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HARM SCORE AND ITS ROLE IN MEASURING THE QUALITY OF COLORECTAL CANCER SURGERIES.

Surgery

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ABSTRACT

Background: Various Scoring system are there to measure the quality of life after any surgery .One such system is HARM Score(Hospital stay, Readmission, and Mortality) .

MATERIALS AND METHODS: Scores are assigned to individual patients based on the length of hospital stay, any re-admission for complications, and hospital mortality.. Scores thus obtained are correlated with the observed complication rates obtained from patient follow up.

Results: A total of 84 colectomy patients from our hospital were evaluated - The hospital-level mean HARM score was 3.6667 (SD=0.70) for emergent and 4.77 (SD = 0.67) for elective cases. Spearman's correlation coefficients for the mean hospital-level HARM score and the complication rate were 0.62 (P < 0.01) for emergent cases (significant) and 0.09 (p value=0.483) for elective cases (not significant). The complication rates for patients correlated well with respective HARM Scores i.e. patients with higher HARM Scores had higher complication rates and those with lower Score had less number of complications only in case of patients with emergent mode of admission (Spearman's Correlation Coefficient = 0.62, P Value< 0.01

CONCLUSIONS: HARM Score values correlate well with the complication rates both for elective and emergent cases. However only in the emergent group the correlation is statistically significant. Therefore, using the HARM score may decrease the cost and administrative burden of quality measurement while providing actionable signals for improvement.

KEYWORDS

INTRODUCTION

The incidence of colorectal cancer in our part of the world is quite high. There is an ever increasing demand about improvement in the quality of surgical care including colorectal cancer surgeries. Many scoring systems for measurement of surgical quality care have thus come into vogue. Most of such scoring systems usually involve extensive variables, are time consuming, tedious to use, require extensive manpower and good financial support .One simple scoring system measuring quality in colorectal cancer surgeries is the HARM Score(**H**ospital stay, **R**eadmission, and **M**ortality) developed and introduced in the United States by Keller, D.S.[1] It is based on variables that are easy to obtain from routine administrative data. Scores are assigned to individual patients based on the length of hospital stay, any re-admission for complications, and hospital mortality. Scores are obtained separately for elective and emergent cases. Scores thus obtained are correlated with the observed complication rates obtained from patient follow up. Patients with higher complication rates have higher HARM score.

The HARM Score has a robust statistical significance in measuring the quality of colorectal cancer surgeries being performed in any hospital. It serves as a surrogate marker for the complications of the surgeries performed and hence reflects the quality of surgical care provided. We decided to test the validity of this score in our centre by adopting the same criteria as mentioned during the time of development of the original score by Keller D S et al.

Ours is a tertiary care teaching hospital which serves as a referral centre for operative procedures on colorectal cancer. Our hospital is a high volume centre for colorectal procedures and has got a dedicated Colorectal unit for such procedures, besides full-fledged support is being provided by allied departments like Surgical Oncology and Surgical Gastroenterology that also deal with such patients on a regular basis.

MATERIALS AND METHODS

The present study was conducted in the Department of General and Minimally Invasive Surgery and allied surgical departments-Surgical Oncology, and Surgical Gastroenterology, Sher-I-Kashmir Institute of Medical Sciences, Soura, Srinagar, J&K, and India prospectively for a period of two years.

AIMS OF THE STUDY

1. To assess the validity of HARM Score in measuring the quality of colorectal cancer surgeries in our clinical settings.
2. To understand the differences of its applications in emergency and elective sub settings of colorectal cancer surgeries

INCLUSION CRITERIA

All patients, of both sexes who underwent a transabdominal procedure (open or laparoscopic) for colorectal cancer were included in the study.

EXCLUSION CRITERIA:

1. Patients aged less than 18 years were excluded.
2. Patients undergoing perineal and local trans anal excisions were excluded.

