

Risk Classification & Nursing Workload Measurement in the AMS

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At the Massachusetts General Hospital (MGH), challenges to the effective use of unfractionated heparin in the hospital management of patients with acute thrombosis created big interest in finding a more standard and efficient approach to discharging patients new to Warfarin. With the help of LMWH and several discharge pathways the patient population and landscape of the MGH Anticoagulation Management Service (AMS) was changed forever. What had been exclusively long term maintenance therapy for less than 3000 patients has grown to more than 4000 patients and now includes management for induction and bridging therapies. During this time of major change the clinic had great organizational support including increases in both direct care and support staffing, space and technology. Budget requests were formed in lengthy, time consuming proposals describing the change in care needs of the changing population. It was clear, more objective data would be needed for budget justification, something consistent with other clinical departments that would also establish benchmarks for the clinic's future.

Innovation in Warfarin management, including patient self-testing and management and new oral drugs on the horizon will challenge the AMS to re-define its role even further. As Warfarin management disappears it will be necessary to adapt by strengthening our role as coordinators and educators, and less so as managers of anticoagulation therapy. The MGH AMS aim is to provide total management for all anticoagulant therapies, this will require provision of adequate staffing that depends on the program composition and patient population as it continues to change. As the services and patients with complex needs increase estimating the workload on patient visits and INR volume alone loses validity. As patient acuity increases so does the workload and measuring this work requires a calculation that not only considers volume but the intensity of care.

Measuring work in consideration of intensity of care considers each patient's therapy type; in our case, induction, bridging and maintenance, and the relevant clinical and behavioral characteristics that influence the patterns of absorption, distribution, metabolism, and elimination of Warfarin. It's "knowing the patient", a concept central to nursing practice that includes the complex process of acquiring understanding of patients as unique individuals that enhances clinical decision-making.[1] We believe that knowing the patient optimizes our clinical judgment to best meet the needs of our patients and creates the potential to more effectively interpret the meaning of INR levels, make dose adjustments, and maximize therapeutic time in range.

Reviewing the literature it became apparent that though there has been rapid development of measurement systems in hospitals, very little attention has been given to outpatient services in the past 30 years.[2] To consider care intensity we needed to develop a patient classification system (PCS) based in expert experience that stages risk and reflects intensity of care.

That is, a system for summarizing clinic activity into patient groups on the basis of common clinical characteristics and levels of resource use. There are three basic elements of a patient classification system. Each will be discussed here.

The first element is a procedure for grouping patients according to their requirements for nursing care.[3] The characteristics of patients in each class are described using critical indicators that will most likely predict the intensity of care needs. When individual patients are assessed for the presence or absence of these indicators they may be assigned to one of the classification categories.

It was while learning about the database during the implementation of DAWN AC in June, 2007 and understanding how data was collected and stored in DAWN AC that the idea for a risk assessment and calculation of a weighted risk class came about. Risks, events, procedures, drug-drug interactions, age, non-compliance with INR testing, length of time on Warfarin, and the patient's therapy type were identified as the critical indicators of care. The presence of these indicators can be recorded easily in the DAWN AC record and is generally information all anticoagulation managers collect for their patients. The value or score for each indicator is determined by its significance, is included in the calculation for a pre-defined period of time, and are applied in the same way for all patients. When and how long an indicator value is applied uses tools already available in DAWN AC namely severity descriptions and warning durations. A very clever custom template called the risk class assessment, created by George Kitching at 4S Information Systems Ltd., sums the scores for each of these critical indicators and determines the risk

class. The patient's age, length of time on Warfarin, and INR testing attendance records also have value conditions, that when present, are automatically included as part of the risk class assessment.

The second basic element in a classification system is a *quantification of the nursing care resources required with each category*.^[3] That is accomplished by creating the categories and developing a mechanism for measuring the relative amounts of resources consumed in providing care for the patients in each of them.

The service types; induction, bridging and maintenance together with the risk classes; controlled, low watch, high watch, and complex care combine to identify 11 distinct classifications as depicted in Table 1. Each classification type is described according to a standard, which in our case is the controlled maintenance type, and includes evaluation of risk factors that correlates and generates resource utilization, or in other words the amount of time needed to provide care. We measure that in minutes. We determined the standard times to provide care to patients in each class by repeated direct observation and independent time estimates made by the AMS nurses. Our standards were developed internally as there was no relevant patient classification system for anticoagulation management available.^[4] We aimed to identify indicators that reflect direct care to the patient. The value, and therefore resource requirement, for each critical indicator takes into consideration tasks including such things as time to document and monitor compliance.

Originally, nurses would run the risk class assessment and change the risk class manually at defined times. Presently, the risk class assessment calculation is performed and the risk class adjusted automatically by DAWN AC whenever a patient's dose is authorized. This is an important enhancement because the monthly workload calculation is performed using the therapy type and risk class associated with each INR authorization and assuming patient records are up to date, assures 100% accuracy and improves reliability.

The third element is *a method for calculating staffing for required nursing hours*.^[3] We use a relative value approach to create a representative and consistent measure of work that can be used to monitor productivity.

