The Development and Implementation of the Electronic Student Management System (ESMS) for Nurse Practitioner Students at the University of British Columbia Family Nurse Practitioner Program

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Abstract

Purpose: To describe the development and implementation of an electronic student management system (ESMS) used to track all aspects of student activities in a nurse practitioner education program.

Development and implementation: Nursing students have historically collected and documented patient encounter data in paper and pencil format with periodic submission to faculty. While electronic databases have been used to collect standard log information they have been criticized for limited types of prescribed fields that in turn, restrict types of data collected and quality of generated reports. Nursing Faculty and the School's Information Technology team identified a need for an efficient method to track students' clinical progress throughout their program, collect evaluative data about the student, site and preceptor and manage site and preceptor information. The existing ESMS database was revised and designed to create an efficient student tracking system.

Conclusions: Faculty, an administrator and students used the system to gain access to clinical practice information and to produce useful instantaneous reports on total clinical hours, schedules, clinical experiences and evaluations.

Implications for practice and education: The ESMS streamlined access to practice information and generated reports for faculty to respond to rapidly thereby improvling the clinical experience for the student and faculty member. Future plans for the ESMS include the addition of Nurse practitioner competencies and a means for narrative information entry.

Introduction

Nurse practitioner program courses have complex clinical components that have traditionally consumed large amounts of faculty time to plan, coordinate and manage. Coordination of clinical placements requires identification of appropriate preceptors for clinical supervision, tracking student and preceptor schedules, completion of faculty site visits, monitoring clinical logs, completing and reviewing faculty/preceptor and student self evaluations, and monitoring the progress of each student. At the University of British Columbia School of Nursing Nurse Practitioner (NP) Program, the Electronic Student Management System (ESMS) was designed to coordinate clinical NP placements. The ESMS is a web-based software application that draws from an underlying database of information. Students and faculty both use the ESMS to track all aspects of student activities in the program. In this paper, the authors describe the design, capabilities and implementation of the ESMS.

Paper and Pencil Records

Tracking nurse practitioner clinical practice has generally meant logging of practice hours and clinical experiences with paper and pencil. This systematic record of supervised clinical hour and other practice details s is required for credentialing of nurse practitioners. For family nurse practitioner programs, a minimum of 500 clinical practice hours is mandated by the National Organization of Nurse Practitioner Faculties (NONPF, 2002). While credentialing agencies have required that clinical practice hours be documented keeping accurate records of clinical practice experiences, level of clinical practice difficulty, patient age, and other variables.

The traditional pen and paper method used to log and submit data about clinical practice experiences has its disadvantages. Paper and pencil records are bulky, can be lost, require storage space and are asynchronous. Asynchronous feedback means a delay between receipt of data by course faculty and timely feedback and modifications to the student learning experience (Gordon, Weiner, Tragenstein, McNew, 2006). Paper and pencil logs also limit data summary, consistency of information with national practice norms, and time data entry for students (Fontana, Kelber, & Devine, 2001). Furthermore, the hand written paper and pencil information may be difficult to read, students may use inconsistent presentation styles, and data quality can vary (Longworth & Lesh, 2000).

Electronic Databases in Nursing Education

Researchers have documented the use of electronic databases to collect information about students in nursing education programs. Femea and Abdur Rahman (1999) described the development and utilization of a computerized database to maintain undergraduate student data. Burnard (1996), in Wales, designed a database to house student names and addresses, course information and marks. The database also generated individual student reports of their own records.

Electronic Records in Nurse Practitioner Programs

Nurse practitioner programs have also reported use of electronic information systems for clinical practice. Fontana, Kelber and Devine (2001) described a system in which students completed a paper and pencil log that was entered into either a personal computer or PDA. Data entry was accomplished via use of a combination of a faculty designed software program and Epi Info, which is free public domain software. At

Vanderbilt University, a web based clinical log system enabled advanced practice nursing students to enter data from their clinical site (Gordon, Weiner, Trangenstein, & McNew (2006). Kuehn and Hardin (1999) described a "menu driven" database for nurse practitioners that used standardized language to classify clinical data into clustered patient diagnoses, patient demographics, number of patients seen and level of student responsibility. While students participated readily, they reported that data entry was time consuming and that the diagnostic clusters did not necessarily reflect their practice (Kuehn & Hardin (1996).

Longworth and Lesh (2000), created an electronic log modelled on the National League for Nursing's minimum data set for nursing centers. Students used the log to document their skills and progress and to enhance their understanding of a nursing minimum data set. Faculty used the log to track and evaluate student learning and to plan future learning experiences for students. Coding was based on the International Classification of Medical Diagnoses (ICD-9), the Clinical Procedural and Treatment Codes (CPT) and the Evaluation and Management (E&M) codes from the ICD-9. Students entered data using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) was used to analyze the data. Categories of data collected included demographics, diagnoses, interventions, time spent with the patient and the student's level of responsibility. Students reported problems using both the software and hardware and also reported data entry was time consuming.

