Patient Safety-Related Good Practice Indicators

Results of a good practice indicator measurement taken on a sample of Spanish NHS hospitals

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(Pending review)

Contents

1. Executive Summary 7
1.1. Methodology 7
1.2. Detailed results for each recommendation and indicator 11
GROUP 1: Create a safety culture 11
GROUP 2: Adapt department capacity to patient needs 11
GROUP 3: Facilitate a proper conveyance of information and a clear understanding 12
GROUP 4: Improve safety in specific situations 13
GROUP 5: Improve safety in the use of drugs 15
1.3. Overall outcomes of the recommendations 17

1. Executive Summary

Based on the field work carried out throughout 2007, a description is provided in this report of the findings regarding the degree to which the National Quality Forum recommendations for improving patient safety are being implemented according to the indicators prepared and measured for this study.

With the exception of "Creating a Safety Culture" regarding which a report has been drafted in a separate document, including the findings concerning the twelve dimensions comprising patient safety, each recommendation is related to structure and process (in most cases) or solely to structure or solely process. The basis used for constructing the indicators we have measured is the document "Safe Practices for Better Health Care" written by the U.S. National Quality Forum (NQF, Washington 2003) in which a working group with wide-ranging scientific and institutional participation summarizes the high-priority practices to be implemented on the basis of the currently-existing evidence as to the patient safety-related effectiveness thereof and their potential for being implemented throughout the system.

This document presents the findings of the current status study conducted. Individualized reports have been made in separate documents for each one of the hospitals which were included in the study, as well as the methodology for constructing and validating the indicators. The measurement of the indicators constructed and validated provides information on the current status of the hospitals in regard to the degree to which the patient safety-related good practices proposed by the NQF are being implemented, which can serve as a basis for setting priorities concerning strategies for improvement and subsequently verifying the success of the interventions which are implemented.

1.1. Methodology

This project has been carried out in 3 stages:

(1) Constructing the indicators in adaptation of the recommendations set out in the NQF document and designing the pertinent measurement tools and strategies.

(2) Pilot testing the measurement tools and strategies, evaluating the reliability of the indicators, preparing their final version and the manual on methodological recommendations concerning measurement strategies for their routine use in the internal management of the patient safety improvement.

(3) Study of the current situation on a representative sample of the Spanish NHS hospital.

The results of stages (1) and (2) are accessible on the Ministry of Health and Social Policy website. The summary of the findings of the measurement of the indicators for the entire Spanish NHS as a whole and by groups of hospitals, by hospital size, is presented in this report prepared employing the following methodology.

1. Set of indicators. A total of 68 indicators (69, if safety culture is included) have been employed, 39 of which are structure indicators and 29 process indicators, 10 being combined indicators.

2. Measurement strategies. To facilitate the measurement process and the use of the indicators as troubleshooting tools, the following strategies were designed:

(1) Using LQAS for the indicators measuring with a sample of recorded data, such as medical records and X-rays.

(2) Constructing combined indicators for those highly relevant recommendations and indicators which include the evaluation of several aspects (preventing surgical ward infection, central venous catheter-related infection, abbreviations on prescriptions, etc.). Thus, it was possible to summarize the different aspects evaluated into one single number.

(3) Screening for inspection in the different environments (pharmacy department, floor medicine cabinet, emergency first-aid cabinet, surgical theater medicine cabinet, etc.) for those drugs which are representative of the different types of defects which might be found in their storage and preservation (concentration, labeling, refrigeration, storage under lock and key, etc.) Therefore, not only is the entire medicine cabinet evaluated, but those drugs which have been selected.

(4) Combining, whenever possible, both structure and process indicators for one some recommendation.

(5) Risk focus for the LQAS samples for the purpose of taking best advantage of the entire initial sample and minimize substitution. For example, people over age 65 for pressure ulcer prevention, specific interventions in which chemoprophylaxis is indicated for evaluating chemoprophylaxis; intensive care patients for evaluating the prevention of malnutrition, etc.

