A Case Study in Turkey-Importance of Right Nurse Staffing Plans & Ratios in Turkish Private Hospitals (Acibadem Healthcare Group)

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ABSTRACT— ***Shortage of nurses in Turkey has gained momentum in recent years and severely threatens nursing profession. However, medical errors caused by lack of nurse staffing, patient outcomes, increased infection rate, nurse burnout, nursing injuries negatively affect the nurse, patient and hospital management at the same rate. Today, arrangements on nurse staffing plan are still made according to the prediction of the director nurse. Over the past 10 years, floors reshaped according to nursing needs of patients and the number of nurses included in staffing plan display a more realistic picture. Other than the number of nurses assigned to floors, the factor of nurse workload planning is also an issue avoided to be expressed in Turkey. The number of patients per nurse is twice the figure recommended and no arrangement has been made on this matter, leading to inefficient use of the nursing workforce. Our staffing plan based on patient care needs (Acuity) which we introduced into Acibadem Healthcare Group in 2005 offers a realistic approach to hospital managers by considering the number of required and available nursing staff members and seasonal changes. Study method is based on literature support, and our staffing plans we put into use since 2009 when they are described.***

Keywords— Nurse staffing plan, nurse-to-patient ratio, nurse workload, AHG case study, Acuity

1. INTRODUCTION

Incomplete workforce planning threatens patient health and decreases quality of nursing care. Also, problems about workforce and staff planning underlie resignations caused by lack of employees. In many scientific studies on nursing, it is stated that quality of patient care could be increased and nurse resignations could be reduced by nurse staff planning and increasing the percentage of nurses with a bachelor's degree. In the literature, it is recommended that methods by which nurse work load is planned should be selected according to specifications of hospitals and among those conforming to workforce management.

For continuity of patient safety and the nursing workforce, nurse-patient ratio should be controlled by the state. By a legal regulation to be made by the Ministry of Health, it will be possible to turn a new page in the history of patient safety in Turkey. For this, first of all, nursing requirement of patients in floors and wards of public and private hospitals in Turkey has to be established. At this point, patient dependency coefficient should be defined according to patient dependency level. Patient dependency level is determined by classification of patients. The next step, which is determination of number of nurses per bed for each floor and ward, will give an accurate value provided that bed occupancy rate is assumed to be 100% (within the context of simulation- not a real case)

In Turkey, Acıbadem Healthcare Group integrated nurse-to-patient ratio method into its health information systems and has used this system since 2005. The ratio, which can be monitored through Cerebral, the nursing console, is addressed in two different aspects. The first is the number of nurses required and the second is the number of nurses in the system. The system calculates the number of nurses required by a specific floor and on the other hand, finds the number of available nurses on that floor and shows the difference. Therefore, the limits of compulsory nurse-to-patient ratio to close this gap should be established by considering minimum values of World Health Organization and other implementing countries. For Acıbadem Healthcare Group, the only limitation in this practice is that the cost paid to nursing workforce by the hospital will increase because one nurse will be allocated to 5 patients, while formerly one nurse was allocated to 7 patients.

Passage to mandatory nurse-to-patient ratio of Acibadem Healthcare Group will not cause any change in the current operational system. The only issue that needs improvement is defined as the deviation in the number of nurses (the difference between the number of nurses required and the number of those available). Currently, although patient outputs

and nursing clinical indicators(pressure sores, patient falls, rate of developing thrombophlebitis, satisfaction with nursing care) of Acibadem Healthcare Group is above the target rate, determination of nurse-to-patient ratio for each unit is important since it will approach the methodology of "harm free care " along with the new practice.

2. HISTORY OF NURSE STAFF PLANNING METHODS

In 1960-1970s, a method called "Utilized Work Sampling" was used. This method was not susceptible to type of patient, skill mix and nursing process.

From mid-1970s to 1990, an acuity-based staffing methodology was followed. Terminological equivalent of acuity is referred to as medical measure of severity of disease or patient care coefficient. Dependency can be expressed as nursing dependency of a patient up to a certain degree. By the 1990s, a concept called nursing ratio was introduced and measurements for performance were created. Undoubtedly, the key factor for its creation was the pressure from the administration to reduce nursing costs. In the late 1990s, trade unions found working system in the California model advantageous in terms of work safety (Rogers, Overfelt,Mc Nally, 2003).

Nurse-to-patient ratio, a staffing methodology, became a compulsory procedure for the first time in the state of California, USA in 2004 (Coffman, Seago and Spetz, 2002; Spetz 2004). As of September 2009, American Nurses Association (ANA), Columbia in conjunction with 14 states turned nurse staffing policies into procedures, while nurse staffing legislation was created in 17 states.

