CHAPTER-II

REVIEW OF LITERATURE

The review of literature was done extensively and is presented under the following heading.

2.1.0. REVIEW OF RELATED LITERATURE:

2.1.1. Studies on early ambulation and abdominal surgery.

2.1.2. Studies on early ambulation and activities of daily living.

2.1.3. Early ambulation and physiological wellbeing

2.1.4. Early ambulation and length of hospital stay

2.1.5. Early ambulation and prevention of complications.

2.1.6. Effectiveness of early ambulation.

2.1.7. Early ambulation and psychological wellbeing.

2.2.0. CONCEPTUAL FRAMEWORK:

2.1.1. Studies on early ambulation and abdominal surgery:

Chang, Chia Hui (2011) conducted study on factors influencing abdominal surgical patients at their first postoperative ambulation. The purpose of this study to explore the factors, which influences the duration of the patient getting out of bed for those who underwent surgery. An instrument was modified by the researcher entitled to interview the patients who get out of the bed at the first time after a general surgery. The instrument has been revised by a panel of expert for its content validity and conducted a pretest among the patients for its reliability. Totally 58 subjects were recruited from a surgical ward of a medical center of nursing, using convenient sampling technique. Observation, interviewing and reviewing medical records were used by two research
assistants who are the students of department of health management. SPSS 10.0 package was facilitated for analysis of data. The finding revealed that the period taken by the patient to get out of the bed for the first time after surgery was 79.2 hours. Based on the demography data, the patients who are younger, well-educated and female are more likely to experience shorter period of time to get out of the beds. However, after a surgery the patients whose bodies had inserted some tubes than those who have no tube inserted would be more likely to take increase in period of time to get out of the beds. Approximately, there are 50% of the participants with his /her first time to get out of bed after a surgery being encouraged by the health professionals, and the barriers include fear of pain and wound split, 55.2%, 32.8%, respectively. The discomforts experienced by the patients who are at the moment of the first time of getting out of the beds are pain, fainters and lower leg weakness, 67.2%, 58.6%, 34.5% respectively.

Kaur, Nirmal (2007) conducted a study to assess the effectiveness of planned preoperative teaching on early ambulation for patients undergoing abdominal surgery. A quasi experimental design was adopted using convenient sample of 30 subjects, allotted samples 15 in each of experimental and control group. Preoperative teaching plan on early ambulation was developed after an extensive review of literature and expert opinion. It includes the steps on deep breathing exercises, extremities exercises, up and down walking, maintenance of daily routine activities and progressive ambulation. A checklist with 40 items was used the level of performance preoperatively, before the implementation of teaching on early ambulation as well as on the 3rd and 5th postoperative day. Control group did not receive any preoperative teaching. Data were analyzed using both descriptive and inferential statistics. The major findings of the study revealed a non significant difference of pretest performance scores between the two groups (p>0.05) before the implementation of planned preoperative teaching on early
ambulation. There was strong statistically significant difference (p < 0.001) found between the posttest performance scores of experimental and control group when analyzed by unpaired ‘t’ test. In conclusion the patient who received preoperative teaching had less pain, early wound healing and recovery than the patients who did not received.

McCarran B (2004) conducted study to investigate the effects of early ambulation on respiratory and hemodynamic variables in the intubated, ventilated abdominal surgical patients. Ambulation was designed as the progression of activity from supine to sitting over the edge of the bed, standing, walking on the spot for one minute, sitting on the bed initially and sitting out of the bed for 20 minutes. 17 patients who fulfilled the inclusive criteria were selected as sample. Respiratory and haemodynamic parameters were measured in each of the above positions and compared with supine. The investigator concluded that changes in the tidal volume, respiratory rate and minute volume were largely due to positional changes when moving from standing.

Hossco (2004) conducted a prospective study to examine a new perioperative treatment plan for accelerating postoperative recovery and evaluated the results. This is so called fasttract programme for employees underwent thoracal peridural analgesia, forced early ambulation and rapid renourishment done within the clinic, 64 consecutive patients with benign and malignant disease of the large intestine aged an average of 66 years (range 54-71) were operated. 30 received conventional resection and 34 were opened on laproscopically and treated perioperatively used the fast-tract program. The hospital diet was given to all the patients in the 1st postoperative day. The results showed that the first bowel movements occurred in all cases on the 2nd day (range 2-3). The study concludes that in colic surgery the fast tract method accelerated the
convalescence, lowered the number of general complications and reduced the duration of hospital stay. Therefore evaluation of fast-tract concept is warranted in other types of elective abdominal surgery.

