

## Comparing the organisational structure of the preoperative assessment clinic at eight university hospitals

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**Abstract:** The preoperative assessment clinic (PAC) has been implemented in most major hospitals. However, there is no uniformity in the way PACs are organised. We compared the organisational structure of the PACs from all eight university hospitals in the Netherlands, looking at the following variables: number of patients visiting the PAC, staffing of the PAC, opening hours, scheduling, and additional preoperative diagnostic testing. The number of patients seen yearly varies from 7.000 to 13.500. In all clinics, the preoperative assessment was performed by anaesthetists and residents. In five PACs, preoperative assessment was also performed by physician assistants or nurse practitioners. Opening hours varied. Consultations are by appointment, 'walk-in', or a combination of these two. In four clinics additional testing is performed at the PAC itself. This study shows that the organisational structure of the PAC at similar university hospitals varies greatly; this can have important implications when designing a benchmarking process.

**Key words:** Organisation and administration; ambulatory care; preoperative care.

Nowadays, stakeholders of the health care system, i.e. governments, health insurance companies, and patients, expect transparent outcome measures and tools to compare similar health care services in different hospitals with regard to quality and cost efficiency (1, 22, 24). This contributed to the increase of benchmarking projects in health care. Benchmarking is a process first practised by Xerox Corporation (Rochester, NY). The concept can be described by the Japanese word *dantotsu*, which means striving to be the "best of the best". An operational definition of benchmarking is "finding and implementing best practices" (2). The practice of learning from the best has spread from office copiers, business and industry to the medical health care system.

Traditionally, preoperative assessment was performed the evening before or on the day of surgery. However, performing the preoperative assessment on an outpatient basis several weeks or days before surgery has shown to enhance cost-

efficiency (7, 8, 14, 15, 25, 29). It reduces preoperative diagnostic testing (8, 25), operating room cancellations and delays for medical reasons (7, 8, 15, 29), and length of the hospital stay (14, 29). Therefore, a preoperative assessment clinic (PAC) has now been implemented in the organisational structure of most major hospitals (13). Although some organisational aspects of the PAC have been investigated, such as patient satisfaction (3, 10), staffing (11, 28), and scheduling of the PAC (3), there is no consensus on the best way to organise a PAC.

In a previous study (5) we compared the patient flow time at the PACs of two university hospitals and encountered several difficulties in interpreting the differences between the hospitals. Though the two hospitals were similar in respect of tasks, i.e. routine care, high-level clinical care, and high-level reference care, the number of patients visiting the PAC of each hospital was significantly different, as was the staffing of the PAC. Not only did these factors influence patient flow time, but also costs-efficiency. Differences in organisational structure should thus be taken into account when benchmarking.

The purpose of this observational study was to explore the differences in organisational structure of the PAC in similar hospitals within the Netherlands, which has a relatively uniform health care system.

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Table I

Characteristics of the preoperative assessment clinic

Centre	Patients per year	Patients per day (mean)	Hours open per day	Hours open per week	Consultations	Additional testing	E-records
AMC	± 11.000	55	7,5	37,5	Appointed	No	No
VUMC	± 10.000	40	8,5	42,5	Walk-in	ECG	No
UMCG	± 13.500	60	9	45	Appointed & walk-in	ECG + venepuncture	Yes
LUMC	± 7.000	35	8,5	42,5	Appointed & walk-in	ECG + venepuncture	Yes
UHM	± 13.000	60	9,5	43	Appointed & walk-in	No	No
UMCN	± 12.000	55	7	32,5	Appointed & walk-in	ECG + venepuncture	Yes
Erasmus MC	± 10.000	40	9	45	Appointed & walk-in	No	No
UMCU	± 12.000	50	6,25	31,25	Appointed	No	Yes

*E-records = electronic records; AMC = Academic Medical Centre; VU = Free University Medical Centre; UMCG = University Medical Centre Groningen; LUMC = Leiden University Medical Centre; UHM = University Hospital Maastricht; UMCN = University Medical Centre Nijmegen; Erasmus MC = Erasmus Medical Centre; UMCU = University Medical Centre Utrecht; ECG = electrocardiogram.*

## METHODS & RESULTS

We visited all of the eight Dutch university hospitals and compared the organisational structure of the PAC. In detail, we looked at the following variables: the number of patients per annum and per day, opening hours, scheduling, staffing, the organisation of additional preoperative diagnostic testing, and electronic medical records versus paper records.