3. IMPORTANCE OF MAKING NURSE STAFFING PLAN

3.1. Its Importance In Terms Of Retaining Nurses And Cost

Stress in hospital environment, low wages, busy working hours and workload increase nurse turnover, which has become a global problem, and have adverse effects on meeting the hospital's patient demand and its capacity of providing high-quality care, reduce business efficiency and motivation of nurses, and increase costs (Cavanagh and Coffin, 1992; Sofer, 1995, Gray and Philips, 1996; Tai et al., 1998; Shields and Ward, 2001).

According to a study conducted by Rosseter (2011) with American Association of Colleges of Nursing (AACN), the cost of a licensed nurse as a human resource to the hospital was $2,820 (2011), while turnover cost of that nurse was considered as $65,000 ($65,000). It emerged that annual percentage increase of nurse turnover corresponded to $300,000(Hunt, 2009).

In a study by Johnson et al. (2000), recruiting, training and orientation of someone else instead of a former employee, corresponded to 50% of annual salary of the former employee. Moreover, it is emphasized that the process of understanding the job and recognition of the organization as well as its financial aspect have an effect on the efficiency in the job. In addition, loss of intellectual capital was also considered, and hidden loss of the organization is that competing firms benefit from these values.

Nurse staffing plan increases a nurse's commitment to the institution while reducing stress. Because she pays much more attention to the patient, this leads to correct application of the treatment, and reduction in medication errors as well as hospital's expenses on recruitment and training (Aiken, 2008; Greenberg, 2006). From a social point of view, this leads to an increase in nursing efficiency as well as wages and thus allows balancing the extra costs. In addition, a better nursing care results in a decrease in future drug spending and indirect care expenditures, including travel, loss of productivity during doctor's appointment or in the time spent by patients' relatives helping the patient. Therefore, determining the causes of turnover and taking precautions is essential.

The high demand for the profession of nursing directs many nurses to part-time nursing or other non-nursing career alternative. Considering AHG case, "controllable resignations", which is one of the indicators monitored under the heading "Nursing Quality Indicators" (its international counterpart is referred to as "voluntary turnover" increased by 45.2% between 2009 and 2011, and reached 520 in the year 2011. The main reasons for these resignations are resignation or dismissal of an employee because of a problem under the control of the employer or an environmental quality or feature. For example, salary status, uncertain career plans, perceived disrespect or work injuries are among the reasons shown the most.

3.2. Its Importance in Terms of its Effect on Patient Care and Mortality

In an investigation with the topic "nurse staffing, patient mortality, professional burnout and dissatisfaction" conducted by Aiken et al.(1993), the maximum number of patients a nurse may provide care for was established as 4. It was underlined that patient mortality rate increased by 14% within 30 days if the number of patients provided with care was 6, and by 31% if the number was 8. The low number of nursing staff risks the quality of patient care. In the case of research conducted in intensive care units, it was established that 22% of actual infections were related to health care. During a 24-hour nurse-patient ratio of 1.9 on average, central venous catheter, mechanical ventilation, urinary catheter-related infection rate and the use of antibiotics were checked. A high nurse-patient ratio is positively related to a decrease of 30% in the risk of infection. Where nurse-patient ratio is more than 2.2, 26.7% of all the infections can be avoided.

Current studies show that the relationship between higher nursing staff and mortality is becoming more and more complicated every day. Ten years ago, there was no sufficient evidence to relate nurse staffing and patient output,

whereas in 2002, Needleman et al. established the relationship between nurse staffing levels and not being able to keep a patient alive who experienced one of five complications, including pneumonia, sepsis, heart attack, advanced stomach / intestinal bleeding and deep vein thrombosis. By conducting a more comprehensive study than Needleman et al.'s study, Aiken et al. measured numerical magnitude of the impact of nurse staffing on mortality. In UK Rafferty (2007) report, it is apparent that hospitals having a mortality ratio of 26% have a very high patient to nurse ratio (which means low staff level).

Every year, a budget of $8.5 million is prepared for nursing care indicators in pressure sores and other categories.

The relationship between nurse staffing level and patient output has been studied for over 10 years. Considering the results of the studies conducted, it was observed that a correct staffing plan led to a decrease in outputs such as mortality, not being able to be saved, complications, infection rates, development of pressure ulcers, falls, period of hospitalization and medication errors (Mcgahan, Kochaski, Coyer, 2012).