Munikumar (2002) did a quasi experimental study to determine the effectiveness of preoperative video, assisted teaching on early ambulation among patients following elective abdominal surgery. The study was conducted in surgical units of Sri. Ramachandra Hospital, Chennai. The sample size was 30 which included 15 experimental and 15 in control group. The sampling technique used was convenient sampling. The research tool used was the check list on functional abilities of the patients postoperatively till seventh day and interview guide who collect the patient’s response on early ambulation. Data on selected demographic variables obtained from patient chart. The statistical calculation done on frequency, percentage, mean and standard deviation. The statistical test used was chi-square and ‘t’ test. The research finding of the study explains that about 67% of patients who received video assisted teaching on early ambulation regarding their ability of functional activities are compared with 27% of 15 patients in the formal teaching group. The study concluded that patient who received video teaching on early ambulation has showed significant level of responses and high level of functional abilities in their postoperative period.

Kim MS (1984) conducted study on the Effects of Structured Preoperative Teaching on Postoperative Recovery. The purpose of this study was to test the effect of the structured preoperative teaching on postoperative recovery and to observe the effects of an structured preoperative teaching on the adult surgical patient's ventilatory function ability, the length of hospital stay, the number of analgesics within a 72 hour postoperative period, the length of early ambulation. The research question investigated
in the study was to find the effects of a structured preoperative teaching upon the adult surgical patients postoperative recovery. This study was based on a sample of 40 patients who were scheduled for abdominal surgery. They were assigned alternately to experimental and control group. Among 40 subjects, 20 were placed in the experimental group and 20 in the control group. Preoperative ventilation function testing of control and experimental subjects was done the evening before surgery and before the patient received the structured preoperative teaching. A structured preoperative teaching was given to the subjects in the experimental group. Postoperative testing was done the 5th postoperative day. The data were collected over a period of two months, from Aug. 8 to Oct. 31, 1983. For the analysis of the data and test for the hypotheses, the t-test with mean difference was used. The results of this study regarding the four-hypotheses were as follows: Experimental group who received structured preoperative teaching had increase strength to cough and deep breathe as measured by his forced vital capacity(FVC), forced expiratory volume 1 (FEV1), maximal voluntary volume 15 (MVV15) than control group without structured preoperative teaching. The ventilation function ability was more increase in experimental group than in control group; the mean difference was statistically significant at 0.01 level. Experimental group with structured preoperative teaching had reduced the length of hospital stay than control group without structured preoperative teaching. The length of hospital stay of the experimental group and control group were 11.90 days and 16.05 days respectively. Experimental group with structured preoperative teaching had reduced intake of the number of analgesics within a 72 hour postoperative period than control group. The number of analgesics taken within a 72 hour postoperative period of experimental group and control group were 1.65 times and 2.4 times. The difference was not statistically significant at 0.05 level.
Ramachandran (1972) conducted a descriptive comparative study on the effects of structured and unstructured pre operative teaching on early ambulation during elective abdominal surgery. The sample size was 30, which include 15 experimental and 15 control group patients. The sampling technique used was random sampling. The study was conducted in Christian Medical College and Hospital, Vellore. The tool used was observation checklist on ability on activities of the patients postoperatively up to the seventh day also Interview guide on early ambulation. The statistical analyses were descriptive and non-parametric inferential statistical methods were used. The study finally revealed that, there was a significant difference in structured and unstructured preoperative teaching on early ambulation among the experimental and the control group.

2.1.2. Studies on early ambulation and activities of daily living:

Bernardshaw and Ristesund (2009) conducted a study on enhanced recovery after colorectal surgery results from a prospective observational study. The aim of the study to understand the enhanced recovery after surgery (ERAS) has reduced the median hospital stay from 8–10 days with traditional perioperative routines to four days. The aim of the present study was to introduce the principles of ERAS in hospital and measure the effect on hospital stay, complications and quality of life after discharge from Hospital. 94 consecutive patients, 40 males, 54 females, median age 66 years, were included in a prospective non-randomized observational study at Haukeland university hospital and Haugesund hospital from October 2000 until February 2003. After a three-month preparation period, the principles of Eras were implemented. The results were evaluated with questionnaires and by follow-ups 8–10 and 30 days after surgery. The results were compared to the results of colorectal surgery before introduction of accelerated recovery. The study results shown that 45 (48%) and 73 (78%) patients
were discharged within three and five days after surgery with ERAS, compared to zero and seven (5%) patients with traditional recovery. The complication rate with ERAS was 31%, and the readmission rate was 15%. After one week, 57% had resumed their daily activities at home. After 30 days, 65% of the patients had resumed their normal and leisure activities. The study concluded that after a proper preparation period, ERAS principles can be implemented in surgical department, and is followed by a reduced median hospital stay and rapid return to normal daily activities for most patients after colorectal surgery.

