



## HIGH DEPENDENCY UNIT; IMPACT OF CARE ON OUTCOME OF SURGICAL PATIENTS AN EXPERIENCE OF SURGICAL UNIT OF DISTRICT TEACHING HOSPITAL.

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**ABSTRACT... Objectives:** To study the impact of “High Dependency Unit” care on outcome of surgical patients. **Study Design:** Descriptive, Prospective. **Setting:** Surgical Department of Aziz Bhatti Shaheed (Teaching) Hospital. Nawaz Sharif medical College, University of the Gujrat. **Study Period:** January 1<sup>st</sup> to December 31<sup>th</sup> 2016. **Results:** A total of 275 patients of all age groups from surgical and allied specialties requiring dedicated continues monitoring were admitted in High Dependency Unit (HDU) of the surgical department. Out of 275 patients 165 were admitted through emergency room after some surgical operation, whereas 115 patients are from those who were electively operated and shifted in HDU for management and monitoring due to some anaesthesia related complications or comorbidities. **Conclusion:** The High Dependency Unit care promotes efficient and effective care by increasing the flexibility of patient triage, utilizing resources efficiently, and providing cost effective timely care to serious surgical patient admitted in surgical wards.

**Key words:** Intensive Care, Postop Care, Recovery, Critical Illness, HDU Mortality.

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## INTRODUCTION

Enormous improvement in the management of surgical patients has been seen over the last two centuries. This is all because of revolutionary discoveries such as anesthesia, asepsis, antibiotics, blood / blood products and radiology. Drastic changes in organizational aspects of health care system occurred during this period. These includes purpose build operation theaters, recovery rooms, High dependency Units (HDU) and intensive care. (ICU). All these factors have contributed in postoperative patient safety. Surgical mortality decreased whereas spectrum invasive interventions expanded. Now the patients with extensive comorbidities can be safely operated and managed because of availability of modern monitoring devices and dedicated premises for postoperative care.<sup>1,2,3</sup>

Surgery is not without risks. Death directly attributed to anesthesia are extremely rare in surgical patients. Operative expertise, spectrum of surgical intervention expanded over last 50

years, same is true in improving in caring for critically ill patients. High dependency units were set up for selected patients, such as the postoperative neurosurgical unit at the Johns Hopkins Hospital in 1923.<sup>5,14</sup> Pre term baby care center established in Chicago in 1927. (A60). It is generally acknowledged that intensive care at least in Europe, began with polio epidemic in Copenhagen, Denmark in 1952.<sup>5</sup>

Specialty of intensivists physicians who specialize in the care of critically ill patients and provide critical care in dedicated critical care units evolved and in the 2000, and the positive impact of a qualified intensivist on the outcome of critically ill patients was recognized as a separate specialty.<sup>6</sup>

In Pakistan there is very scared scenario. Availability of purposebuild intensive care units with trained staff is only in few public sector tertiary care hospitals and mostly are available in expensiveprivate based hospitals which are not affordable for common man who is alsnot

entitled in those available in armed force hospitals. Almost all the District Head Quarters Hospitals do not have ICU facility, even at times it become difficult to find an accurate functioning sphygmomanometer in the wards. However now scenario is changing with the establishment of medical colleges at district level leading to upgradation of hospitals to tertiary level with provision of intensive care units. Major constraint in the establishment of ICU in each district hospital is shortage of trained intensivist and paramedical staff.<sup>6,7</sup>

Concept of High Dependency Unit (HDU) is not new.