The number of patients seen yearly at the PAC ranged from 7.000 to 13.500. The mean number of patients seen daily ranged from 35 to 60. Opening hours varied between 6 $\frac{1}{4}$  and 9 $\frac{1}{2}$  hours per day. Six clinics are open 5 days a week; 2 clinics are open 4,5 days a week. Three clinics are closed for an hour at lunchtime. Consultations are by appointment in two clinics and are on a walk-in base in one clinic. In five clinics, there is a combination of appointed and walk-in consultations (Table I).

All clinics have anaesthetist and residents for the preoperative assessment. In addition, in five PACs the preoperative assessment is also performed by physician assistants (PAs) or nurse practitioners (NPs). Supporting administrative and clinical tasks are performed by nurses (3 PACs), or by doctor's assistants (5 PACs) (Table II).

The clinics have similar guidelines for additional preoperative testing. In four clinics, electrocardiograms and/or venepunctures are performed at the PAC itself (Table I). In the other clinics, these tests are performed at the general outpatient laboratory. Other additional preoperative tests, e.g. chest X-rays, pulmonary function tests, and echocardiograms, are not performed at the PAC, but at other outpatient departments.

Four PACs have electronic records; the other four PACs work with paper records (Table I). All

eight hospitals perform ambulatory surgery. One PAC has an additional paediatric session, with a paediatric anaesthetist available for the preoperative assessment. One PAC has an extra clinic session for patients undergoing cardio-thoracic surgery in cooperation with a cardio-anaesthetist.

## DISCUSSION

The uniform aim of all PACs is preoperative assessment of the patient in order to reduce the morbidity/mortality associated with surgery and anaesthesia, increase the quality of care, decrease the cost of perioperative care, and restore the patient to the desired level of functioning (21). In addition, the preoperative visit is an appropriate time to educate the patient on anaesthesia, perioperative care and pain treatments, to reduce anxiety, to develop care plans, and to obtain informed consent (20). Preoperative assessment allows the patient to consider a second opinion by another surgeon or anaesthetist (according to the Belgian law of 2002 "The rights of the patient").

Although the aim of the PACs studied is the same, the organisational structure of the PACs is not as uniform. Even though the hospitals are all tertiary care centres within the same health care system, the number of patients visiting the PAC annually and the organisation of the PAC differ considerably between the institutions.

### *Staffing of the PAC*

The staffing of the PAC varies. All clinics we visited have anaesthetists and residents for the preoperative assessment, who rotate daily. In addition,

Table II

## Staffing of the preoperative assessment clinic

Centre	Anaesthetist	Resident	NP	PA	Nurse	Doctor's assistant	Clerk
AMC	1	2	–	–	2-3	–	2
VUMC	1	2	–	1	–	1	2
UMCG	1	1	2	–	–	5	–
LUMC	1	2	1	–	–	2	1
UHM	11/2	2	–	1	–	6	–
UMCN	1	3	–	1	3	–	2
Erasmus MC	1	2	–	–	–	4	–
UMCU	1	2	–	–	4	–	3

NP = nurse practitioner; PA = physician assistant; AMC = Academic Medical Centre; VU = Free University Medical Centre; UMCG = University Medical Centre Groningen; LUMC = Leiden University Medical Centre; UHM = University Hospital Maastricht; UMCN = University Medical Centre Nijmegen; Erasmus MC = Erasmus Medical Centre; UMCU = University Medical Centre Utrecht.

in five PACs the preoperative assessment is also performed by physician assistants or nurse practitioners under the supervision of an anaesthetist. Doctor's assistants and nurses assist the physicians, NPs, and PAs with the preoperative assessment; they do not assess patients.

#### Doctor's assistant versus nurse

In the Dutch healthcare system, doctor's assistants are *unlicensed* health care workers who perform administrative and clinical tasks. Direct supervision of a licensed healthcare provider, e.g. registered nurse or physician, is required when performing direct patient care procedures, e.g. doing venepunctures or taking electrocardiograms.

Nurses are healthcare professionals, *licensed* to perform defined patient care procedures. Tasks include treating and educating patients, and providing advice and emotional support to patients' family members. As opposed to NPs and PAs, nurses are not licensed to provide diagnostic medical care.