Patients meeting the inclusion criteria were followed for the development of any complications post-operatively, number of days of hospital stays, readmissions and deaths if any in hospital. Elective and emergent cases were followed separately.

For each discharge, a HARM score was calculated (0–10 scale) on the basis of admission source (emergent vs elective), Length of Stay (LOS), discharge status (expired or alive), and 30-day readmission.

The categorical variables - discharge status and readmission were defined as deceased/alive and yes/no, respectively.

For each class, the HARM score was calculated using the following formula:

HARM = LOS category (0–5) + Discharge status (0/1) × 5 + Re-Admission (0/1)

LOS was categorized into 6 categories on the basis of a normal distribution curve (Table 1).

TABLE 1: Hospital LOS Categories by Admission Type

Los Category	Emerygency Stay In Days	Elective Stay In Days
0	1-5	1-3
1	6-8	4
2	9-10	5
3	11-13	6
4	14-19	7-8
5	20+	9+

Discharge status : Dead = 1 ; Alive =0
Re-admission : Yes = 1; No = 0

If deceased, the re-admission was taken out of equation.

Individual HARM scores were calculated by averaging all discharge scores at the hospital level. Spearman correlation coefficients between the hospital-level complication rate and HARM scores were used for validation.

The data so obtained was analyzed as per standard statistical methods.

RESULTS

A total of 84 colectomy discharges from our hospital were evaluated - 75% cases were elective and 25% were emergent.

The hospital-level mean HARM score was 3.6667 (SD=0.70) for emergent and 4.77 (SD = 0.67) for elective cases.

Spearman's correlation coefficients for the mean hospital-level HARM score and the complication rate were 0.62 (P < 0.01) for emergent cases (significant) and 0.09 (p value=0.483) for elective cases (not significant).

The hospital level mean HARM Score was higher for elective as compared to emergent cases. (4.77 for elective Vs 3.667 for emergent cases).

The overall complication rate was 1.18%(Standard deviation=0.01) for patients with elective admission whereas the value of the same variable was 4.54% (Standard deviation= 0.06) for patients with emergent mode of admission.

The complication rates for patients correlated well with respective HARM Scores i.e. patients with higher HARM Scores had higher complication rates and those with lower Score had less number of complications only in case of patients with emergent mode of admission (Spearman's Correlation Coefficient = 0.62, P Value< 0.01). The complication rates did not correlate well with the HARM Score in case of patients with elective mode of admission (Spearman's Correlation Coefficient = 0.090, P = 0.483).

Majority of the patients were males comprising about 58% of the total. The age range varied between 19-78 years with a mean age of 54.6 years. Maximum number of patients were between 51 and 60 years of age. Only 33% of the study population had a positive history of smoking. Bleeding per rectum was the most common presenting complaint, followed closely by abdominal pain and intestinal obstruction.

Table 2 shows the overall HARM score and the overall complication rates.

Group Statistics					
	ADMISSION	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
HARM Score	ELECTIVE	63	4.7778	.70584	.08893
	EMERGENT	21	3.6667	1.55991	.34040
Compl rate	ELECTIVE	63	.0118	.01534	.00193
	EMERGENT	21	.0454	.06646	.01450

TABLE 2: Overall HARM Score Vs Overall Complication Rates

The complication rates for HARM Score values < 2, 3-5, 6-8 were 1.0 %, 1.17%, 1.58% for elective cases and 0.8%, 4.32%, and 10.71% for emergent cases respectively.

P value was 0.6 (not significant) for elective cases whereas the value was <0.05 (significant) for emergent cases.

Post-operative 30 day mortality was zero percent where as 90 day mortality was 6%.

Re-admission rate was 13.09%. It was 5/63 = 7.9% for elective cases and 4/21 = 19.04 % for emergency cases respectively.

Overall average length of hospital stay was 12.80 days (range= 5-37 days). Average length of stay for elective cases was 12 days while the same was 16 days for emergent cases.