Williams B. (2008), conducted study on supporting self-care of patients following general abdominal surgery to determine whether the information people receive following general abdominal surgery is sufficient for them to be able to care for themselves at home or in the community. Patients who received information on pain and wound management, activity, nutrition and complications generally felt that it was sufficient at the point of discharge and still felt informed up to three weeks following discharge. Up to 50% of patients did not receive information or received inaccurate information. The majority of the patients who were given information about pain and wound management did not experience any concerns following discharge. However, many of the patients who did not receive information on pain and wound management experienced concerns that required them to make a non-routine visit to a health care facility after discharge. The findings emphasize the importance of nurses providing specific and accurate verbal and printed discharge information to all patients who have undergone abdominal surgery.

Deepa.M. (2007) studied the effectiveness of early ambulation on postoperative recovery of patient’s undergone abdominal surgery at railway hospital,
Chennai. Quasi experimental, nonequivalent control group posttest only design used in the study. The study conducted in postoperative ICU, surgical wards (male and female), the sample was 60 patients who had undergone abdominal surgery were assigned to the experimental group (n =30) and control group (n =30). The investigator ambulated the patients in the experiment group from 24 hours after surgery, until patients are able to do independently. Hospital regular regimen was followed for the control group. The level of dependency in performing activities of daily living was assessed using observational checklist; the level of comfort checked using an structured interview. The patient in the experimental group showed a highly significant decrease in the level of dependency in performing activities of daily living following early ambulation (P< 0.001), in comparison with patients in the control group.

Hardy SE. et.al (2005) conducted a study on factors associated with recovery of independence among older persons undergone major abdominal surgery. The aim of the study was to identify independence predictors of time and the duration of recovery of independent activities of daily living (ADL) function among community dwelling older persons who had a major abdominal surgery. The study was cohort used 754 persons under the age of 70 years older Were included, the investigator studied the 420 participants who experienced at least 1 episode of disability involving 1 or more key activities of daily living (ADLs) bathing, dressing, walking or transferring during a median follow-up of 53 months. The results showed that habitual physical activity is important predictors of time and duration of recovery of independent ADL function among community-dwelling older persons who had a major abdominal surgery.

Anderson ADG, McNaught CE (2003), conducted study on randomized clinical trial of multimodal optimization and standard perioperative surgical care. Multimodal
optimization of surgical care has been associated with reduced hospital stay and improved physical function. The aim of this randomized trial was to compare multimodal optimization with standard care in patients undergoing colonic resection. Twenty-five patients requiring elective right or left hemicolectomy were randomized to receive a ten point optimization programme (14 patients) or conventional care (11). The groups were similar in terms of age (64 versus 68 years), male: female sex ratio (6: 8 versus 5: 6) and Physiological and Operative Severity Score for the enumeration of Mortality and morbidity score (both 26). Outcome measures were recorded before operation and on postoperative days 1, 7 and 30. They included hand grip strength, lung spirometry, and pain and fatigue scores. Further outcome measures included time to achieve a predetermined mobilization target, time to resumption of normal diet, and length of stay. Optimization was associated with maintained grip strength, earlier mobilization (46 versus 69 h; \( P = 0.043 \)), and significantly lower pain and fatigue scores. Patients in the optimization group tolerated a regular hospital diet significantly earlier than controls (48 versus 76 h; \( P < 0.001 \)). Optimization significantly reduced the median length of hospital stay (3 versus 7 days; \( P = 0.002 \)). Optimization of surgical care significantly improved patients’ physical and psychological function in the early postoperative period and facilitated early hospital discharge.