3. Sample of hospitals. The sample of hospitals used is that same as that which was used for the nationwide study on hospitalization-linked adverse effects. The sample, by conglomerates, layered by groups of hospitals grouped by size and their resulting contribution to the total number of hospital releases in the NHS, initially including 24 hospitals: 5 large-sized hospitals (over 500 beds), 13 medium-sized hospitals (200-500 beds) and 6 small-sized hospitals (less than 200 beds). One hospital in the large-sized hospital group and another in the medium-sized hospital group decided not to take part in the study and were replaced. At another two in the mediums-sized hospital group and at one of the small-sized hospitals, the study could not be conducted. One of the large-sized hospitals did not conduct the survey. The final sample was comprised of 22 hospitals: 6 large-sized hospitals (one of which provided solely the data from the survey in lieu of the survey which was not conducted), 11 medium-sized hospitals and 5 small-sized hospitals.

*4. Data collection***.** Given the diversity of the type of indicators which are included, this is actually a matter of four studies with methodologies which differ in terms of the type of indicators to be evaluated.

4.1. Indicators to be measured by way of a survey. These indicators are included in the safety climate-related survey. The methodology for the distribution and analysis of the results is explained in detail in the report on the survey.

4.2. Indicators to be measured by means of auditing, inspection or interviewing. The data was collected in keeping with the verification tools designed for the study (described in the document devoted to the Indicator Construction and Validation).

4.3. Indicators to be measured by means of reviewing medical records. Employing the LQAS methodology, random samples were taken from 17 medical records for each indicator, using the hospitals' MBDS printouts as the realm for the diagnoses and conditions pertinent to each indicator, so that the results could be interpreted with this methodology for each individual hospital in particular. With the resulting sample, we assured ourselves of an accuracy of +/- 0.05 or greater (in other words, a smaller confidence interval) in the nationwide estimates, in addition to being able to have classified the hospitals evaluated individually as to whether or not they were particularly problematical by employing the LQAS methodology for a standard of compliance for each indicator which we hope to be 85% for those not considered problematical, a 55% threshold, a 0.05 alpha error and a 0.9 power.

4.4. Indicators for measuring by means of supervision/observation. Preparing the verification protocols by means of concurrent observation and evaluation, the application and resulting measurement of the associated indicators of which has only been possible for some thereof (verification of the handwashing technique, compliance with maximum barriers on inserting central venous catheters) at those hospitals where we were able to rely upon the active collaboration of the supervising nursing personnel or the quality coordination of the hospital proper.

5. Results analysis. All of the results of the indicators are described and discussed according to the recommendation to which they are related and in relation to the overall evaluations for each hospital, group and Health System. In general, for the structure indicators (existence of standards and protocols, presence of a pharmacist, prescription validation procedure, normothermia maintenance procedure, unit dosages, handwashing infrastructure, etc.), a detailed description is provided of the variability of the different options encountered both overall and within each group of hospitals. In the case of the sample-measured indicators, whether medical records or another type of documents (i.e. X-rays) and study units (i.e. drug cabinets, emergency carts), the percentage of compliance or noncompliance in question has been calculated for each indicator and its respective 95% confidence intervals. For this purpose, the appropriate equations for sampling by two-stage, layered conglomerates were used, in which the first stage is the sampling of hospitals (conglomerates) into the three groups (layers) considered (large, medium-sized and small hospitals), the second stage being a non-proportional, systematic, random sampling (set number of cases) per hospital, at the hospitals included in the study. For conducting a more thorough analysis by type of defect, in those indicators summarized as defect percentages, a supplementary calculation was made for summarizing the percentage according to the type of defect. In the survey-measured indicators, a adjustment was made for non-response bias potential according to the "profession" and "hospital size" variables and in relation to the categories "unprompted response" and "prompted response". For the analysis of the safety culture and the twelve dimensions included therein, a description is given of the percentage of positive responses for each one of the dimensions, by hospital, pointing out the hospital's ranking in relation to all of the other hospital, the median and the 25th and 75th percentiles of all of the hospitals surveyed.