#### Nurse practitioner (NP) versus physician assistant (PA)

In the United States, the NP and PA professions emerged in the 1960's as a result of the shortage of physicians (23, 26). The job description for NPs and PAs are similar, but their educational background and clinical experience differ. Whilst NP students are registered nurses, PA students have a more diverse background in health care. Both NPs and PAs provide diagnostic, therapeutic, and preventive health care services. They take medical histories, examine and treat patients, order and interpret diagnostic tests. Both practise with the

supervision of a licensed physician. With approximately 115.000 practising NPs and 63.000 practising PAs, the two professions are completely embedded in the United States' health care system. In Europe, the United Kingdom has approximately 3.000 practising NPs; the profession of PA is still in development. Both professions are fairly new in the Netherlands.

The global shortage of anaesthetists has led to the incorporation of PAs and NPs in the field of anaesthesiology, particularly at the PAC, where additional manpower is required for the preoperative assessment (8, 11, 12, 16, 17, 27, 28, 30). The accuracy of preoperative screening by nurses was studied by Vaghadia & Fowler (27) and Van Klei and colleagues (28). In both studies, the negative predictive value, i.e. the probability that the nurse identifies those patients who are ready for surgery without additional work-up, was high (93% versus 98%), but the positive predictive value, i.e. the probability that the nurse identifies those patients who require additional work-up, was considerably lower (29% versus 34%). Thus, nurses seem better at identifying patients who are ready for surgery without additional work-up, than identifying patients who do need additional work-up. When benchmarking the quality of the medical assessment at the PAC between hospitals, a differentiation should be made between the different types of staff performing the preoperative assessment.

#### Patient flow time

The patient flow time is dependent on 1) waiting time and 2) consultation time.

At the PAC, consultations are either by appointment, walk-in based, or a combination of

these two. In general, an appointment-based PAC will have a shorter average waiting time in the waiting room, because there is less variability in arrival times (3, 6, 18, 19). Dexter states that an appointment-based PAC will always provide a better service than a walk-in PAC (3). However, we found that some hospitals deliberately chose for a (partly) walk-in PAC, in order not to subject patients to an additional hospital visit for preoperative assessment.

The consultation time is dependent on various parameters. On average the preoperative assessment of patients with a higher American Society Anesthesiologists' (ASA) class requires more time (28). VAN KLEI *et al.* (28) showed that nurses needed 1.85 times longer for assessing the patient than an anaesthetist. No studies are available comparing the consultation time of NPs, PAs, residents, and anaesthetists. In many clinics NPs and PAs only assess ASA class 1 and 2 patients. A specific, discriminative health questionnaire can help to make a good estimation of patients' ASA physical status. By having patients complete such a questionnaire prior to making an appointment, it is possible to direct patients to the appropriate caregiver, improving efficiency.

Patient flow time is also dependent on the capacity, i.e. the number of patients per day, the available staff, opening hours, and the organisation of preoperative diagnostic testing.

In a comparison of the patient flow time at the PACs of two university hospitals, we found that the patient flow time was longer when ECG and venepuncture were performed at the general outpatient laboratory than when they were performed at the PAC. Total waiting time was shorter if a patient's co-morbidity was taken into account when planning the appointment interval. This study showed that the organisational structure of a PAC influences patient flow time (5).

### Costs

In the Netherlands the salary costs of PAs, NPs, residents, and anaesthetists differ considerably. On average the salary of a resident is 25% higher than the salary of a PA or NP, and 50% lower than the salary of an anaesthetist. We found the staffing of the PACs studied to vary considerably: not only did the type of personnel differ, but also the staff (performing preoperative assessment) - patient ratio. A formal cost-effectiveness analysis was beyond the scope of this study. This would include the following costs: educating personnel,

refresher courses, working hours, and the relative costs per patient as the working pace differs between the different types of staff (28). Possible difference in the quality of the preoperative assessment between the various types of staff should also be analysed, as this can bring additional costs, e.g. an increase in the late surgical cancellation rate or an increase in preoperative diagnostic testing.

### Patient experiences

Patient feedback can be used as a performance indicator for the quality of health care (9). Therefore, patient experiences are a good benchmarking parameter. Surveys to obtain patient feedback can be used to compare the service level of i.e. communication, information and participation in decision-making of the PAC across institutions. The organisational structure of a PAC influences patient satisfaction: a strong correlation exists between the time spent at the PAC and patient satisfaction (3, 10). We have developed the Patient Experiences with the Preoperative Assessment Clinic (PEPAC) questionnaire, an in-depth questionnaire which can be used to measure patient experiences with the PAC (4).

In conclusion, this study shows that within one nation with one health care system the organisational structure of the PAC varies greatly, even when hospitals are similar. This should be taken into account when considering a benchmarking process within one nation, and more so when comparing different health care systems.

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