An electronic database was used by midwifery students to document patient encounters (Walker & Pohl, 2003). The 28-item database gathered information about

demographics, the student, and the preceptor, type of encounter, diagnoses, nursing work performed, medications, payment and referral.

Typhon, a profit oriented company, sells an electronic nurse practitioner student tracking system (2005-2007). The system permits student data entry in fields such as demographics, diagnoses, procedures performed and clinical notes. A standard, limited set of summary data reports can be generated with the option of purchasing more reports.

E Logs, another commercially available database, offers a nursing and nurse practitioner clinical tracking system (e Logs, 2007). Fields such as demographics, gender of the patient, body system addressed, level of responsibility and time of encounter are available. Faculty are able to track student performance in the given fields. This program emphasized time spent with the patient and numbers of patient seen. Neither of the commercially available databases captured all of the fields or the quality of the practice.

Lears, Olsen, Morrison & Vessey (1998) described a computerized relational database designed to manage student/preceptor placements. The system manages placements by interfacing students' experiences, goals, and courses with preceptors, schedules and clinical sites. Managed by a single clinical co-ordinator, the database was reported to save faculty time and to improve student learning and preceptor retention.

Portfolios

Clinical portfolios have also been used to document clinical practice learning. For example, Weber (2006) described a clinical portfolio that enabled students to document experiences that profile their best work, evaluations about exceptional learning or skill

development. Documentation in a portfolio assisted students to become more competitive in the workplace.

Garret and Jackson (2006) developed an e-portfolio accessible via the PDA which facilitates reflective clinical practice. Using the PDA, students can record clinical experiences, use a digital camera, and access resources such as drug and laboratory programs, and email from any location. Students reported that the e-portfolio kept them in touch with resources and more engaged in reflective practice.

The Gap

In addition to the clinical log, it is important to have a complete picture of each student's progress in their educational program. While computerized databases were found that capture clinical log data and even generate reports about clinical experiences, none were found that housed all elements of a student's progress throughout their nurse practitioner program. Since this was deemed to be important and not commercially available, UBC faculty and staff of the School of Nursing Nurse Practitioner Program joined forces to develop a more complete software solution.

The University of British Columbia

Nurse Practitioner Program

The University of British Columbia offers a two year full time family nurse practitioner program. The program is based on the NONPF (2002) competencies and the College of Registered Nurses of British Columbia (CRNBC) Competencies for Nurse practitioners in British Columbia (2003). The curriculum combines core Master's program courses such as theoretical foundations, statistical literacy and nursing research

with nurse practitioner focus courses. The focus courses include pathophysiology, advanced health assessment, health promotion, advanced pharmacology, clinical procedures, professional role and ethics, three levels of primary care management courses with clinical components, a final practicum and project.

Design of the Database

In February 2006, School of Nursing (SON) faculty and staff, along with members of the school's Information Technology (IT) department, initiated Phase One of the ESMS. The overall goal of Phase One was to identify and use specific components in order to plan and track clinical progress through the NP program. After many meetings and specific aims of Phase One were developed and these were to: 1) coordinate and track students' progress through their clinical experiences at various sites, 2) collect evaluative information about the student, site and the preceptor, and 3) manage site and preceptor recruitment for future placements. In Phase One, four data sources were configured to create a placement record; placement sites, contacts, students and preceptors. .

Sources of Data

Sites

As part of the design, a site was defined as the location of the placement. Site data included site specific information such as name and type of organization, primary and secondary clinical foci, address, parking instructions, and directions to the site.   (See Figure 1 on page nine).

Site Name:	BROADMOOR CLINIC
Availability:	⦿ YES ◯ NO
Department:	[ ] Org. Type: FAMILY PRACTICE
Street:	118-10151 NO. 3 RD
City:	RICHMOND Province: BC
Postal Code:	V7A 4R2 Country: CANADA
Environment Quality:	- ▼
Prim. Focus:	PRIMARY CARE
Sec. Focus:	
Instructions:	
Comments:	
	Clear Save

Figure 1: Input form containing placement site specific information

Contacts

Contacts included specific information for the administrative and operational

contact persons for each site. (See Figure 2 brlow).

Figure 2: Input form with operational contact information

Students

Student data such as demographics and anticipated year of completion were

entered from the University-wide information system into the database. (See Figure 3 on

page eleven).

Figure 3: Input form with student demographic information

Preceptors

A preceptor was defined as a credentialed nurse practitioner or a qualified

licensed physician. Names, credentials, specialty and contact information for preceptors

were entered into the system. (See Figure 4 on page twelve).