While emphasizing the necessity of safe staffing level for quality patient care, RCN (2009) specifies the evidence-based effects of high level of staffing found by research studies as follows:

- Increase in the quality of patient care (positive patient output)
- Increased nurse retention and recruitment
- Providing economic benefits to employer and society

3.3. Its Importance in terms of Patient Safety

20 years ago, insufficiency of the number of nurses for a high-quality patient care was reported by Aiken and Mullinix (1987). Immediately afterwards, the Institute of Medicine began working for the level of sufficient staff in clinics and hospitals in 1993. Findings at the beginning of the study did not support the relationship between nursing staff ratio and patient care (Wunderlich, Sloan and Davis 1996). In 2002, the relationship between nurse staffing level and patient output could be based on several pieces of evidence. Aiken et al.(2002) suggested that in case of any increase in the workload, mortality rate in surgical interventions increased by 7%, leading to subsequent increase in burnout and job dissatisfaction and unavoidable resignations. Similar studies were also carried out in Canada, UK, Belgium, and eventually 90 meta-analysis studies were assessed by the Agency for Health Care Research and Quality and the relationship between patient output and nurse staffing was formally approved (Kane et al., 2007).

It was noted that upon association by government authorities of patient output with nurse staffing, staffing level of licensed nurses also increased and staffing level of nurses with associate's degree decreased. Although the costs of nurses with a bachelor's degree are higher than nurses with associate's degree, it is understood that it is the main labor force which enhances the quality of patient care. Therefore, several improvements will be observed in patient safety if an extensive space is allocated thereto in staffing plan.

4. WORLDWIDE STAFFING MODELS/METHODS

According to Rogers, Overfelt and Mc Nally(2003), there are 3 factors that are taken into consideration in staffing. These can be listed as "hospital structure", "patient profile", "nursing unit". Because "age", "companion care", and "training requirements" vary from patient to patient, while the areas in which the hospital provides care also vary. In addition, the design of nursing unit, unit equipment, help & support and IT units also affect nurse staffing.

Recent studies showed that architectural structure of the hospital also has a major impact on the workload of nurses. Studies demonstrating impact of architectural structure on both patient health and performance of nursing were conducted by McCusker et al. (2004), Pattison and Robertson (1996). Analyzing architectural structure of modern hospitals, it can be said that the present situation is less costly than the past. The reason for this is that since services are designed according to purpose, treatment takes one fifth less time. Short hospitalization period is important for effectiveness of both the patient and the hospital.

Hospitals are designed according to 4 major structures, which include:

1. **Bay Units**
2. **Nightingale Units**
3. **Hub and spoke Units**
4. **Other designs**

In bay units, patients of different genders and different classes may be included in the same unit. Patient care cost does not vary according to patient dependency. Moreover, if the necessary equipment is positioned in a place close to patient rooms, the distance traveled by a nurse also decreases (Stichler, 2001). However, Bay design experiences problems at floors with staff shortage. A centralized nurse station can tolerate the floors with staff shortage. Although sub-stations in wide units with a regular nurse staff better organize nurse-patient communication, nurses' job satisfaction declines because they feel isolated.

In bay type designs, audible warning device system allows access of patient to the nurse. In case this audible device sounds for too long, both patients and nurses are affected negatively and their efficiency decreases. On the other hand, Bay design configures a better staff and offers a number of modern facilities so it creates an appropriate environment for the patients during their hospitalization period. An example of modern facilities offered by Bays design is "a toilet per patient ratio. In Bays system, there are 6 patients per toilet, whereas in Nightingale system, there are 12 patients per toilet (Pattison and Robertson, 1996).

In Nightingale type of design, patient rooms should be as large as possible and positioned in such a way as to maximize visibility of nurse station and audibility of calls. In Nightingale type of design, there is stronger communication between patients and nurses (because of the position of nurse station). However, the most significant handicap in this system is "noise" since the service covers more number of patients. Pattison and Robertson (1996), Stichler (2001), Topf (1985) reported that recovery rate of patients suffering from noise-induced stress decreased. It was stated that in Nightingale type wards, patients may be transferred between wards for 5 times, and this situation is stressful for the patient and an extra workload for the nurse (CABE, 2004; Lawson et al., 2003; Seelye, 1982).

Also in the case of hub-and-spoke type designs, there is a nurse station positioned in the middle of wards. According to nurses, the most ideal ward is where it is positioned in such a way that it gets light and fresh air, and has a large storage area and a regular fire exit. Based on the impressions of nurses, this is a unit where patients requiring critical care should stay because the least waste of time on the go takes place in this unit. It is a type of design in which the link between the patient and nurse is healthy and management of which can be provided better. In hub and spoke type wards, a clear field of vision is available between the nurse and the patient dependent on her. Similar to Nightingale design, patient confidentiality will be reduced depending on the size of the ward so there'll be discomfort because there'll be noise and patients will witness other patients' stress during their examination.