The Resource-Based Relative Value Scale was created at Harvard University in 1985. The scale came from a national study by a multi-disciplinary team of researchers including statisticians, physicians, economists and measurement specialists. In 1988 the study results were published and submitted to the Health Care Financing Administration (today the Center for Medicare and Medicaid Services) to be used in the American Medicare system. The following year, President George H. W. Bush signed into law the Omnibus Budget Reconciliation Act of 1989, switching Medicare to a relative value system for estimating physician work and payment schedule. It is now used by nearly all HMOs in the country.^[5]

The relative value model provides an analytical method for measuring productivity that removes subjectivity. Its benefit is the ability to adjust for variations among patients using a very simple data collection process. This methodology is not a precise measure of all the work that we do but it does capture the major drivers of our work and the construct of a relative value scale is conceptually quite simple.^[6] Staffing targets are based in historical levels that include benefit and non-productive time that were qualitatively acceptable at the outset. We started with staffing that felt right and began to measure work. A DAWN AC report provides the risk class and therapy type for each INR authorization each month. Importing it into MS Excel© a pivot table is used to summarize the data. First we count the numbers of transactions in each of the 11 classification types in a month. The sum of each type is then multiplied by the standard time for the type to calculate the grand total relative value units (RVU). The hours spent providing patient education, one hour education visits for all new patients, is then added to arrive at total work units for the month. This calculation is illustrated in Table 1.

<u>Authorizations</u>	<u>Bridging</u>	<u>Induction</u>	<u>Maintenance</u>
Controlled (0-25)	53	N/A*	6588
Low Watch (26-50)	73	114	1635
High Watch (51-75)	38	144	279
Complex Care (>75)	10	177	56
<u>Times</u>	<u>Bridging</u>	<u>Induction</u>	<u>Maintenance</u>
Controlled (0-25)	10		5

Low Watch (26-50)	15	20	8
High Watch (51-75)	20	25	12
Complex Care (>75)	25	30	15
<u>RVU</u>	<u>Bridging</u>	<u>Induction</u>	<u>Maintenance</u>
Controlled (0-25)	530		32940
Low Watch (26-50)	1095	2280	13080
High Watch (51-75)	760	3600	3348
Complex Care (>75)	250	5310	840
			<u>64033</u>
Dosing Work Units (Hrs)			1067
Teaching Work Units (Hrs)			113
Total Work Units (Hrs)			<u>1180</u>
*The controlled induction class does not exist as the critical indicator "new patient" is weighted to place the patient in the low watch risk class at a minimum.			

The process of developing a budget and performance measurement system starts with the RVU volume measure. The RVU measure only quantifies the need for direct nursing care, so the performance expectation is not set at 100% utilization. We looked at the ratio of worked hours to RVU over a period of about eight months to evaluate performance in consideration of nonproductive time and the work not being measured, indirect time, and determined that roughly 78% of time was spent performing direct patient care activities. We then considered other resource needs such as coverage for benefit time to arrive at a budget target. Required direct paid FTEs is then determined by multiplying the measured work hours in RVU by the average hours per RVU and adding back a percentage for benefit time. With each month and YTD data we are able to compare average hours per RVU to monitor workload trends and productivity. As historical data grows we have increasingly meaningful benchmarks that bring increasing credibility to our requests for staffing and equipment.

Monitoring and maintaining the reliability and validity of our classification system is important and ongoing. Assuring a high level of agreement between raters in relation to scoring brings reliability. Just as in any other data collection or research study, you must ascertain that each data collector comes up with the same results as another in the same situation. Our automated process helps with that, assuming critical indicators are documented, by removing the need for staff to consciously classify patients or make any judgment about the risk class. In addition, descriptions of patient scenarios for performing inter-rater reliability test our nurse's ability to interpret and apply critical indicator definitions consistently. Similarly, expert anticoagulation managers continuously evaluate the validity of the risk assessment's relevance and that the critical indicators continue to accurately represent patient risk to assure we are measuring what we intend to measure.

The data collected has utility for projecting resource needs and determining cost per unit of work. Performance can be analyzed to measure productivity and identify potential day-of-week and seasonal variations as examples.

It can also be used to inform our understanding of patient needs. By monitoring the patient type distribution over time we can identify changes in our population profile to make care delivery adjustments, continuously improve staffing effectiveness, and identify any relationships to event complications that might exist. Finally, the data can help answer important research questions. For example; what is the cost of care for a particular patient or group of patients? If the mix of patients changes, what is the impact on staffing resource requirements? What drives differences in staffing costs for specific populations across entities?

In conclusion, educating leaders and others on the functionality, use and value of systems like this is critical to its success. Extensive communication and discussion of the framework and methodology is needed to allay staff skepticism and ongoing availability of resources to maintain the system must be assured to keep the framework current and updated.

[\[1\]](#)Whittemore, R. (2000). Consequences of not "knowing the patient". *Clin Nurse Spec*, 14(2):75-81.

- ^[2] Swan, B., & Griffin, K. (2005). Measuring nursing workload in ambulatory care. *Nursing Economics*, 23(5), 253-260.
- ^[3] Giovannetti, P. (1979). Understanding patient classification systems. *Journal of Nursing Administration*, 7, 4-9.
- ^[4] Henninger, D., & Dailey C. (1983). Measuring nursing workload in an outpatient department. *Journal of Nursing Administration*, 13(9), 20-23.
- ^[5] Hsiao, W. C. *et al.* (29 Sep 1988). "Results and policy implications of the resource-based relative-value study". *New England Journal of Medicine* **319** (13): 881–888.
- ^[6] Graf, C. M. (2001). The Operating Budget. In S. A. Finkler (Ed.), *Budgeting Concepts for Nurse Managers* (3rd ed., p. 178). Philadelphia: W.B. Saunders.