Placements

A placement was defined as an association between or combination of a single

site and one or more site contacts, a single student, and one or more specific preceptors.

Figure 4: Input form with detailed preceptor information

This means that a placement is viewed as a combined record that tracks where students perform their clinical work and who oversees them. A placement, within this context, is not simply a site. It incorporates a relationship among specific variables.

Associated with the placement record, stores of logs, schedules, evaluations, students'

objectives and any other information deemed important for this placement are housed.

(see Figure 5).

Figure 5: Input form with detailed placement information

Reports

Report documents can be generated that aggregate and summarize system data. These reports can be used for descriptive and decision making purposes. Examples of reports include a clinical hours report, schedules report, site report, clinical experiences report, evaluations report and contact reports. The ESMS also has the capacity to add other needed reports. Aggregate data can be viewed graphically in pie charts or bar graphs and at various levels of granularity such as student, entire class, or program in general. A particularly valuable report for faculty is the student evaluation which can be viewed individually, collectively, and comparatively. A report can be generated for the site visitor with site details, schedule, contact, and preceptor information thus making it much easier to set up site visits. (see Figure 6 on page fifteen).

Workflow (Utilization) of the ESMS

The ESMS provides different levels of user access based on user responsibility and role. Privacy is protected at all times, and students only have access to their own information, preceptors only to the information that they provide, and faculty only to the information that relates to their current students. As a privacy safeguard, access to archived data must be approved by the Nurse Practitioner Program Coordinator (NPPC) or designate.

Faculty Workflow

Faculty workload involves faculty assignment of students to a site and a preceptor. Once a student is assigned to an available site and preceptor, the Administrator set up the system to track student progress throughout the placement. Each

Placement Summary

Placment Info

Placement ID: 28

Student 1

98765432

Year Level: 2

Site Info

Three Bridges Community Health Centre
Community Health Centre

1292 Hornby Street
Vancouver, BC
Canada, V6Z 1W2

Preceptors

Preceptor 1

Physician
preceptor1@someplace.com

Preceptor 2

Physician

BC Women's Hospital Women's Hlth Ctr
Vancouver, BC
Canada, V6H 3N1

604-123-4567

preceptor.2@vancouver.bc.ca

Contact Person

Contact Person

Manager

1292 Hornby St
Vancouver, BC
Canada, V6Z 1W2

604-876-6543

Figure 6: Individual student placement summary report as viewed by visitor

student could have any number of placement records configured (as defined previously) and/or have more than one preceptor per placement record. Faculty have access to reports that allow them to monitor clinical hours, types of learning experiences, levels of responsibility, evaluations and to prepare site visits.

Administrator Workflow

The Nurse Practitioner Program Associate, with administrative responsibilities, oversees data entry and creation of student placement records. Other responsibilities include monitoring students' data entry, ensuring the accuracy of ESMS records and

reports, development of new reports as needed, and communication with the NPPC regarding student issues related to the ESMS.

Student Workflow

Students are responsible for keeping demographic data current and for entering their schedules and logs on a regular basis. They have ongoing access to their clinical experience data and are able to use their reports as feedback on a daily basis (see Figure 7 on page seventeen). Students are responsible for online evaluation submission and they continually build their records and shape individualized clinical portfolio that can be used throughout their career.

Preceptor Workflow

Preceptors are notified when it is time to evaluate their student. They are provided with directions and are encouraged to go over the evaluation with the student and complete the evaluation process online. For those who do not want to use the online format, paper and pencil evaluations are still an option and can then manually entered into the system. However, due to ease and convenience, it is expected that all preceptors will eventually use the online format.

Evaluation of the ESMS to Date

To date, both students and faculty have provided informal and formal feedback about the ESMS. Students have been periodically encouraged to submit suggestions during informal sessions and provide written feedback to the IT team.

To date, feedback about the ESMS from students and faculty have been positive. Students like having a permanent record f their log data. Benefits of the ESMS mean that pieces of paper are not lost and students are no longer required to manually count log data