Other unit designs are listed as "Racetrack", "Triangular", "Pyramid" and no further detail was provided in the literature.

Although AHG has no scientific data in this regard, there is no finding which associates architectural structure of the hospital with the number of nurses. In a study conducted by Hendrich et al. (2008), three different areas (racetrack, corridor and radial) were evaluated by time and whether architectural design affected a nurse's time while she was carrying out care activities. As a result of the study, it was concluded that there was no statistically significant data. In the same study, they indicated that during night shifts, nurses traveled less distance because patients were less mobile and there was increased rate of pain.

In AHRQ's nurse staffing, one of two principles are taken as the basis. **These are:**

- Time spent by a nurse for one patient per day
- Nurse-to-patient ratio (the ratio of licensed nurses' RN+LPN/number of patients)

When we think of the time spent by a nurse for one patient in a day, it ignores non- care-related activities, even though it is considered as the most accurate measure. In addition, time of care between nurses working in temporary periods on a monthly basis and nurses working on a regular basis can be misleading.

Minimum nurse-to-patient ratio according to health legislation published in California is shown in table 1 by units and departments.

Table 1: Suggested Nurse Ratio by Type of Units (Shereveport LA,2011)

Type of Unit	Suggested Nurse-Patient Ratio
General Medical Care	1:5 or 1:6
General Surgery	1:5 or 1:6
Telemetry	1:5
Pediatric	1:4
Newborn	1:8
Neonatal Intensive Care	1:2 or 1:3
Adult Intensive Care	1:2 or 1:3
Oncology	1:4 or 1:3
Delivery room	Varies
Antepartum; Section for postpartum high-risk patients	1:5 or 1:6
Postpartum	1:6
Psychiatry	1:7

Patient-nurse ratio, created as a solution to such problems, also has advantages as well as disadvantages. For example, measuring nursing care per minute is not economical and this ratio provides a more realistic approach in the case of unit management and calculation of training days. Today, nurse-to-patient ratio is used in many institutions throughout the USA (Minnick and Mion, 2009).

Table 2: Nurse-to-Patient Ratio By Departments

Departments	Nurse-Patient Ratio
Medical and surgical	1:5
Pediatric	1:4
Intensive-care	1:2
Oncology	1:5
Obstetrics and	1:3

Findings of large-scale study conducted by RCN on 9000 nurses in 2009 are given below.

Table 3: Nursing Data (RCN 2009)

	Day	Night
Number of beds	24	24
Total number of patients	23	22
Occupancy	%97	%92
Number of nurses with a bachelor's degree	3.3	2.5
Number of healthcare support staff members	2.2	1.5
Number of staff members on duty (nurses with a bachelor's degree – healthcare support staff members)	5.4	3.9
Ratio of nurses with a bachelor's degree to other nursing staff members	%60	%62
Average number of nurses with a bachelor's degree	7.9	10.6
Number of patients per nursing staff member	4.4	6.1
Number of cases	713	324

4.1. Current Staffing Methods In Use

According to Hayes (1991), necessary and appropriate health care will be provided if patient dependency and level of staffing match one-to-one. Many calculation methods only meet physical needs of the patient.

In a study conducted in Nuffield Health Institute in 2003, Hurst stated that nurse staffing plan can be made in 5 different ways. These are:

1. Professional Judgment Approach
2. Nurses per occupied bed method
3. Timed-task/activity approaches
4. Regression-based systems
5. Acuity-quality method

1. Professional Judgment Approach

This approach provides the most appropriate size for the unit, and optimum creation of the nursing team. In principle, it changes duty route into labour format.

Table 4: Seven-Day Staffing Plan

Shift Information	Duration of Daily Work	Total Time of Work
Morning shift: X hrs from....to....	X*number of nurses*7	XZ hrs
Night shift: Y hrs from.... to....	Y*number of nurses*7	YZ hrs
Total	=	XYZ hrs

In a unit where weekly work load is established as XYZ hrs, nurse's leaves should also be taken into account. Nuffield Institute For Health (2003) defines this time as a "time-out" and represents it as 22%. Therefore, total time of

work should be multiplied by time-out in the new calculation. The abovementioned method is not only easy to calculate but also low in costs and operable in every area of the clinic. Certain care groups may require minor adjustments. However, it is difficult to explain the relationship between staffing and nurse quality by this method. On the other hand, there'll be a trouble in the calculation when number of patients and patient dependency level are changed so the ward will be over- or understaffed.