“An HDU is a specially staffed and equipped section of an intensive care complex that provides a level of care intermediate between intensive care and general ward care”

Patients may be admitted in HDU from the ICU as step down prior to transfer to ward and directly from the wards, recovery or operation theater.<sup>12,13</sup>

Typically patients in HDU will have single organ failure and are at high risk of developing complications. An HDU should have resources of immediate resuscitation and management of the critically ill. Equipment should be available to manage short term emergencies, eg need for mechanical ventilation. In stable patients routine monitoring may include ECG, Oximetry, Invasive Blood Pressure monitoring, inotropic support and non-invasive ventilation.<sup>14,15,21,22</sup>

Aziz Bhatti Shaheed Hospital (ABSH) is newly upgraded teaching hospital affiliated with Nawaz Sharif Medical College University of Gujrat. When we started working in Surgical Department of ABSTH in 2011, there were not a single dedicated bed with monitoring facilities available in whole hospital for critically ill patients. All the critically patients who need dedicated care of some level have to be referred to CMH Kharian or somewhere in Lahore. Most of the patients could not survive either died while being transferred / travelling or non-availability of intensive care bed.

In the absence of adequate and efficient backup and support facilities like postoperative care in HDU/ICU, lab and availability of blood bank etc in hospital, the operating surgeons feel uncomfortable and avoid to operate serious patients or to do advanced surgical procedure. Availability of such facilities definitely boosts up the confidence of surgical team.

This gloomy picture provoked us in 2013, to create a dedicated space (4 bedded HDU) for critically ill patient where availability of functional basic resuscitative and monitoring biomedical equipment ensured.

In present study we are sharing our experience of impact of HDU care on the outcome of surgical patients during last 1 years. We found that provision of simple dedicated space with availability of basic resuscitative equipment and lifesaving drugs in the presence of a vigilant health worker has substantial impact on the recovery and outcome of surgical patients.

## MATERIAL & METHODS

This retrospective study is conducted in Department of Surgery Aziz Bhatti Shaheed Teaching Hospital (ABSTH) Gujrat from January 1<sup>st</sup> to December 31<sup>th</sup> 2016. ABSTH is 500 bedded newly declared teaching hospital affiliated with Nawaz Sharif Medical College University of Gujrat. District Gujrat has large rural catchment, area also catering patients from District Bhimber of Azad Jammu & Kashmir in addition to adjacent districts Mandi Bhaou Din. ABSTH is the only tertiary care hospital located on GT road in between Rawalpindi & Gujranwala. No dedicated space was available in ABSH hospital for management of critical surgical patients. Being a secondary care hospital facility of ICU was not available in any district hospital of Punjab. After this affiliation with Nawaz Sharif Medical College Gujrat as teaching hospital, initiative to establish a dedicated space with minimum required monitoring facilities was taken by Department of Surgery NSMC.

Department of Surgery is a 60 bedded unit equally divided in male & female wards. Department is accredited with College of Physicians & Surgeons

for fellowship in General Surgery.

High Dependency Unit (HDU) of the department is a 4 bedded dedicated space having basic monitoring, resuscitative facilities and central Oxygen supply, located adjacent to surgical ward. Availability of functional monitoring and resuscitative equipment and all lifesaving essential medicines within the HDU are ensured round the clock. Resident doctors are specifically posted in HDU exclusively for the care of HDU patients.

#### HDU patient admission inclusion criteria

- All the patients of surgical and allied specialties who need close monitoring / resuscitation and mechanical Ventilatory support were admitted in HDU
- Surgical and allied patients having single organ failure
- Surgical and allied patients with multi organ failure for resuscitation and optimization prior to shifting to hospitals having ICU care. These patients were also provided with Ventilatory support while making arrangements for shifting. If shifting was not possible, there management was continued in HDU

#### HDU Patient admission exclusion criteria

- Patients with confirmed brain death
- Patients with decompensated liver disease
- Patients requiring urinary Dialysis
- Patients with severe head injury

Dilemma of any public sector hospital in Pakistan is non availability of functional basic monitoring and resuscitation equipment in the wards. Hectic procedural delay in repair & maintenance of equipment and replacement of essential drugs is key factor in non-availability of these basic items in wards. In order to address these issues locally feasible system and SOPs were devised for timely maintenance, replacement drugs and equipment with self-generated financial resources.

