

## CLINICAL SCIENCE

# Outpatient Quick Diagnosis Units for the evaluation of suspected severe diseases: an observational, descriptive study

Xavier Bosch, Anna Foix, Anna Jordán, Antonio Coca, Alfonso López-Soto

Department of Internal Medicine, Hospital Clínic, Institut d'Investigació Biomèdica August Pi i Sunyer (IDIBAPS), University of Barcelona, Barcelona, Spain.

**BACKGROUND:** Hospitals in countries with public health systems have recently adopted organizational changes to improve efficiency and resource allocation, and reducing inappropriate hospitalizations has been established as an important goal.

**AIMS:** Our goal was to describe the functioning of a Quick Diagnosis Unit in a Spanish public university hospital after evaluating 1,000 consecutive patients. We also aimed to ascertain the degree of satisfaction among Quick Diagnosis Unit patients and the costs of the model compared to conventional hospitalization practices.

**DESIGN:** Observational, descriptive study.

**METHODS:** Our sample comprised 1,000 patients evaluated between November 2008 and January 2010 in the Quick Diagnosis Unit of a tertiary university public hospital in Barcelona. Included patients were those who had potentially severe diseases and would normally require hospital admission for diagnosis but whose general condition allowed outpatient treatment. We analyzed several variables, including time to diagnosis, final diagnoses and hospitalizations avoided, and we also investigated the mean cost (as compared to conventional hospitalization) and the patients' satisfaction.

**RESULTS:** In 88% of cases, the reasons for consultation were anemia, anorexia-cachexia syndrome, febrile syndrome, adenopathies, abdominal pain, chronic diarrhea and lung abnormalities. The most frequent diagnoses were cancer (18.8%; mainly colon cancer and lymphoma) and Iron-deficiency anemia (18%). The mean time to diagnosis was 9.2 days (range 1 to 19 days). An estimated 12.5 admissions/day in a one-year period (in the internal medicine department) were avoided. In a subgroup analysis, the mean cost per process (admission-discharge) for a conventional hospitalization was 3,416.13 Euros, while it was 735.65 Euros in the Quick Diagnosis Unit. Patients expressed a high degree of satisfaction with Quick Diagnosis Unit care.

**CONCLUSIONS:** Quick Diagnosis Units represent a useful and cost-saving model for the diagnostic study of patients with potentially severe diseases. Future randomized study designs involving comparisons between controls and intervention groups would help elucidate the usefulness of Quick Diagnosis Units as an alternative to conventional hospitalization.

**KEYWORDS:** Diagnosis; Public Health; Cancer; Hospitalization; Waiting Lists.

Bosch X, Foix A, Jordán A, Coca A, López-Soto A. Outpatient Quick Diagnosis Units for the evaluation of suspected severe diseases: an observational, descriptive study. *Clinics*. 2011;66(5):737-741.

Received for publication on December 7, 2010; First review completed on December 23, 2010; Accepted for publication on February 2, 2011

E-mail: xavbosch@clinic.ub.es

Tel.: 34 93 2275539

## INTRODUCTION

In recent years, hospitals in countries with public health systems have adopted organizational changes to improve efficiency and resource allocation.<sup>1</sup> Alternative models of care include one-day hospitals (created primarily to provide medical procedures that require less than 24 hours of

hospitalization);<sup>2</sup> short-stay observation units (areas often located adjacent to emergency departments that accommodate patients requiring brief periods of observation or therapy);<sup>3-6</sup> hospital-in-the-home (programs that deliver a limited range of acute care services to selected patients in their homes);<sup>4,7</sup> outpatient major surgery programs (the provision of surgical procedures with postoperative recovery periods short enough to permit same-day discharge);<sup>8</sup> and, more recently, Quick Diagnosis Units (QDUs)<sup>9-12</sup> (outpatient diagnostic units for patients with suspected severe diseases).

In 1996, the use and benefits of quick and early diagnosis units were first described for suspected cancer patients

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referred from primary health care centers to the Queen Elizabeth Hospital in Birmingham, UK.<sup>12</sup> Patients were evaluated by specialists according to the suspected diagnosis (e.g., patients with hematuria or testicular masses were assessed by urologists, and those with breast masses were assessed by gynecologists).

QDUs were recently introduced in Spain, where they are mainly directed by internal medicine specialists or internists (similar to United States). Patients with specific symptoms, such as breast or testicular masses, are referred to and evaluated directly by the appropriate medical specialist.<sup>1</sup>

With the exception of two opinion articles on QDUs by specialists other than internists in the UK<sup>12</sup> and by internists in Spain,<sup>1</sup> there have been no other English-language reports on this health care innovation.