1.2. Detailed results for each recommendation and indicator

GROUP 1: Create a safety culture

The average score awarded to the level of safety on the Unit or in the Department of the hospitals surveyed is 7.08. Within the relative homogeneity found in the evaluation of all the hospitals, there are appreciable differences among them, with values ranging from 5.95 to 7.6. The greatest differences are among the small-sized hospitals, three of which are below the 25th percentile, while there is one which has the highest perception of all the hospitals. The most homogeneous values among hospitals are found among the group of large-sized hospitals.

The results by dimensions show a considerable degree of variability among hospitals, most likely revealing the unique individual aspects of each one of these hospitals in the aspects being measured. The dimensions showing the greatest range of values are, in this order, “Hospital Administration Support of Patient Safety” (minimal percentage of positive answers: 10.0; maximum: 66.5), “Teamwork Among Units/Departments” (minimum: 25.8; maximum: 72.7) and “Staffing” (minimum: 19.9; maximum: 65.6). The three dimensions showing the greatest range of values are also those showing a lower average of positive responses and would therefore be the most problematical for a suitable safety culture in the NHS. These are, in order from lowest to highest percentage of positive responses, “Hospital Administration Support of Patient Safety” (average 26.4% positive responses), “Staffing” (29.4% positive responses) and “Teamwork Among Units/Departments” (43.2% positive responses). On the contrary, the least problematics, although without going so far as to be strong points of an overall nature are “Intra-unit Teamwork” (average 71.8% positive responses), “Administration-Supervisory Patient Safety-Promoting Measures” (61.3%) and “Organizational Learning/Continuing Improvement” (54.8%). As will be noted, all three are related to the internal functioning of the departments. There are only two dimensions which are identified as strong points at any hospital. Specifically, the “Intra-unit Teamwork” dimension reveals itself as being a strong point at three hospitals and “Administration/Supervisory Patient Safety-Promoting Measures” at one.

GROUP 2: Adapt department capacity to patient needs

This group takes in indicators in regard to recommendations on the staffing of nurses and the involvement of the pharmacist in the prescription, dispensing and drug administration processes.

In regard to nursing, most of the hospitals do not have explicit, reasoned standards concerning this matter at all the hospitals as a whole and also within each group. Even fewer have made an effort to gauge the workloads involved by specific types of patients for whom they provide care, a premise of interest for precisely basing the necessary staffing of this type of personnel.

In regard to Pharmacy’s involvement in the drug prescription, dispensing and administration processes, the partial availability of the pharmacist seems to be the norm at the large majority of hospitals. This circumstance may be relatively justifiable at small hospitals, the high frequency rate at large and medium-sized hospitals however being surprising.

The protocolizing of the detection, recording and reporting of medication errors is in place at a considerable number of hospitals, but the majority still as yet do not have an explicit, standardized mechanism established for this major safety-related problem. The data with regard to the regular prescription validation process also varies greatly. The prescriptions validated less frequently are the nighttime ones and those which are written on weekends. Nevertheless, the absence of any validation record at most hospitals particularly calls one's attention.

GROUP 3: Facilitate a proper conveyance of information and a clear understanding

The communications breakdowns among the different departments and professionals involved in providing care and with the patients for whom care is being provided leads to essential information possibly lacking for the diagnosis and treatment decision-making processes and the basis for errors and duplicated tests and scans. Some particularly well-documented aspects of these breakdowns in communication and their repercussion on safety are the use of certain initials and abbreviations on prescriptions, the need of using at least two identifiers on the tests and scans, and the confusion to which mumbled verbal orders can lead when they are not repeated speaking clearly to assure they are being understood and/or are not put into writing.

The degree of protocolization we have found concerning all of these aspects is, nearly generally throughout, quite deficient. Only a minority of the hospitals in any of the groups have set standards concerning these matters, although this is so relatively more often among the large hospitals.

The results as regards process indicators also show some homogeneously low levels of correct measures, with some generally insignificant differences in favor of the large hospitals. Special mention may be made of the following results:

- The repetition of verbal orders speaking clearly by the person being given the orders in question (a standard way of assuring comprehension) is carried out very infrequently at all hospitals (around 15% of those surveyed answered "always"), verbal orders also being relatively frequent in regard to high-risk medications such as chemotherapy drugs.