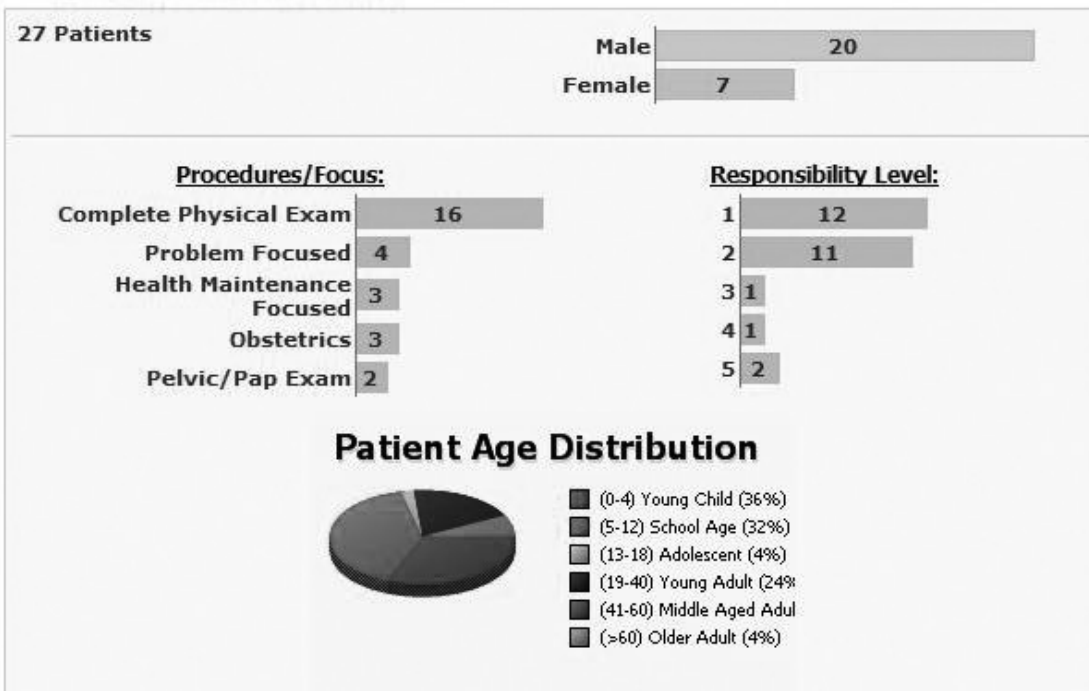**Figure 7: Individual clinical summary report as viewed by student**

log data totals. Faculty appreciate the convenience of direct access to real time data

about students' clinical progress that enables faculty to communicate timely guidance to

students. Reports are generated based on faculty and student needs, specific program

requirements and new reports can be generated when needed

.

Future Directions

Faculty, the NP Program Associate and the IT team reviewed the database in the summer of 2007 and suggested revisions were incorporated into Phase Two. During Phase Two, the ESMS database will be further streamlined based on findings from the review. Additions to be incorporated in Phase two include a mail merge function to generate preceptor thank you letters and a student placement map record to facilitate placement location.

The curriculum of the Nurse Practitioner program at the UBC SON is based on the College of Registered Nurses of British Columbia Competencies for Nurse Practitioners (2003). Those competencies are consistent with the NONPF Competencies (2002) and the Canadian Nurses Association Competencies for Nurse Practitioners (2002). During a third study phase, a tracking system for achievement of nurse practioner competencies and a student eportfolio will be developed. Students can use the eportfolios to document their performance and to support career development.

Weber (2006) noted that it is important that educators are able to articulate whether clinical experiences meet both entry level competencies and academic expectations. In addition, both evidence based practice and critical thinking must be integrated into nurse practitioner education (Goolsby, Taylor-Seehafer, Abel, Tyler, & Sonstein, 2004).

In a competency based medical curriculum, Nierenberg, Eliassen, Mcallister, Reid, Pipas, Young and Ogrinc (2007) described the development and implementation of an online system that kept track of clinical activities according to competencies. The authors reported that a competency based curriculum was new to medical education and

noted that the system enabled them to better understand the competency domains through the review of reflective narrative input. Phase Three of the database may also incorporate narrative input. Additional dimensions such as the use of practice guidelines, scope of practice documents and standards of practice as hyperlinks may be incorporated into the ESMS to assist students to track practices, competencies and evaluate their practice in a reflective manner.

Conclusion

Phase one began in February 2006 with a consultation process. Coding started in May, 2006. The ESMS went live (was implemented) with students and faculty in September, 2006. In the summer of 2007, the ESMS and its use was reviewed and Phase two improvements and additions have been started. The admissions process has been developed and added to the ESMS, but not been used yet. A goal is to begin processing admissions using the EMS in the spring of 2008. Details of Phase Three plans, will depend on further evaluation of the ESMS during the 2007-2008 academic year. In real terms, the ESMS was designed, developed and implemented in an extremely short period of time. The success of the ESMS can be attributed to the cooperative nature of the work between faculty, the Nurse Practitioner Program Associate and the IT team. That was only possible due to the commitment of very dedicated faculty and staff that made an effort to understand, trust and appreciate each others' areas of expertise. The successful collaboration among faculty facilitated the translation of a business vision into a practical technical solution for clinical practice.

The ESMS has been a successful tracking system to date. Other positive outcomes of this study have also been noted. For example, the project team has realized that

working collaboratively with the IT team, rather than viewing them only as support providers, maximized the quality of the ESMS. The research team highly recommends that faculty in other Nurse Practitioner Programs broaden their views and value the expertise of different professions to enhance the work and outcomes of their programs.

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