The objective of the present study was to describe the functioning of a QDU in a Spanish public university hospital after evaluating 1,000 consecutive patients. We also aimed to ascertain the costs of the model compared to conventional hospitalization and the degree of satisfaction of QDU patients.

## METHODS

We conducted an observational, descriptive study of 1,000 consecutive patients evaluated between November 2008 and January 2010 in the QDU of the Hospital Clinic of Barcelona, a public university hospital serving a reference population of 540,000 with 840 acute beds.

The QDU is staffed by a specialist in internal medicine and a registered nurse, with specialists from other fields assisting. It has a consulting room and a waiting room for patients and families, and it functions daily. The QDU physician and nurse devote five hours a day five days a week (Monday to Friday) to QDU work.

Patients evaluated in the QDU typically meet the following criteria: they have potentially severe diseases that would normally require hospital admission for diagnosis, their general condition allows for outpatient treatment, and they do not have physical or psychological disabilities that would make traveling to the hospital several times difficult. The diseases selected for QDU assessment are agreed upon by central services. In our hospital, patients with lung abnormalities (e.g., pulmonary nodules) are usually evaluated quickly in the one-day hospital of the Department of Respiratory Diseases; however, they are not excluded from QDU evaluation.

The operation of the QDU is based on an urgent first visit, followed by the preferential scheduling and coordination of complementary tests and subsequent visits until a diagnosis is made.

The main diagnostic tests (analytical and microbiological tests, simple radiology [X-ray], computed tomography [CT], echography, nuclear scintigraphy, digestive endoscopy, biopsies and lymph node fine-needle puncture aspiration [FNPA]) are normally performed within 7 days after the first visit.

Patients are referred from the hospital emergency department, outpatient clinics or primary health care centers. Referral by fax or e-mail permits a certain degree of control over the correctness of the referral. During the establishment of the QDU, the emergency department, primary health care centers and other referral sources were informed of the criteria for QDU referral. All diseases

selected for QDU assessment were identified according to established guidelines.

For each patient, we prospectively recorded demographic data; reason for consultation; referral source; waiting time for the first visit; number and dates of visits; waiting times between visits; time to diagnosis; type, number and dates of complementary tests; diagnosis and derivation. The full diagnostic workup was performed according to previously established protocols for most patients.

The time to diagnosis was defined as the time between the first visit and a definitive diagnosis and usually coincided with the results of diagnostic tests (imaging, endoscopic, laboratory or cytology).

Patients who would have been admitted for a diagnostic workup if there were no QDUs were considered "hospital admissions avoided".

In a subgroup analysis, we calculated the mean number of visits from 50 randomly selected patients with iron-deficiency anemia, 50 with fever of unknown origin and 50 with anorexia-cachexia syndrome who were evaluated in the QDU in 2009. We then analyzed the full direct and indirect costs and calculated the mean cost per visit and the mean cost per process (admission to discharge episode). The mean length of stay and the direct and indirect costs were also calculated for the same groups of patients who were hospitalized from September 2007 to September 2008 in the hospital's two Internal Medicine wards. We calculated the mean cost per daily stay and the mean cost per process (admission to discharge episode). It should be noted that an internal medicine ward (25 beds) is staffed by the following: two full-time (8 hours daily) consultant physicians, four full-time residents, charge nurse, three teams of three charge nurses working in eight-hour daily shifts, teams of two nursing assistants and a full-time secretary. In contrast, the QDU is staffed by a physician and a nurse and receives administrative support from two secretaries shared with other units.

A telephone survey based on a survey previously used and validated by our department was conducted in a random sample of patients three months after the QDU intervention. To respect privacy issues, all participants provided verbal consent over the telephone prior to the survey interview. Research ethics approval was obtained from our hospital. The survey consisted of 20 multiple-choice questions (four options) and evaluated the following aspects of the QDU: perception of the care process, degree of difficulty of travel to the unit, overall satisfaction, preferred care type in the future, and the conditions of the physical space. The survey was administered to 155 patients.

## RESULTS

One thousand patients with a median age of  $60 \pm 18.84$  years (range: 15 to 95 years) were evaluated. The sample included 447 men and 553 women. Over three quarters of the patients (84%) met the appropriateness criteria for QDU assessment according to the agreed-upon list of diseases. The remaining 16% either did not meet the established patient profile or did not have diseases suitable for QDU care and therefore could have been better treated by another type of care. In particular, these patients were judged to have a clinical situation that required either routine outpatient follow-up or hospitalization (e.g., active bleeding,

uncompensated heart failure, impaired general status, and mobility and social problems).