- Error-free prescriptions as regards the use of abbreviations, symbols or phrases related to medication errors are not very frequent at all of the hospitals surveyed. The large majority (around 90%) have some type of flaw which may be related to error, confusing abbreviations for dosages, routes and administering frequency being the type of defect most often encountered.

- Solely around 40% of the professionals surveyed answered that they always take the precaution of reviewing all of the medication the patient is taking on filling new prescriptions.

- Only a third of those surveyed answered that they never make any record without having the data in front of them.

- The frequency with which the professionals make certain that the informed consent has been well-understood and look into finding out about terminal patients' preferences is really low. Although the percentage of those who answered positively is slightly higher in the large hospitals, the average is 10%-15%.

- The precaution of using two identifiers on envelope and on the X-ray document it contains ("fault-free" documents according to the indicator we have used) averages near 50% of the documents evaluated, meaning that in approximately half of the cases, the probability of erroneously classifying the documents does exist. The item of data which is most lacking is the second numerical identifier (medical record or health card). Discrepancies have been found between the name stated on the envelope and the name on the X-ray in 2% of the X-ray documents evaluated at the medium-sized hospitals (an average of 0.7% for the NHS).

GROUP 4: Improve safety in specific situations

This group of recommendations includes those related to specific clinical processes especially well-known due to their relationship with preventable adverse effects.

The degree of standardization/protocolization in relation to these processes varies greatly despite the importance of the matters involved and the degree of scientific evidence currently existing with regard thereto. For none of the recommendations have we found any protocols for taking action at any of the hospitals. Those most often in place are those related to washing/disinfecting hands (18 of the 20 hospitals at which we collected protocols), pressure ulcer prevention (at 15 hospitals), antibiotic prophylaxis for preventing surgical wound infection (at 15 hospitals), surgical prepping of skin and mucous linings (at 15 hospitals, although only 5 including shaving body hair, which is a recommended procedure), and prevention of CVC-related infections (at 14 hospitals. Three of the ten recommendations of this group stand out for the very minor degree to which they are protocolized at the hospitals evaluated: prevention of malnutrition, influenza vaccine injections for healthcare personnel and prevention of injuries associated with ischemia cuff use (Table 4.8). The total lack of standardization is not at just any one type of hospital in particular, defects having been found - even for the processes most often protocolized – at hospitals in all three of the groups.

Nor is compliance sufficient with regard to the process indicators, as a result of which the probability of the onset of adverse effects necessarily continues to be high for most thereof and are, practically without exception, first-order opportunities for improvement. The findings can be summarized as follows:

- The explicit evaluation of the risk of pressure ulcers is made only solely for an average of one third of the patients (more often at small hospitals, where this figure is up to 50%), with the added detail that this is an indicator which we have evaluated in patients over 65 years of age, in whom it would be especially important to have made this assessment.

- The explicit evaluation of the risk of TVP and TEP is a minority occurrence at our hospitals. The average is around 5%, and in the group of large hospitals where we have found this assessment to be made more often, averaging solely slightly over 10%.

- The assessment of the patient to properly adjust the dosage of heparin (weight for all types of heparin, weight and renal function for low molecular weight heparin) is made on an average of less than 20% of the patients on heparin (somewhat more often in large hospitals). The most frequent fault is that of not assessing the weight (70%-75% of the cases).

- The most frequent fault in compliance with what are known as maximum barriers when inserting CVCs is failing to wear a cap (nearly 40% of the cases), followed a great distance by not wearing a sterile coat or mask. A somewhat better situation (averaging around 60% fault-free) was found on evaluating CVC care. The most frequent fault in this case is there being no clamping on the CVC lights not in use, which were protected solely with a cap.

- The measures for preventing surgical wound infection, one of the most frequent adverse effects in healthcare, revealed many different faults of major importance.