2.1.3. Studies on early ambulation and physiological activity:

Wang G, Jiang ZW (2011) conducted Fast-track rehabilitation program Vs conventional care after colorectal resection: a randomized clinical trial. One hundred and six consecutive patients who underwent fast track rehabilitation program were encouraged to have early oral feeding and movement for early discharge, while 104 consecutive patients underwent conventional care after resection of colorectal cancer. Their gastrointestinal functions, postoperative complications and hospital stay time were
recorded. The restoration time of gastrointestinal functions in the patients was significantly faster after fast-track rehabilitation program than after conventional care (2.1 d Vs 3.2 d, P<0.01). The percentage of patients who developed complications was significantly lower 30 days after fast-track rehabilitation program than after conventional care (13.2% Vs 26.9%, P<0.05). Also, the percentage of patients who had general complications was significantly lower 30 days after fast track rehabilitation program than after conventional care (6.6% vs 15.4%, P<0.05). The postoperative hospital stay time of the patients was shorter after fast track rehabilitation program than after conventional care (5 d vs 7 d, P<0.01). No significant difference was observed in the re-admission rate 30 d after fast-track rehabilitation program and conventional care (3.8% Vs 8.7%). The fast track rehabilitation program can significantly decrease the complications and shorten the time of postoperative hospital stay of patients after resection colorectal cancer.

Cheifetz O, L & Crowe J (2010), conducted a study on the effect of abdominal support on functional outcomes in patients following major abdominal surgery: a randomized controlled trial. Immobility and pain are modifiable risk factors for development of venous thromboembolism and pulmonary morbidity after major abdominal surgery (MAS). The purpose of this study was to investigate the effect of abdominal incision support with an elasticized abdominal binder on postoperative walk performance (mobility), perceived distress, pain, and pulmonary function in patients following MAS. Seventy-five patients scheduled to undergo MAS via laparotomy were randomized to experimental (binder) or control (no binder) groups. Sixty (33 male, 27 female; mean age 58±14.9 years) completed the study. Preoperative measurements of 6-minute walk test (6MWT) distance, perceived distress, pain, and pulmonary function were repeated 1, 3, and 5 days after surgery. Surgery was associated with marked
postoperative reductions (p<0.001) in walk distance (75-78%, day 3) and forced vital capacity (35%, all days) for both groups. Improved 6MWT distance by day 5 was greater (p<0.05) for patients wearing a binder (80%) than for the control group (48%). Pain and symptom associated distress remained unchanged following surgery with binder usage, increasing significantly (p<0.05) only in the no binder group. The study concluded that elasticized abdominal binders provide a non-invasive intervention for enhancing recovery of walk performance, controlling pain and distress, and improving patients' experience following MAS.

Ellie Mentler (2010) conducted a study on the Influence of Ambulation on the Return of Bowel Function after Colorectal Surgery: Traditional Care Versus Early Mobilization Protocol. The study conducted at United States Naval Medical Center, Portsmouth. "Fast-track" or "enhanced recovery" programs, which are the new standardized accelerated clinical pathways for postoperative care for colorectal surgeries, have three goals: to 1. quicken the return of bowel function (as evidenced by passage of flatus and stool), 2. decrease the length of hospital stays, and 3. decrease the rate of overall complications. Aside from several components, or interventions that can vary from institution to institution, these programs share three common modalities: early oral feeding, protocol pain management regimens less dependent on opioid use, and early mobilization (i.e. ambulation). Evidence-based practice has shown that the modalities individually contribute significantly to the program goals except for postoperative ambulation, which has not been shown to increase bowel function although it contributes to decreased pulmonary complications and early discharge of patients. The investigators propose a randomized, prospective clinical trial in exploring the impact that postoperative ambulation has on the outcome of colorectal surgeries, particularly on the return of bowel function and the length of hospital stay. With the use
of pedometers to measure physical activity, the investigators subjected the patients to use the current traditional postoperative care or one with an aggressive ambulation regimen. Through the use of radiopaque markers, the investigators hope to correlate increased ambulation with increased gastrointestinal motility function to prove the impact of early ambulation on postoperative care.