The main reasons for consultation are shown in Table 1. The primary referral sources were the emergency department (511 patients) and primary healthcare centers (471 patients). Waiting times for a first QDU visit ranged from 2 to 8 days (mean: 3.9 days) in patients referred from primary healthcare centers and from 0 to 4 days (mean: 2.1 days) in patients referred from the emergency department of our hospital.

The types and numbers of main complementary exams are shown in Table 2.

The first 1,000 visits generated 2,233 successive visits (ratio successive/first = 2.23).

The main diagnoses are shown by type in Table 3. The most frequent diagnosis was cancer (either epithelial or hematological) in 188 patients, representing 18.8% of diagnoses, and iron-deficiency anemia (unrelated to malignancy) in 180 patients (18%). The most common cancers were colon cancer and lymphomas, while the leading cause of iron-deficiency anemia was chronic gastrointestinal bleeding (74 cases; 7.4% of all 1,000 patients).

After the diagnostic study was completed, 616 patients were referred to primary health care centers, 356 were referred to outpatient clinics and 28 required hospitalization.

In our sample, the mean time to diagnosis was 9.2 ± 5.86 days (range: 1 to 19 days).

Taking into account previously used criteria, we estimated that 410 patients (41%) would have been candidates for conventional hospitalization (for diagnostic studies) before the QDU was established. Considering that the mean length of stay in the internal medicine department (50 beds) in 2009 for patients admitted for a diagnostic workup was 10.3 days, we estimated that 12.5 beds/day were made available over the course of a year (i.e., 4,563 bed-days were saved in a year). However, 45 of 1,000 patients (4.5%) required immediate or early hospitalization due to their bad health status, which impeded further QDU diagnosis.

Tables 4 and 5 show the mean costs per stay, per visit and per process for hospitalized and QDU patients, taking into account the above-mentioned groups. In hospitalized patients, the total mean cost per day of the hospital stay was 356.59 Euros, and the mean cost per process was 3,416.13 Euros. In contrast, the mean cost per process in the QDU was 735.65 Euros.

We received 85% compliance with the survey. The results highlighted three main findings: a) the overall satisfaction with QDU care was high in 95% of cases, b) repeated travel

**Table 1 - Main reasons for consultation.**

REASONS FOR CONSULTATION	N
ANEMIA *	275 (27.5%)
ANOREXIA-CACHEXIA SYNDROME **	231 (23.1%)
FEBRILE SYNDROME ***	122 (12.2%)
ADENOPATHIES	106 (10.6%)
ABDOMINAL PAIN	64 (6.4%)
CHRONIC DIARRHEA	54 (5.4%)
LUNG ABNORMALITIES	25 (2.5%)

\*Only patients with a hemoglobin level below 8 g/L were evaluated.

\*\*Unexplained anorexia, asthenia and loss of 10% or more of body weight during at least 6 weeks.

\*\*\*Febrile syndrome was defined as a fever of unknown origin with a temperature equal to or higher than 38°C for at least 2 weeks.

**Table 2 - Main complementary explorations.**

COMPLEMENTARY EXPLORATIONS	N
COMPUTED TOMOGRAPHY	258 (25.8%)
COLONOSCOPY	240 (24%)
UPPER ENDOSCOPY	192 (19.2%)
ABDOMINAL ECHOGRAPHY	153 (15.3%)
BONE MARROW ASPIRATION	80 (8.0%)
MAGNETIC RESONANCE	77 (7.7%)
ECHOGRAPHY-GUIDED NEEDLE ASPIRATION	45 (4.5%)
JEJUNOSCOPY	15 (1.5%)
FIBERBRONCHOSCOPY	14 (1.4%)
ECHO-ENDOSCOPY	10 (1.0%)
CAPSULE ENDOSCOPY	9 (0.9%)
ERCP*	3 (0.3%)

\*Endoscopic retrograde cholangiopancreatography.

to the hospital was not a major difficulty for the patients, and c) if further diagnostic tests were required, 80% of patients would prefer the QDU care model over conventional hospital admission. The same results were obtained analyzing only patients who had experience with hospital admissions. The remaining 20% did not indicate a preference for any one type of care.

**DISCUSSION**

Inappropriate hospitalization is a significant problem for publicly funded acute care hospitals. In recent years, due to the inadequacies of conventional outpatient services, hospital beds have increasingly been used for patients admitted for diagnostic tests for potentially severe diseases that are neither acute nor commonly require immediate treatment.<sup>10-11</sup> The filling of hospital beds with patients admitted for diagnostic testing is to the detriment of the acute care patients.