Average pre-operative hospital length of stay was 4 days (range= 1 to 7 days) for elective patients whereas the same was usually < 1 day for emergent cases.

Average postoperative length of stay was 8 days (range 5 to 18 days) in elective cases, whereas the same figure was 15 days for emergent cases (range 6 to 20 days).

Table 3 reveals the overall and individual elective and emergency complication list.

Complication	**Overall**	**Elective**	**Emergent**
Infection	20 (23.8%)	14 (22.2)	6 (28.5%)
Hemorrhage	1 (1.1%)	0 (0 %)	1 (4.7%)
Hematoma	6(7.1%)	5 (7.9%)	1 (4.7%)
Anesthetic Reactions	0 (0%)	0 (0%)	0 (0%)
Wound Dehiscence	2 (2.3%)	0 (0%)	2(9.5%)
Peritonitis	2 (2.3%)	1 (1.5%)	1 (4.7%)
Ileus	5 (5.9%)	4 (6.3%)	1 (4.7%)
Enteric Fistula	2 (2.3%)	1 (1.5%)	1 (4.7%)
Wound Infection	10 (11.9%)	6 (9.5%)	4 (19.04%)
Thrombotic Complications	0 (0%)	0 (0%)	0 (0%)
Blood Transfusion	19 (22.69%)	16 (25.3%)	3 (14.2%)

TABLE 3: Over all complications – Elective and Emergent

DISCUSSION:

Quality of care is increasingly being recognized as a marker of importance (2).It is a surrogate marker of the quality of care provided and is likely to guide physician reimbursement in the near future. Economically speaking it is a cost benefit ratio. Since its introduction by Keller D S et al — the HARM score has been used as an easily calculable tool which can be easily determined from routine administrative data.

Without providing good quality care it is impossible to lower **M**ortality, **L**ength Of Stay, and **R**e-admission rates (3).Studies have shown that each individual component of HARM score acts as an independent marker of measurement of quality(4) .The idea of incorporating all those components to form the HARM score was thus developed aiming to amalgamate, combine and complement the efficacy of each individual entities.

In-hospital LOS has gained increasingly more attention as an indicator of the efficiency of surgical care provided. A consistent and safe reduction in LOS is usually the result of an effective enhanced recovery program (5).In addition, LOS also acts as an excellent surrogate marker for complication rate (6)and increased health care utilization, making it among the many focussed targets for cost reduction(7).

Unplanned re-admissions are also common—occurring among 6% to 24% of patients after colorectal surgery, even after using standardized care pathways and discharge criteria(8).Re-admissions remain unpredictable and have a significant impact on hospital costs and quality of care (9).However, isolated assessment of re-admissions without estimation of the overall burden of in-hospital stay and complications for the treated population can lead to incorrect assumptions about hospital or surgeon quality. In the US, it is estimated that each re-admission episode after colorectal surgery costs approximately $9000, accounting for $300 million in readmission costs annually. Thus, readmissions are a key element to consider in a quality metric.

Finally, mortality is the main short-term outcome measure of interest (10) and a benchmark for measuring quality of care. As might be expected, mortality has been demonstrated to be a valuable quality measure, with strong association with clinical outcomes. Furthermore, mortality data are easily collected and can be validated and risk adjusted (11).

The composite of mortality, re-admissions, and total LOS should be at least as accurate a descriptor of surgical outcomes and quality of care as current surgical quality improvement programs.

HARM score is different from other performance measures used to estimate surgical outcome and quality. It is easy to use, can be calculated using routinely available administrative data with no capital investment or new software need or any further cost of maintenance or personnel. HARM score thus offers the advantage of very low administrative costs but high quality data and being easily re-producible. HARM score is built entirely on patient outcome measures thus is directly linked to patient outcomes and quality of care. HARM score was applied to hospitals with at least 30 colectomy cases performed to ensure a consistent result. The HARM score is also applicable for any individual surgeon with at least 30 cases. Thus, this one simple instrument addresses both hospital-based and individual physician-based quality.