Robert Lee Massey (2007) conducted a study on the effects of rocking chair motion on postoperative ileus duration, subjective pain, pain medication use and time to discharge following abdominal surgery. Rocking motion will be useful in resolving postoperative ileus (POI) in cancer patients who have undergone abdominal surgery. The study examined the effects of a rocking as a moderator of the surgical stress response and mediator of the gas and distention effects of POI in abdominal surgery cancer patients compared to standard postoperative care. The outcome variables assessed indicating resolution of POI was duration of time to first flatus, subjective reports of pain intensity and interference, total pain medication received and time to discharge. The hypotheses tested was there were no differences in duration of time to first flatus, subjective reports of pain intensity and interference, total pain medication received and time to discharge from the hospital. Two groups of postoperative abdominal surgery cancer patients were randomized to the rocking or non-rocking groups. The study results revealed that the rocking group had a significant reduction in time to first flatus and no differences in subjective reports of pain, total pain medication received and time to discharge from the hospital. Our results indicated rocking chair motion is effective in reducing the duration of postoperative abdominal surgery cancer patients.
Madsen (2005), evidenced-based study conducted by nurses evaluated the best indicators of returning gastrointestinal motility in patients who had undergone abdominal surgery (Madsen et al., 2005). The aim of the study was to determine if bowel sounds were reliable indicators to use to determine resolution of POI. The literature did not provide them with definitive support for the use of bowel sounds, so the investigators turned to the practitioners and developed questionnaires that were given to general nurses, specialist nurses, advance practice nurses and physicians requesting that they describe the criteria to determine the resolution of POI. Nurses responded that problems of POI were vomiting, distention, pain, wound drainage and firmness of the abdomen. Physicians responded that return of flatus (89%) was the primary indicator of returning bowel functioning, followed by having a bowel movement (44%) and feeling hungry (44%). A majority (78%) of the surgeons in the Madsen et al. (2005) study responded that the monitoring of bowel sounds by nurses was not helpful to them in planning patient management. The five nursing assessments most valued by surgeons included noting the return of flatus (78%), bowel movement (67%), distention (44%), nausea (44%), and vomiting (44%). Return of flatus and passage of stool were positive indicators of recovery from POI and distention, nausea and vomiting were considered negative indicators or signals that the patient had not recovered from POI. As a result of this study, the nurses who participated changed their practices from traditional listening and assessing bowel sounds in each of four quadrants of the abdomen for a minimum of five minutes and toward assessing the two indicators that include the passage of flatus and passage of stool. They also changed their practices by establishing that the three negative indicators of nausea, vomiting and abdominal distention would serve to validate that POI remained an active problem for the patient.
Zafiropoulos B & McCarren B (2004) conducted a study on physiological responses to the early mobilization of the intubated, ventilated abdominal surgery patient. The aim of this study was to investigate the effects of mobilization on respiratory and hemodynamic variables in the incubated, ventilated abdominal surgical patient. Mobilization was defined as the progression of activity from supine, to sitting over the edge of the bed, standing, walking on the spot for one minute, sitting out of bed initially, and sitting out of bed for 20 minutes. Seventeen patients with age (mean ± SD) 71.4 ± 7.1 years satisfied inclusion criteria. Respiratory and hemodynamic parameters were measured in each of the above positions and compared with supine. In the 15 subjects who completed the protocol, standing resulted in significant increases in minute ventilation (VE) from 15.1 ± 3.1 l/min in supine to 21.3 ± 3.6 l/min in standing ($p < 0.001$). The increase in VE in standing was achieved by significant increases in tidal volume (VT) from 712.7 ± 172.8 ml to 883.4 ± 196.3 ml ($p = 0.008$) and in respiratory rate ($f_R$) from 21.4 ± 5.0 breaths/min to 24.9 ± 4.5 breaths/min ($p = 0.03$). No further increases were observed in these parameters beyond standing when activity was progressed to walking on the spot for one minute. When supine values were compared with walking on the spot for one minute, inspiratory flow rates (VT/TI) increased significantly from 683 ± 131.8 ml/sec to 985.1 ± 162.3 ml/sec ($p = 0.001$) with significant increases in rib cage displacement ($p = 0.001$) and no significant increase in abdominal displacement ($p = 0.23$). Arterial blood gases displayed no improvements following mobilization. Changes in VT, $f_R$, and VE were largely due to positional changes when moving from supine to standing.

Lee DS, Chein WT (2002) conducted a study on effects of preoperative nursing intervention for pain on abdominal surgery, preoperative anxiety and attitude to pain, and postoperative pain. The experimental group received routine care and preoperative
nursing intervention for pain, while the control group received routine care only. Perceived pain interference during position changes, deep breathing/coughing, and moments of emotion in the experimental group was statistically significantly lower than that of the control group in the same situations. The experimental group also started out-of-bed activities 1.5 days earlier. They conclude that Preoperative nursing intervention for pain has positive effects for patients undergoing abdominal surgery.

2.1.4. Studies on early ambulation and reducing length of stay:

Lin DX and Zhang QY (2011) conducted study on fast track clinical pathway is designed to streamline patient care delivery and maximize cost effectiveness. It has decreased postoperative length of stay (LOS) and hospital charges for many surgical procedures. However, data on clinical pathways after liver surgery are sparse. This study examined whether use of a fast track clinical pathway for patients undergoing elective liver resection affected postoperative LOS and hospital charges. A fast track clinical pathway was developed and implemented by a multidisciplinary team for patients undergoing liver resection. Between July, 2007 and May, 2008, a total of 117 patients underwent elective liver resection: the fast track clinical pathway (education of patients and families, earlier oral feeding, earlier discontinuation of intravenous fluid, no drains or nasogastric tubes, early ambulation, use of a urinary catheter for less than 24 h and planned discharge 6 days after surgery) was studied prospectively in 56 patients (post pathway group).