2. Nurses per occupied bed method

In this method, staffing and nursing skills mix show an empirical variety. Data such as formula, bed occupancy and payroll information are collected in a routine fashion.

It establishes very little relationship between ward data, ward size and occupancy. Moreover, the formula is insensitive to dependency level changes and the same number of nurses can remain inadequate in high dependency patients. Lastly, routinely collected data, data such as bed occupancy used in staffing formula are error-prone and they are confirmed after their accuracy and reliability are established.

3. Timed-task/activity approaches

This is a method to which nurses refer while making care plans. What is essential here is to arrange the amount of time spent for a patient during an intervention according to need. Each patient's daily care needs are determined manually or electronically by checking via a checklist of nursing interventions.

4. Regression-based systems

Regression analysis or in other words demand analysis determines the number of nurses necessary for a specific activity. Outcome of regression analysis is mostly as follows: The number of nurses increases as bed occupancy increases and accordingly estimated number of staff members also increases. Regression analysis is appropriate where it is possible to make predictions, e.g. in the case of planned patient admissions. Nursing staff members in the unit are shaped in line with bed occupancy and patient demand.

5. Acuity Method

Third method used to estimate and evaluate the size and mix of nursing team in wards is referred to as "dependency-activity- quality" method. This staffing method improves weak points of the methods mentioned above. It is especially useful for wards where patient numbers and patient mixes fluctuate. Formula is not only sensitive to the number and mix of patients but also evaluated patient floor. Therefore, the formula used is more complex to derive and use.

Patients with a dependency level of **1** are independent of nurses and those with a dependency level of **4** are completely dependent on nurses.

1. In stage 1, duration of care by dependency should be indicated in minutes.
2. In stage 2, nurse to patient ratio should be calculated.
At this stage, we have to calculate care time difference in hrs between patients with dependency level 1 and patients with dependency level 4, by taking the table above as the basis.
3. Stage 3, calculating workload throughout the hospital(Acuity)
Formula : Workload/number of patients
4. Stage 4, Calculating Bed Acuity(Future Projection)
Even though workload and bed acuity are sufficient in the scope of criterion, bed acuity as well as bed occupancy should be known. If formulated, total workload/bed occupancy=bed acuity
5. Stage 5, how much time is necessary for good care?
Direct care time for all patients is: workload x dependency level/60 minutes
6. Stage 7, Calculating the time spent by a nurse while providing direct care
7. Stage 7, Deducting Meal Breaks from Care Time
Nurses spend a certain part of their time when they provide care, for meal breaks. While calculating care times, this detail should be taken into consideration.
8. Stage 8, Taking Sick Leave, Annual Leaves into Consideration
Such periods are also called time-out. While calculating number of staff members, this factor should also be taken into account.
9. Stage 9, Converting Nurse Care Hours into Weekly Work Format
10. Assigning Time Schedule According to Nursing Skills

As Acıbadem Health Group(AHG), we're using *ACUITY* method during nurse staff planning.

Why Acuity Method?

Because, other than available values, it calculates values such as bed acuity. Unit occupancy and patients dependency can be adjusted in a mixed way. Values in other timed-task-activity and regression models do not take patient care coefficient as the basis. However, they are also not sensitive to change.

Acıbadem Health Group works on "acuity" method, which assigns adequate quantity of workload for patient care. Additionally, the fact that it is the only model with applicability and confidence in terms of literature (that it has more advantages than the other 4 models) and that Mayo Clinic, Cleveland, Mass General Hospital also incorporated this method into their own methodologies was a decisive factor. Acuity method was activated randomly-manually in AHG between 2003-2008, and transferred into the system in 2008 and its use in all hospitals was initiated in 2009.

5. GENERAL SITUATION IN ACIBADEM HEALTH GROUP (AHG)

It has a total of 23 hospitals, including 14 hospitals and nine polyclinics. A total of 2372 nurses are on duty in these 23 hospitals. In AHG, nurse staffing is conducted by a health management program we call Cerebral.

Findings

AHG Patient Profiles

Patients' Gender

Given AHG's location and service data, no correlation could be established between "Female" and "Male" patients and their level of dependency. Since the services they benefit from mainly arise from gender difference (e.g. the fact that number of female patients is higher in obstetrics and gynecology, aesthetic, plastic and reconstructive surgery, that number of male patients is higher in ear-nose-throat and urology departments), it could be misleading to make some kind of comparison between patient care coefficient and the level of dependency.