Specifically formatted HDU monitoring chart were used for continuous patient monitoring. Annexure I. Specific SOPs for HDU were implemented strictly. Annexure II. Separate antiseptic dressing

arrangements were available within the HDU. Biomedical equipment placed in HDU is given in Annexure III.

Data of all the patients were recorded both manually and digital record keeping. Data analyzed and results in terms of impact of HDU care on patient outcome formulated. We compared our data of patients managed in HDU in 2016 with of previous years in terms of patient referral to other hospitals having ICU/HDU care.

No.	Equipment	Number
1	Adult ventilator	01
2	Cardiac monitor	01
3	Pulse Oximeter (Portable + Finger)	04
4	Suction apparatus	01
5	Nebulizer	01
6	Central Oxygen Supply	Back up with 4 EL O2 Cylinders
7	Airway management set	02
8	Vene-section set	02
9	Minor dressing set	20
10	Emergency lifesaving drugs & Disposables	Ample quantity
11	Glucometer	02
12	BP Apparatus	04
13	ECG Machine	01
14	Dressing trolley	01

**Surgical High Dependency Unit  
Available Biomedical / Resuscitation Equipment**

#### RESULTS

A total of 275 patients of surgical or surgical allied specialty of both genders and all age groups, requiring dedicated continuous monitoring and management were admitted in HDU directly from emergency operation theaters, surgical wards and after elective surgical operation. Out of total 275 patients 165 patients admitted through emergency after some sort of surgical operation, whereas 115 patients are from those who were electively operated and shifted in HDU for monitoring and management due to anesthesia related complications or for the management of their comorbidities. 273 patients were of general surgical specialty whereas two were of some gynecological surgery.

Exploratory laparotomy was the commonest surgical emergency operation performed in 125

patients. Emergency exploratory laparotomy was performed in 73 patients who presented with acute secondary peritonitis whereas 52 patients were explored for alleged firearm/ gunshot injuries.

Elective patients who underwent Cholecystectomy either open or laparoscopic shifted in HDU for management of comorbidities were 16 followed by thyroidectomy in 8 patients.

212 patients were shifted to surgical wards once they become stable whereas 42 patients were discharged to home from HDU. 5 patients left against medical advice whereas 9 patients were shifted to another hospital facility for ICU care once they were stable enough to be shifted. Mortality was seen in 6 patients, sepsis, multi organ failure was the cause of mortality in these patients. Average stay of patients in HDU was 6.4 days.

Total patients	Surgical	Allied specialty	Emergency	Elective surgery
275	273 (92.07%)	02 (0.8.03%)	165 (60%)	115 (41.81%)

**Table-I. Break of patient's on the basis of specialty & mode of admission:**

Discharged	Stabilized & shifted in SW	Referred for ICU care	LAMA	Expired
42 (15.27%)	212 (77.09%)	09 (3.27%)	05(1.81%)	6 (2.1%)

**Table-II. Final fate of patients from HDU:**

Exp Laparotomy Trauma	Thyroidectomy	Cholecystectomy	Mastectomy	Exp Laparotomy Acute Abdomen	Miss
52(18.90%)	08 (2.90%)	16 (5.81%)	06 (2.1%)	73 (26.54%)	120 (43.63%)

**Table-III. Spectrum of surgical interventions:**

Single organ failure	Assisted ventilation	Resuscitation /Inotropic support	Sepsis & DIC	Miscellaneous
81 (29.45%)	53 (19.27%)	69 (25.09%)	13 (4.72%)	59 (21.45%)

**Table-IV. Indications of admission in HDU:**

Parameter	Year 2015	Year 2016
Mortality	7.9 %	2.1%
Referral	13.6%	5.9%

**Table-V. Comparison of mortality and patient referral to other hospital for ICU care: 2016 vs 2015**

## DISCUSSION

In this study we retrospectively reviewed impact of High Dependency Unit (HDU) care on clinical outcome of surgical patients. The main finding of our observational study was that implementing close clinical monitoring and management of surgical patients in dedicated care area adjacent to surgical ward associated with significantly better clinical outcome of surgical patients.