In Spain, some patients are hospitalized for several days awaiting diagnostic tests for the study of potentially severe diseases rather than being treated for their disease. This raises the issue of whether these patients could have been

**Table 3 - Main diagnoses of QDU patients.**

DIAGNOSIS	N
MALIGNANT NEOPLASM	188 (18.8%)
•Colon	51 (5.1%)
•Lymphoma	42 (4.2%)
•Gastric	23 (2.3%)
•Lung	16 (1.6%)
•Pancreas	16 (1.6%)
•Other hematological *	16 (1.6%)
•Breast	10 (1.0%)
•Ovary	8 (0.8%)
•UPM **	6 (0.6%)
IRON-DEFICIENCY ANEMIA	180 (18%)
•Digestive	74 (7.4%)
•Unknown cause	40 (4.0%)
•Heavy menstrual bleeding	33 (3.3%)
•Multifactorial anemia	33 (3.3%)
CHRONIC LIVER DISEASE	39 (3.9%)
ACUTE VIRAL ILLNESS	65 (6.5%)
REACTIVE ADENITIS	54 (5.4%)
MGUS ***	17 (1.7%)

\*Chronic lymphocytic leukemia, myelodysplastic syndrome and multiple myeloma.

\*\*Unknown primary-site malignancy.

\*\*\*Monoclonal gammopathy of unknown significance.

**Table 4 - Mean costs (Euros) of hospitalization.**

	Cost per day	Cost per process***
Staff *	260.94**	2,499.42
Complementary tests *	48.72	466.76
Stock *	14.91	142.83
Pharmacy *	0.83	7.95
Medical gases	0.01	0.07
Catering	14.49	138.79
Cleaning	8.57	82.08
Laundry	4.89	46.89
Maintenance	0.36	3.44
Communications	0.31	3.01
Mail	0.00	0.00
Depreciation	2.56	24.51
Total	356.59	3,416.13

\*Direct costs.

\*\*Salary of all the staff for a single stay of 12.5 patients.

\*\*\*Admission to discharge episode.

studied and diagnosed on an outpatient basis. Reports suggest that 9 to 17% of patients admitted to internal medicine units in Spain could be studied on an outpatient basis.<sup>13-15</sup> However, in this country's public health system, delays in outpatient diagnostic tests make a diagnosis outside conventional hospitalization unfeasible. Anorexia-cachexia syndrome and severe anemia are among the principal disorders for which patients are hospitalized to undergo diagnostic tests.<sup>14,16</sup>

QDUs are an under-reported alternative for the diagnostic study of patients with potentially severe diseases; this model allows coordinated, agile diagnostic procedures to be performed and often makes hospital admissions unnecessary. Importantly, these units increase patient comfort by allowing a high percentage of patients to remain at home during the diagnostic process. Thus, the new model may represent a shift in the paradigm of hospitalization for the evaluation of these patients.

Reasons for QDU consultation and final diagnoses are fairly homogenous among Spanish units,<sup>9-11</sup> allowing for the development of a profile of patients who could benefit from early QDU diagnosis.

In 88% of our patients, the reasons for consultation were anemia, anorexia-cachexia syndrome, febrile syndrome, adenopathies, abdominal pain, diarrhea and lung abnormalities. The most frequent diagnosis was cancer (18.8%),

**Table 5 - Mean costs (Euros) of a Quick Diagnosis Unit.**

	Cost per visit	Cost per process **
Staff *	58.79	205.78
Complementary tests *	144.06	504.22
Stock *	0.74	2.58
Pharmacy *	0.17	0.58
Laundry	0.00	0.00
Cleaning	4.28	14.99
Maintenance	0.18	0.63
Communications	0.19	0.68
Mail	0.00	0.00
Depreciation	0.26	0.93
Travel	1.5	5.25
Total	210.18	735.65

\*Direct costs.

\*\*Admission to discharge episode.

although most patients showed no clear signs or symptoms of cancer at the initial consultation, which suggests that non-specific but suspicious symptoms warrant early investigation.

Physicians in other Spanish QDUs have preferential arrangements with specialists (e.g., surgeons, oncologists, endoscopists and radiologists) to hasten diagnostic studies and gain access to a hospital's diagnostic infrastructure (e.g., radiology, operating rooms and pathology laboratories). The chief task of QDU physicians is to reach a rapid diagnosis by analyzing patients' symptoms and signs, aided by the results of protocol-based diagnostic tests (e.g., endoscopies and CT scans), which are mainly performed and reported on by other hospital specialists. In these QDUs, the head physician, nurses and specialists performing diagnostic tests are permanent staff members with fixed salaries, which is unlike hospital staff in countries where salaries are based on the number of patients evaluated and interventions performed.