- The suitability of the antibiotic prophylaxis, assessed on a sample of cases in which the same is indicated, is fulfilled on an average of in 50% of the cases (70% at large hospitals, 25% at the small hospitals). The most frequent fault is that of an inappropriate antibiotic being prescribed, followed by a likewise inappropriate duration or administering time.

- No monitoring is done of the temperature to check to ensure that normothermia is maintained (assessed in interventions lasting more than two hours) at 15 of the 21 hospitals studied.

- The proper intraoperatory oxygen supplement (FiO2 80%) in longer interventions (> 2hours) under general anesthesia is a highly infrequent practice. We did not find this to be done at any medium-sized or small hospital and solely in 1% of the patients evaluated at the large hospitals.

- The risk of contrast nephropathy (creatinine level) is assessed on the average in somewhat over 65% of the patients undergoing tests with iodide contrasts. The higher degrees of compliance for this indicator (around 75%) are at the large hospitals, the lowest (around 55%) being at the medium-sized hospitals. However, the documented setting out of a prevention plan in those patients who would be in need thereof is apparently less frequent than the assessment per se.

- The risk of malnutrition (evaluated on a sample of ICU patients) is not explicitly assessed routinely at our hospitals. Approximately one third of the patients for whom we have looked for this item of data were already on artificial nutrition, but in none of them did we find any explicit calculation or check of their calorie-protein requirements on their medical record.

- Only a small minority (less than 5% of the patients with an ischemia cuff in place) undergo any explicit check and record of the pressure and inflating time. This problem is similar at the three groups of hospitals, and the main fault is that no pressure monitoring is done (more than 90% of the cases with fault). In 25% of the interventions, neither the pressure nor the time is monitored.

- In regard to handwashing, there is a protocol in place at most of the hospitals regarding this procedure, there also being a relative majority (12 of 21) hospitals which have scheduled some continuing training course on this subject during the past year. We found some occasional faults in the infrastructure for performing the washing/disinfecting correctly (no disposable towels at two hospitals, and no soap or antiseptic solution on the floor at five hospitals). The hydro-alcohol solution was in place in practically all of the hospitals. Full compliance with the washing protocol is a voluntarily measured indicator by means of

observation on the part of the hospitals, and we obtained data solely from one large hospital, five medium-sized hospital and from two small hospitals. This data, furnished by the hospitals proper, indicate that the contacts in which proper procedure is performed barely total 30%. The most frequent type of fault (60%-90%, according to the hospitals in question) is the washing procedure, following by a considerable percentage of professionals (12%-15%) who do not wash before touching the patient and a similar percentage who wash neither before or after contacts in which this would be indicated.

- Lastly, special mention must also be made of the low prevalence of influenza vaccine injections among the personnel at our hospitals (totaling barely 40% of the professionals). This deficiency is quite similar among the three groups of hospitals.

GROUP 5: Improve safety in the use of drugs

Medication-related adverse effect are the most frequent safety problem in hospitalized patients, preferential attention having therefore been placed thereon and a number of measures identified which are effective for preventing their onset, including the recommendations set out in this group. Many of these recommendations are related to setting rules and structural barriers around the preparation, labeling, storing and administering of medication in order to reduce the probability of error. The indicators we have measured include checking to see if this type of rules exist and on the resulting situation in terms of the implementation of the circumstances favoring the safe use of mediations. In short, we found the following:

- There is very little standardization with regard to mediations which are high-alert medications or entail of high risk of adverse effects (anticoagulants, concentrated electrolytes, insulin, chemotherapy). At no hospital did we find any explicit labeling and special storage standards for this type of mediations.

- There is also frankly room for improvement as regards the attention given to antidotes. A total of 18 of the 21 hospitals do not have a list of antidotes including the minimum of expected characteristics (location, minimum stocks, expiration date control checks). The most frequent faults, apart from the list per se, are there being no specified minimum stocks which must be available, nor of the mechanisms for controlling their expiration. It is not infrequent that they not have a specific location, but rather are mixed in with all the other medications.