Doctors working in public sector hospitals here in Pakistan are well aware of the fact that public hospital are flooded with patients. It has been observed while working in public sector hospital that functional basic monitoring and resuscitative equipment like BP apparatus, airway management set, lifesaving drugs even at time syringes are not available. That is usually because of flimsy resources, prillfriging, long and hectic replacement, repair and maintenance

procedures, lack of sense of ownership by medical and paramedical staff. All these factors adversely affect the management of serious patients. Waiting for functional equipment / drugs while managing serious patient in General ward create unpleasant scenario in front of relatives and embracement, the ultimate sufferer are the patients. In General Surgical wards only few patients needs dedicated, close, continuous monitoring. This become very difficult to pay attention to serious patients scattered in ward. Serious patients are usually overlooked in wards. Establishment of a 4-6 bedded dedicated bay for serious surgical patients, with availability of functional basic monitoring and resuscitative equipment and essential drugs with in one room definitely in the presence of vigilant resident staff definitely have positive impact on the clinical outcome of the patients.<sup>1,6,10,14,25</sup>

We observed in our one year experience of patient care in surgical HDU, there was significant decrease in the post-operative complications.

It has been reported in literature that dedicated postoperative care in HDU definitely improve the clinical outcome<sup>26</sup> and hospitality was decreased. Better clinical outcome in HDU is attributed to availability of resident doctor / staff nurse with in the HDU, anticipation and early recognition of adverse clinical events and their timely management.

The HDU patients are frequently visited by Senior Registrars and twice a day by consultants. Patients with cardio respiratory issues are being managed with the consultation of anesthetist and cardiologist if needed.<sup>15,16,26</sup>

Preventing surgical mortality is about providing a package of care. This includes appropriate optimization preoperatively, adequate and efficient intraoperative surgical and anesthetic management, but also postoperative support in dedicated space. The fundamental elements of good surgical care include fluid and judicious use of blood / blood products, management of cardiac output and ensuring adequate tissue perfusion, control of temperature, good analgesia, nutrition and respiratory support.<sup>8,12,13,26,27</sup> All these aspect can be effectively and timely be managed in Surgical HDU. Critical care have a role in bridging the critical care gap that exists in management of serious surgical patients in wards. Critical care and support and intervention prevent death. There is no substitute for an adequate number of critical care beds to which appropriate surgical patients can be admitted.<sup>17,18,25</sup>

In our busy public sector hospitals with financial and organizational constraints, we suggest allocation of a dedicated isolated space in the vicinity of wards in the form 4-6 bedded High Dependency Unit can cover all essential aspect of management of critical surgical patients.

In conclusion we found that, this type of facility (HDU) can easily be established adjacent to every unit only by reallocation of space, little modification

in infra-structure, devising locally feasible protocols for timely provision/ maintenance/ replacement of essential equipment, provoking motivation and sense of ownership in the available medical and paramedical staff of the unit.<sup>20,21,22,23,27</sup>

HDU care of surgical patients during year 2016 in surgical department of ABSTH, significantly reduced the patient mortality and number patient referral to other hospitals for HDU/ ICU care. Impact of HDU care on mortality was analyzed because in critical surgical patients previously, because of non-availability of HDU/ ICU mortality was the major outcome in these type of patients. We have to refer all patients with single or multi organ failure to all the way Lahore / Rawalpindi. Provision basic supportive care in HDU significantly reduced the number of referral of patients.

## CONCLUSION

The High Dependency Unit care promotes efficient and effective care by increasing the flexibility of patient triage, utilizing resources efficiently, and providing cost effective timely care to serious surgical patient admitted in surgical wards. HDU care definitely reduce the patient morbidity, mortality and patient referral to other health care facility and also boosts up the confidence and comfortable level of surgical team.

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