Patient Age Group

AHG's patient age group range is "0-65" and is classified under 4 categories: "newborn", "child", "adult" and "elderly". In order to make the data more understandable, AHG patient age groups are categorized as follows:

Table 5: Patient Age Groups

Age	Group
0-1 year	Newborn
2-14 years	Child
15-65 years	Adult
65<=	Elderly

Number of Patient Care Floors (High level, mid-level, low level)

In the light of the data of Acibadem Maslak Hospital for the year 2012, patient care time in hrs and patient care coefficient vary by age group.

Table 6: Care Time in Hrs/Coefficients by Age Group

Age group	Patient Care Time in Hrs	Patient Care
0-6	11,77	0,44
7-14	10,62	0,44
15-65	10,70	0,46
65<=	11,23	0,45

As can be seen in the practice above, one of the most important factors that affect the number of nurses is the number of patients so there is no correlation which can be largely substantiated between the number of nurses and the patient age group.

Average Daily Care Time in Hours, Rush Medicus and AUKUH Classification System

It is calculated on the basis of dependency level according to Rush Medicus scale and studied in 4 individual groups.

Table 7: Patient Dependency Levels

Type of dependency	Care time in Hrs
Independent Patient	0-2 hrs
Low level dependent patient	2-4 hrs
Mid-level dependent patient Lower level dependent patient	4-10 hrs
High level dependent patient Mid-level dependent patient Lower level dependent patient	10-14 hrs

In addition to Rush Medicus patient classification scale, AHG works on a classification by The Association of UK University Hospitals (AUKUH) as a pilot practice for improving the quality of patient care.

Table 8: Patient Classification System used by AUKUH

Care level	Criteria
Level 0 **Level 0**	Independent patient; the group in which patients requiring post diagnostic care and ongoing medication treatment or awaiting discharge are included.
Level 1 **Level 1a**	Level 1 inpatient; the group which includes patients whose post-op care requires more than basic needs. Level 1a is the group consisting of patients with fluctuating vital signs or those with a high potential for deterioration.
Level 1b	The patient group in which patients are in a stable condition but have an increased dependence on nurse.
Level 2	The patient group in which patients are in an unstable condition and at risk and should not be included in inpatient floor.
Level 3	The group in which patients needing intense respiratory support and having multiple organ

Table 9: AUKUH and AHG Patient Dependency Methodologies Comparison Table

Subject	AHG	AUKUH
Dependency levels and Patient Classification	Studied in 4 groups.	Studied in 5 groups.
Using Patient Dependency Coefficient	Calculated individually for every patient.	5 different coefficients designated according to patient dependency levels are used
Connection with Quality Indicators	Emphasizes time spent by a nurse while she is next to a patient	Studied as integrated into nurse workload planning as official complaints, drug errors, MRSA, C-diff, falls, pressure ulcers and nutrition under the heading "Nursing Sensitive Indicators".
Determination of nursing requirement	Annual calculations are made.	Monthly (25 days)

Unlike AHG, it studies the patients in Level 1 in 3 perspectives.

AHG Department Based Patient Dependency Coefficients

AHG wards are gathered under the following 7 departments according to the unit standard used in California, New Jersey and Pennsylvania hospitals.

Patient dependency coefficients calculated according to these departments are given in the table below.

Table 10: 2012 AHG Patient Dependency Coefficients by Universal Departments

Departments	Patient dependency coefficient
[1]General Medical Care	0,74
[2]Surgical Care	0,76
[3]Pediatrics Unit	0,80
[4] Obstetrics and Gynecology	0,72
[5]Oncology Unit	0,81
[6]Intensive Care Unit	0,96

[1] Skin Diseases, Endocrinology, Gastroenterology, Chest Diseases, Ophthalmology, Internal Medicine, Cardiology, Ear Nose & Throat, Nephrology, Neurology, Orthopedics and Traumatology, Urology, Infectious Diseases, Hematology, Endoscopy, and Psychiatry.

[2] Brain and Neurological Surgery, Pediatric Surgery, Aesthetic, Plastic and Reconstructive Surgery, General Surgery, Thoracic Surgery, Cardiovascular Surgery, Hand Surgery.

[3] Children's Diseases, Pediatric Allergy, Pediatric Gastroenterology, Pediatric Hematology, Pediatric Cardiology, Pediatric Infectious Diseases, Pediatric Pulmonology, Pediatric Oncology, Pediatric Nephrology, Pediatric Neurology, Pediatric Neurosurgery.

[4]Obstetrics and Gynecology, Gynecologic Oncology, Perinatology, IVF and Reproductive Health Center.