These patients were compared with the remainder who had usual care (prepathway group). Outcome measures were postoperative LOS, perioperative hospital charges, intraoperative and postoperative complications, mortality, and readmission rate. Among all patients, 69 (59%) had complicating diseases and/or a history of surgery and
24 patients belonged to American Society of Anesthesiologists grade III-IV. Compared with the prepathway group, the post pathway group had a significantly shorter postoperative LOS (7 vs. 11 days, \( P < 0.01 \)). The average perioperative hospital charges were RMB 26,626 for patients in the prepathway group and only RMB 21,004 for those in the post pathway group (\( P < 0.05 \)), with no differences in intraoperative and postoperative complications (\( P = 0.814 \)), mortality (\( P = 0.606 \)), and readmission rate (\( P = 0.424 \)). Implementation of the fast track clinical pathway is an effective and safe method for reducing postoperative LOS and hospital charges for high-risk patients undergoing elective liver resection. The result supports the further development of fast-track clinical pathways for liver surgical procedures.

Lin JH and Feingold DL (2009) conducted prospective study of ambulation after open and laparoscopic colorectal resection. This study compared the ambulation, hospital length of stay (LOS), and incision length after open and laparoscopic colorectal resection. Equivalent open and laparoscopic group were comparable in terms of gender, age, body mass index, indication of operation and resection performed. Seventy open colectomy patients were compared with 99 laparoscopic assisted colectomy patients. On average, patients in the open and laparoscopic-assisted groups ambulated 67 and 390 feet, respectively, on postoperative day 1 (\( P < .001 \)), 290 and 752 feet on day 2 (\( P < .001 \)), and 495 and 965 feet on day 3 (\( P < .001 \)). The average LOS in the open group was 9.3 days compared with 5.9 days in the laparoscopic group (\( P < .001 \)). The average incision length in the open group was 19.7 cm compared with 5.3 cm in the laparoscopic group (\( P < .001 \)). Seventeen open LAR patients were compared with 30 hybrid LAR patients. On average, patients in the open and hybrid groups ambulated 22 and 150 feet, respectively, on postoperative day 1 (\( P = .003 \)), 105 and 433 feet on day 2 (\( P = .003 \)), and 369 and 488 feet on day 3 (\( P = .43 \)). The average LOS in the open group was
10 days compared with 8.5 days in the hybrid group (P = .46). The average incision length in the open group was 19.8 cm compared with 10.8 cm in the hybrid group (P < .001). When all 216 patients were considered, the 91 patients with incisions shorter than 8 cm (average 4.6 cm) ambulated 396, 752, and 956 feet on consecutive days whereas the 125 patients with incisions 8 cm or longer (average 16.9 cm, P < .001) ambulated 101, 334, and 521 feet on consecutive days (all P values <.001). Average LOS in the <8-cm group was 6 days compared with 8.9 days in the > or =8-cm group (P < .001). Patients undergoing minimal-access colorectal surgery ambulated significantly further than equivalent open patients in the early postoperative period and had a shorter LOS.