Overall morbidity of colorectal surgery varies between 14-30%. The overall mortality rate is around 11.29%. Emergency procedures carry the highest risk factor of mortality. Emergency surgery has a bad prognosis in elderly patients. The functional alterations and physiology in the elderly probably do not allow them to fight effectively against potential post-operative complications.

Length of Hospital Stay is a major variable in determining the final HARM Score,hence variations in this variable are bound to potentially affect the results of the entire score. This factor is apparently very much responsible for the disparity of results found in the values for HARM Scores calculated for elective and emergent cases in our study. Our hospital being the most prominent tertiary care centre in the entire region has the distinction of being a high volume centre as regards operations for colorectal cancer surgeries. This translates into a longer waiting time and may sometimes result in an unusually long pre-operative hospital stay. A higher value for the LOS variable in the equation for calculating the HARM Score means a higher overall mean HARM Score for elective patients. This is not the case with patients who present as an emergency who are operated usually immediately.

Being a tertiary care hospital with a dedicated Colo-rectal surgery department and additional departments like Surgical Oncology and Surgical Gastro-enterology, the surgeons at our hospital have a very high volume to deal with. Over a period of time this high volume has translated into very low complication rates for patients operated in our hospital. This finding supports the centralisation of surgical procedures which has been the trend in recent times in the world of surgery.

Our hospital also follows an ERAS (Enhanced Recovery after Surgery) protocol but there are some logistic hurdles to it's full implementation. Relative shortage of theatre slots, operating consultant surgeons, post graduate surgical residents and allied technical staff to cater to the demands of an ever rapidly growing population are some of the limitations faced by us on a regular basis.

The 30 day mortality rate in our study is Zero %. This variable is an important indicator of the quality of surgery done [53]. This finding adds validity to the already discussed impact of practising surgery in a high volume centre.

Re admission rate is quite low too. This is a proxy indicator that patients have not been hurriedly discharged without fulfilling the usual discharge criteria. Re admission rate acts as a fail safe device to adjust for measuring quality of care for patients who have been discharged early.

The HARM Score however has it's own limitations. The 3 measures of quality comprising the HARM score are not at fully inclusive, and variables such as patient satisfaction were not included. However, the variables enrolled are easily accessible, and are directly linked to patient outcomes, are not subjective, and not easily influenced by routine external factors. There are also limitations stemming from the data source. Premier Perspective from which the score was originally derived is an observational data source. The developers of the score were unable to estimate the impact of missing re-admissions or coding practices outcomes. The Premier Perspective database is also not a random sample—it is derived from acute, non-Federal hospitals and select hospital-associated outpatient facilities.

The data in the original HARM score was not risk adjusted. Although important, this increases the hospital's burden in data collection and risk calculation. The complications were also not weighted by severity. Our primary goal was to define and demonstrate that the HARM score correlated with complications in general. Future studies are needed to address these specific points to strengthen application of the HARM score.

We acknowledge the small sample size in our study as compared to the sample size in the original study. Ours was an honest endeavour for evaluation and validation of the original study. We emphasize the need for repetition of such studies over larger patient sample sizes and inclusion of multiple hospitals with similar facilities in these studies.

Despite the limitations, the HARM score is a valid and reliable quality metric of patient outcomes for colon and rectal surgery. This metric has significant implications for benchmarking quality of care.

CONCLUSIONS

HARM Score values correlate well with the complication rates both for elective and emergent cases. However only in the emergent group the correlation is statistically significant.

The non co-relation of HARM Score values with the complication rates for elective cases is most likely because of a long pre-operative length of hospital stay.

Therefore, using the HARM score may decrease the cost and administrative burden of quality measurement while providing actionable signals for improvement.

The HARM score is an easy, reliable, and valid score for assessing quality in colorectal surgery.

This composite of mortality, readmissions, and total LOS seems to reliably distinguish between outcomes and financial benefit.

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