[5] Medical Oncology, Radiation Oncology.
[6] Intensive Care, Intensive Coronary Care, Intensive Cardiovascular Care

Calculation of number of nurses is based on patient care coefficient. This coefficient is considered while deciding on the number of nurses required by a unit.

DISCUSSION

Comparison between AHG and California and Victoria Nurse-to-Patient Ratio Models

It is apparent that "California" and "Victoria" are the models mentioned the most in available nurse staffing system literature, and are used widely. Units taken as the basis by both models may vary (see Annex-7.). Thus, comparison of nurse-to-patient ratio related to 6 basic unit titles is given in Table 17.

Table 11: Nurse-to-patient Ratio Suggested for 6 Units in Universal Arrangement

	California*	**Victoria****	**AHG*****
General Medicine	1:5	1:4	1:4-1:5
Surgery	1:5	1:3	1:3-1:5
Pediatrics	1:4	1:4	1:3-1:4
Gynecology and Obstetrics	1:3	1:4	1:5
Oncology	1:5	1:3-1:4	1:3-1:5
Intensive Care	1:2	1:2	1:2

* California, year 2008, nurse-to-patient ratio arrangement
* Victoria, year 2001, nurse-to-patient ratio arrangement
***AHG year 2012, nurse-to-patient ratio findings

For AHG, it can be said that average number of patients a nurse provided care in one shift varied between 4 and 5 in the year 2012. This table confirms the table above.

AHG Nursing Job Descriptions

There are 40 nursing job descriptions in quality documentation system set out by staff planning in AHG. These job descriptions are considered under 4 different titles, which are "the main purpose", "main responsibilities", "profile (education level, experience, knowledge, skills)" "position in the organization". Nursing positions defined in the system are listed below:

- Emergency Room Nurse Job Description
- Job Description of Operating Room Nurse
- Job Description of Operating Room Nurse in Charge
- Job Description of Angiography Service/Laboratory Nurse
- Job Description of Diabetes Education Nurse
- Job Description of Maternity Nurse
- Job Description of Training and Development Nurse
- Job Description of Additional Duty - EEG / EMG Nurse / Technician
- Job Description of Additional Duty - Workplace Nurse
- Job Description of Additional Duty - Stoma Therapy Nurse
- Job Description of Additional Duty - Triage Nurse
- Job Description of Endoscopy Nurse
- Job Description of Infection Control Nurse
- Job Description of Hemodialysis Nurse
- Job Description of Director of Nursing Services
- Job Description of Nursing Services Development Manager
- Job Description of Deputy Director of Nursing Services / Nurse in Charge of Patient Care
- Job Description of Director of Nursing Services
- Job Description of Intravenous Therapy and Transfusion Team (IV Team) and Blood-taking Nurse
- Job Description of Outpatient Maternity Nurse
- Job Description of Bone Marrow Transplant Nurse
- Job Description of Clinical Education Nurse

- Job Description of Central Sterilization Nurse
- Job Description of Central Sterilization Nurse in Charge
- Job Description of Oncology Nurse
- Job Description of Special Branch - Oncology Nurse Case Manager
- Job Description of Special Branch - Newborn Home Visiting Nurse
- Job Description of Special Branch - Sexual Dysfunction Nurse
- Job Description of Special Branch - Special Clinical Case Manager Nurse

- Job Description of Special Branch-High Risk Pregnancy Nurse
- Job Description of Outpatient Clinic Nurse
- Job Description of Radiation Oncology Nurse
- Job Description of Ward Nurse
- Job Description of Nurse in Charge
- Job Description of Trainee Nurse
- Job Description of Medical Imaging and Interventional Radiology (TGGR) Department Nurse
- Job Description of Sleep Laboratory and Video-EEG Monitoring Nurse
- Job Description of Reproductive Health Nurse
- Job Description of Newborn Nurse
- Job Description of Intensive Care Nurse

5.6 AHG Nursing Performance Process

In AHG, there is an evaluation process according to each job description.

1. **AHG Competency Based Performance Evaluation:** It is conducted once a year and evaluation is based on competency levels.

2. **Training Needs Analysis Exam:** It is held once a year and its purpose is to evaluate training courses given during the year. Results of training exam are among the criteria in making career planning.

3. **Nurse Performance Ratings:** It is assessed on a personal basis once a month and its results are used in performance system, personal development.