Browning. L. Denehy. L., Scholes RL (2007) studied the quality of upright mobilization performed following upper abdominal surgery is low: an prospective observational study. Fifty patients who had undergone upper abdominal surgery after receiving standardized preoperative education and physiotherapy intervention on the first postoperative day. An activity logger recorded uptime continuously for the first four postoperative days. Postoperative factors such as postoperative pulmonary complications, surgical attachments, pain relief, duration of anesthesia and intensive care admission were collected daily. The median uptime was 3.0 (8.2), 7.6 (11.5), 13.2 (26.6) and 34.4 (65.6) minutes for the first four postoperative days respectively. Morning uptime was greater than both afternoon uptime (p =0.0001) and evening uptime (p < 0.001). Uptime over the first four postoperative days predicted length of stay (r2 = 0.05, p <0.001). Uptime was not significant less in those who developed postoperative pulmonary complications (p = 0.08 to 0.17). The results show that the quality upright mobilization performed is low. Given that uptime predicated length of stay, increasing early upright mobilization had a positive effect on reducing length of stay following upper abdominal surgery.
Khoo CK, Vickery CJ, and Eyre-Brook T (2007) conducted a prospective randomized controlled trial of multimodal perioperative management protocol in patients undergoing elective colorectal resection for cancer. This study evaluates the use of a multimodal package in colorectal cancer surgery in the context of an RCT. Patients for elective resection for colorectal cancer was offered trial entry. Participants were stratified by sex and requirement for a total mesorectal excision and centrally randomized. Multimodal patients received intravenous fluid restriction, unrestricted oral intake with prokinetic agents, early ambulation, and fixed regimen epidural analgesia. Control patients received intravenous fluids to prevent oliguria, restricted oral intake until return of bowel motility, and weaning regimen epidural analgesia. Adherence to both regimens was reinforced using a daily checklist and protocol guidance sheets. Discharge decision was made using pre-agreed criteria. The primary endpoint was postoperative stay, and achievement of independence milestones. Secondary endpoints were postoperative complications, readmission rates, and mortality. Median ages were similar (69.3 vs. 73.0 years). The median stay was significantly reduced in the multimodal group (5 vs. 7 days; P < 0.001, Mann-Whitney U test). Patients in the control arm were 2.5 times as likely to require a postoperative stay of more than 5 days. Patients in the multimodal group had less cardio respiratory and anastomotic complications but more readmissions. There were 2 deaths, both controls. This RCT provides evidence that a multimodal management protocol can significantly reduce postoperative stay following colorectal cancer surgery. Morbidity and mortality are not increased.

King PM and Blazeby JM (2006), conducted a study on influence of an enhanced recovery programme on clinical outcomes, costs and quality of life after surgery on colorectal cancer. Perioperative care using an enhanced recovery programme improves short-term outcomes following colonic resection. Sixty patients underwent elective
resection within an enhanced recovery programme (ERP), incorporated with preoperative counseling, epidural analgesia, early feeding and mobilization. Clinical outcomes were compared with 86 prospectively studied control patients receiving conventional care (CC). Baseline clinical data were similar in both groups. In conclusion the results reveal that postoperative hospital stay was significantly reduced in the study group, with patients staying 49% as long as those in the control group including convalescent hospital stay (95%, CI 39% to 61% P <0.01). There was no difference in the number of complications, readmissions or re-operations.

Piero Brustiaa and Andrea Fassiolab, (2007), conducted a study on Fast-track approach in abdominal aortic surgery: left subcostal incision with blended anesthesia. The study conducted at Department of Anesthesiology and Intensive Care, ‘Maggiore Della Carit’a’ Hospital, Novara, Italy. The introduction of fast-tracking multidisciplinary programs allows good results in postoperative outcome in many surgical specialties. The study conducted between June 2000 and October 2005, 323 unselected patients were treated for atherosclerotic aorto-iliac occlusive disease (aorto-femoral bypass) and aortic or aorto-iliac aneurysm (aorto-aortic graft or aorto-iliac bifurcated graft). The infusion of bupivacaine 0.5% through an epidural catheter at T6-T7 interspace allowed sensory block between T4-S3. A light general anesthesia was performed using sevoflurane by a laryngeal mask in spontaneous breathing; no nasogastric tube was used. The patients were placed in dorsal decubitus; a transperitoneal access was performed with a left subcostal incision parallel to the condrocostal edge and spread from the linea alba to the edge of the rectus muscle. The bowel was maintained inside the abdominal cavity and manipulated with care. Standard surgical instrumentation was used. No drains were placed. Patients were transferred to the surgical ward at the end of surgery; they were early mobilized and enforced to drink and to eat. Analgesia was achieved with a
continuous epidural infusion of bupivacaine 0.25% supplemented by oral ibuprofen on request. The study results shows observed a mortality rate of 2.5% and a low postoperative morbidity: 1.4% of cardiac complications, 3.7% of transient creatinine increase, and no pulmonary complications. All patients ambulated a mean of 536 m (95% CI: 81.4) on the day of surgery and 2544 m (95% CI: 208.9) the day after. They consumed an oral diet, 36.2% of their daily caloric requirement on the same day of surgery and 1583 Kcal (95% CI: 105.2) the day after (77% of daily caloric requirement). Median hospital stay was three days (range 2–21). All patients were discharged home. The study concluded that that hospital stay and morbidity after abdominal aortic surgery can be decreased by performing surgical approach, thoracic epidural anesthesia-analggesia and an aggressive postoperative nursing on the ward. Therefore, this multidisciplinary program can be proposed to all patients undergoing aortic surgery without prior selection, major technological investments and long-term surveillance.