- Nor is there any protocolizing either at most of the hospitals (except at the large hospitals) as regards the mechanism for the upkeep and maintenance of the medicine cabinets at the nursing stations on the floors. What is most often lacking are those related to the stock of medications, the restocking system and the preservation of photosensitive medications.

- At 11 of the hospitals (all of which were medium-sized and small hospitals), there were no explicit set standards for the storage, preservation and restocking of the medication in the Pharmacy Department.

- At 8 of the hospitals (including one large hospital), they had no explicitly set procedure for the maintenance of the emergency carts.

The areas in which medications are prepared in the Pharmacy Department were generally found to be clean, orderly and well-lighted. In a few cases, however, background noise (i.e. a radio) was allowed, there was a certain degree of disorderliness (i.e. empty boxes, large bottles or some similar element lying around on the floor) or the lighting did not seem adequate. All of these circumstance can favor errors being made. Anyhow, the most important faults we found, due to their potential for increasing the probability of errors, are as follows:

- In the upkeep of the medicine cabinets, the % of faults out of the total number of possible faults neared 40%. There are no significant differences by size of hospital. The most frequent fault is related to the labeling of the mediations, particularly high-risk medications, such as CIK, which is found in the medicine cabinets without any warning as to caution in its use in 90% of the cases. It is also frequent to find morphine without being kept under lock and key (13 of the 21 surgical medicine cabinets, at the 21 hospitals evaluated), that the different morphine concentrates are not kept separately from one another, and the presence of expired medications (up to 15% of them at the large hospitals).

- We did not find any emergency cart to be properly kept up. The most frequent faults are insufficient stocking (12%-15% of the medications) and the presence of expired medications (3%-17%). The large hospitals have a lower percentage of faults than the others.

- The percentage of faults found in the preservation and maintenance of the medications in the Pharmacy Department is lower than in the medicine cabinets or the emergency carts, but is still of major importance. The average is around 10% of the possible faults, there being little difference among the three groups of hospitals. These faults are particularly frequent in regard to the antidotes, presence of expired medications and separation of concentrates. Photosensitive medications not being sheltered from the light and morphine not being kept under lock and key are, although not very frequent, also faults which are occasionally found in the Pharmacy Departments at our hospitals.

- There is also great room for improvement in the system for labeling medications prepared in the Pharmacy Departments. We found faults in 53 of the 63 labels evaluated, with an average of 30.8% of faults out of the total number possible, affecting practically in the same manner the four types of labels evaluated (Master Formulas, Parentheral Nutriition, I.V. Mixtures, Cytostatics) and in the three groups of hospitals. Outstanding in a negative sense are the labels for the Master Formulas in the three groups of hospitals and those of the cytostatic agents at the medium-sized and small hospital. The most frequent type of fault is there being no medical record number stated for the patient for whom the medication is prepared, followed by the batch number, the bed, the Department/Unit, the administration route and the date on which prepared.

- On the positive side, outstanding is the implementation, according to the data from the hospitals proper not always checked against documents, of the dispensing in unit dosages, with an estimated average of 73.5% of the beds.

1.3. Overall outcomes of the recommendations

The general situation, according to the overall evaluation we have been able to make with regard to the degree of implementation of the recommendations as a whole, reveals a large majority of them (69.6%) with major deficiencies and solely around 10% for which compliance is acceptable. There are no major differences among the three groups of hospital, although the situation with regard to the % of recommendations being correctly implemented is slightly lower in the small hospitals, and the overall degree of noncompliance somewhat higher in the group comprised of the medium-sized hospitals.

Within the overall panorama of abundance of opportunities for improvement which may explain, for the most part, the incidence of adverse effects in the care provided at our hospitals, the greatest degrees of noncompliance are found in the group of recommendations related to facilitating the conveying of information and clarity of understanding, followed by the group on safety in the use of medications, and the good practices in specific environments for specific care processes.

Similarly, within the relative homogeneity existing at the hospitals in each group and the overall panorama of there being a large majority of recommendations subject to interventions for improvement, a certain degree of variability does exist, and there are some hospitals which stand out over all in either a positive or negative sense.