

Since SNOMED-CT is the international standard that covers the largest number of areas, if you connect it, more accurate primary diagnosis selection models can be developed and CDSS(Clinical decision support system) can be guided if clinical findings other than diagnosis and surgical names are coded in line with the big data era.
Furthermore, if terminology standardization and SNOMED-CT mapping are expanded, it will be possible to exchange medical information in medical institutions. And the primary diagnosis selection model developed is applied to the computations, it will help the accuracy and reliability when using statistics.

Future Directions

In this study, it was coded as SNOMED-CT, limited to diagnostic and surgical names. A wider range of information sharing and joint research between medical institutions could be possible if clinical terms scattered other than diagnosis and surgical names were coded as SNOMED-CT.

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