4. **Quality Indicators followed by Acibadem Healthcare Group:** Acibadem Healthcare Group has monitored nursing quality indicators in order to measure and improve nursing care quality, patient safety and satisfaction with nursing services since 2002. These indicators are universally recognized "NDNQI "[1]'indicators and those currently monitored are given below:

- Daily time spent per patient
- The percentage of inpatients who developed pressure ulcers
- Rate of inpatient falls
- Patient's satisfaction with the nurse
- Patient's satisfaction with pain management
- Patient's satisfaction with nurse's training
- Nosocomial infections
- Nurse satisfaction
- Nurse education levels
- Nurse vacancy rate
- controllable resignations
- Non-controllable resignations
- Rate of patients for whom nurse's first assessment was documented on time
- Rate of satisfaction with our nurses
- Incorrect administration of medication

- Rate of patients who developed thrombophlebitis after IV cannulation
- Rate of inpatients who developed hypoglycemia
- Rate of inpatients who developed hyperglycemia
- Rate of development of port infection in oncology patients with inserted port needle
- Rate of development of extravasation in oncology patients with IV cannulation and inserted port needle
- Number of patients who received diabetes training and returned to emergency room
- Rate of newborns who were only breastfed during their hospital stay

The indicators listed above were revised during "Nursing Council" periodically issued by Directorate of Nursing Services and "rate of inpatients who developed hypoglycemia and hyperglycemia" was removed from the list and "Number of Multiple Attempts at Vascular Access Placement", "Number of Specialist Nurses", "Smoking Rate of Nurses", "Ratio of Extravasated Liquid", "Rate of Falls and Development of Pressure Ulcers in Patients with high risk of Pressure Ulcers and Fall" were added in the year 2013.

5. Nursing Services Quality Indicators: AHG nursing performance is measured by taking "nursing care indicators (nurse clinical indicators)" and "nurse vacancy rate" into account.

Nursing care indicators are listed below:

- Rate of Inpatients who developed pressure ulcers
- Rate of Inpatient Falls
- Rate of patients for whom nursing first assessment was documented on time
- Rate of patients who developed thrombophlebitis after IV cannulation
- Rate of Patient's satisfaction with pain management
- Rate of Patient's satisfaction with the nurse
- Rate of satisfaction with our nurses

Since 2007, the above-mentioned indicators are accessible to the public under the title of "nursing quality indicators" at "**Acibadem Hemşirelik (**Acibadem Nursing)" homepage.

6. WHEN TO REVIZE NURSE STAFFING PLAN?

Healthcare Commission states that staffing should be revised at least once every 2-3 years. However, RCN mentions that early revision may be required in the following circumstances:

- Where patient complaints and adverse events take place
- Where healthcare-associated infections increase
- In case of any failure to exercise policies and procedures and any decline in care standards
- In case of an increase inn employee turnover
- In case employee morale is low
- Where it is not known how an employee will have access to any training she has to get
- Where there is not enough time for practice and developing novelties
- When any change is introduced into care model
- In case of any interruption in communication
- When a variance is observed in bed occupancy and patient dependency
- In case of any change in local and national standards.

7. CONCLUSION

A nurse staffing plan with a proper level is essential for safe patient care. Main clinical indicators considered as criteria in patient care quality fluctuate according to correct staffing plan. Staffing plan is not only a matter that should be taken seriously for patient safety but also for employee safety. Today's nurses resign from the organization for three reasons if AHG is considered. These are "family reasons", "busy working hours" and "salary". Busy working hours" and "salary", two of the foregoing reasons, are also the most common reasons given in many companies. Busy working hours are associated with several deficiencies in staffing plan. Nurses who work intensively have a high rate of making errors-being injured- causing injury and high burnout and their communication with the patient is at minimum level. Other than sentinel increase in cases, negative patient output and nurse satisfaction, another aspect of working hours is the cost. Effect of staffing plan should be examined in three aspects, which are patient-nurse-hospital. Currently, the number of

patients that a nurse should provide care for is not based on solid foundations, and is addressed as a commercial matter in our country and many other countries. Thus, 9-12 patients are assigned to each nurse and patient care quality and employee safety is compromised. Backed by laws, various states in the USA(Washington, Orlando, California, Nevada, Texas, Illionis, New York, New California, Ohio) which set out to provide a solution to this issue converted minimum nurse staffing ratio into a procedure(The American Nurses Association's Nationwide State Legislative Agenda, January 2012). In Turkey, although there is no attempt to do something about this, nursing profession suffers each day and is not preferred. In this study, the objective was to set forth the most suitable staffing plan by taking nurse and patient factors into account.

8. ACKNOWLEDGEMENT

On behalf of the Acibadem Healthcare Group Nursing Services Directorship, we would like to thank all the colleagues who have provided the nursing staffing detail for their hospital. This study would not be effective without their contribution.

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