QDUs appear to be cost-saving. In a study of the Granollers Hospital QDU,<sup>11</sup> the mean cost per patient was up to eight times less expensive than conventional hospitalization; in addition, hospitalization for diagnostic tests was avoided in 45% of patients, representing the yearly freeing of seven internal medicine beds per day (according to the mean length of stay for internal medicine patients during the study period).

In our study, avoiding hospital admission in 41% of evaluated patients resulted in the permanent release of 12.5 internal medicine beds/day over the course of a year and produced a significant reduction in hospital costs. If these patients had been hospitalized, additional internal medicine beds would have been required. However, the striking cost difference between QDU and hospitalized patients (Euros 735.65 vs. 3,416.13) was due largely to differences in staffing and working hours and, to a lesser degree, to other intrinsic necessities of hospitalization (e.g., catering) (see Tables 4 and 5).

In QDUs, it is essential to establish prioritization criteria for diagnostic tests, which should have at least the same priority as those used for hospitalized patients. Priority access to radiological services allows some tests to be performed *in situ* (e.g., simple X-ray, echography and FNPA guided by echography) and allows for the possibility of a CT scan within 1 to 2 weeks through fluid, ongoing dialogue. Likewise, access to rapid digestive endoscopy and lymph node biopsy is vital in diagnosing the most prevalent types of cancer, including digestive cancers and lymphomas. Reports have shown that QDUs are not successful when there is no priority access to these types of tests within a reasonable amount of time.<sup>10,11</sup> QDUs with adequate nursing support can also perform laboratory tests during the initial visit.

The QDU model has some limitations. Using QDU resources for diagnosing mild disorders may delay the diagnosis of severe diseases. Therefore, referral criteria should be clearly agreed upon to avoid overburdening the system. Likewise, although we followed previously approved guidelines, QDU physicians may prescribe too many diagnostic tests while searching for severe diseases that the patient is unlikely to have, especially if the provisional diagnosis on referral to the QDU is incorrect.<sup>1</sup> This drawback can be minimized by implementing standardized QDU diagnostic protocols and guidelines.

Current regular referral processes in Spain are long for diagnosis and specialized care in primary care settings,

especially waiting times for diagnostic procedures,<sup>17</sup> and primary care physicians and patients often voluntarily use the “shortcut” of hospital emergency units.

The key to QDU success is prioritization of specialized consultation and diagnostic tests. Our results have already resulted in policy changes; patients are increasingly being referred directly from the emergency department or primary health care centers to the QDU in lieu of hospitalization, producing savings in hospital beds and costs. The logical ultimate goal would be direct referral from primary health care centers to the QDU without patients being seen at emergency units.

While referral to specialized outpatient care and emergency units may result in dangerous bottlenecks, the general introduction of QDUs should not merely shift the bottlenecks. This goal could be ensured by patient and physician education highlighting the specific QDU referral criteria.

The QDU model could be useful in countries such as the UK, Italy and Canada, as well as in countries in Latin America, where primary health care centers face overcrowding, long waiting lists and suboptimal coordination between primary care and hospital care that mean that patients with suspected severe diseases, including those who are actually in good health, are hospitalized for diagnostic tests, thus aggravating overcrowding and increasing costs.<sup>1</sup> In 2001, 28% of hospital admissions in a public British hospital were inappropriate; the most common reason for an admission being deemed inappropriate was if the diagnostic tests or treatment provided could have been performed in an outpatient setting.<sup>18,19</sup>

There are wide variations in how and where (in-hospital *vs.* outpatient or primary care) patients with potentially severe diseases, such as those seen in QDUs, are managed in different countries. Although there are few reports on this topic,<sup>20,21</sup> these variations might be due to differing guidelines for invasive diagnostic procedures and departmental and hospital traditions.

Costs are much more controlled in private insurance systems than in most public ones. Only a lack of ethics can lead to an increase in costs with no benefit for the patient. Thus, it may be argued that in countries with mainly private health care systems, QDUs created to reduce healthcare costs or free hospital beds might not make as much sense. However, the healthcare cost crisis in the US, which has a largely private system, suggests that QDUs might have a role in a largely privatized system. Indeed, someone clearly pays in these countries, and cost control/reduction would also presumably be needed. Importantly, one of the purported benefits of QDUs is quick diagnosis, the value of which will be captured by better health outcomes rather than just a reduction in hospitalization costs incurred during diagnosis.

The lack of a comparison population, with the exception of the cost analysis, constituted the main limitation of our study. However, in our opinion, the strength of our study as experience is maintained.

A future randomized study design involving a comparison between controls and intervention groups would help elucidate QDU usefulness as an alternative to conventional hospitalization practices.

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