Linda Basse and Per Billesbølle (2005) study conducted randomized, blind study on functional Recovery after Open Versus Laparoscopic. Colonic Resection Laparoscopic colonic surgery has been claimed to hasten recovery and reduce hospital stay compared with open operation. Recently, enforced multimodal rehabilitation (fast track surgery) has improved recovery and reduced hospital stay in both laparoscopic and open colonic surgery. Since no comparative data between laparoscopic and open colonic resection with multimodal rehabilitation are available, the value of laparoscopy per se is unknown. In a randomized, observer-and-patient, blinded trial, 60 patients (median age 75 years) underwent elective laparoscopic or open colonic resection with fast track rehabilitation and planned discharge after 48 hours. Functional recovery was assessed in detail during the first postoperative month. Median postoperative hospital stay was 2 days in both groups, with early and similar recovery to normal activities as
assessed by hours of mobilization per day, computerized monitoring of motor activity assessed, pulmonary function, and cardiovascular response to treadmill exercise, pain, sleep quality, fatigue, and return to normal gastrointestinal function. There were no significant differences in postoperative morbidity, mortality, or readmissions, although 3 patients died in the open versus nil in the laparoscopic group. The study concluded that the functional recovery after colonic resection is rapid with a multimodal rehabilitation regimen and without differences between open and laparoscopic operation. Further large scale studies are required on potential differences in serious morbidity and mortality.

Basse L and Kehlet H (2005) conducted accelerated rehabilitation and conventional care for patient's undergone colonic surgery. The postoperative hospital stay is usually 6 to 10 days, and the morbidity rate is 15-20%. Fast-track rehabilitation programs have reduced the hospital stay to 2 to 3 days. The aim of this study was to evaluate the postoperative outcome after colonic resection with conventional care compared with fast track multimodal rehabilitation. One hundred thirty consecutive patients receiving conventional care (group 1) in one hospital were compared with 130 consecutive patients receiving multimodal, fast-track rehabilitation (group 2) in another hospital. Outcomes were time to first defecation after surgery, postoperative hospital stay and morbidity during the first postoperative month. Median age was 74 years (group 1) and 72 years (group 2). American society of anesthesiologists (ASA) score was significantly higher in group 2 (p < 0.05). Defecation occurred on day 4.5 in group 1 and day 2 in group 2 (p < 0.05). Median hospital stay was 8 days in group 1 and 2 days in group 2 (p <0.05). The use of a nasogastic tube was longer in group 1 (p < 0.05). The overall complication rate (35 patients) was lower in group 2 (p < 0.05), especially cardiopulmonary complications (5 patients p<0.01). Readmission was necessary in 12%
of cases for group 1 and 20% in group 2 ($p < 0.05$). Time to first defecation, hospital stay and mortality may be reduced after colonic resection with fast track multimodal rehabilitation.

Prosier JM and Schwenk W. (2005) the study conducted on fast track rehabilitation in colonic surgery result of prospective trial. 132 patients ranging from the age of 22-88 years following Laprotomy were assessed and treated with fast track rehabilitation protocols which included early mobilization and oral nutrition to accelerate postoperative recovery. Surgical complications were occurred in 15 patients. The study concluded that application of fast track rehabilitation protocols lowers the number of general complications and reduces the duration of hospital stay after colonic surgery.

Bill Zafiropoulos and Bredge McCarran (2004), study conducted on Physiological responses to the early mobilization of the incubated, ventilated abdominal surgery patient. The study conducted at General Intensive Care Unit, Concord Repatriation General Hospital and School of Physiotherapy, University of Sydney The aim of this study was to investigate the effects of mobilization on respiratory and hemodynamic variables in the intubated, ventilated abdominal surgical patient. Mobilization was defined as the progression of activity from supine, to sitting over the edge of the bed, standing, walking on the spot for one minute, sitting out of bed initially, and sitting out of bed for 20 minutes. Seventeen patients with age (mean ± SD) 71.4 ± 7.1 years satisfied inclusion criteria. Respiratory and haemodynamic parameters were measured in each of the above positions and compared with supine. In the 15 subjects who completed the protocol, standing resulted in significant increases in minute ventilation (VE) from 15.1 ± 3.1 l/min in supine to 21.3 ± 3.6 l/min in standing ($p < 0.001$). The increase in VE in standing was achieved by significant increases in tidal volume (VT) from 712.7 ± 172.8
ml to 883.4 ± 196.3 ml (p = 0.008) and in respiratory rate (fR) from 21.4 ± 5.0 breaths/min to 24.9 ± 4.5 breaths/min (p = 0.03). No further increases were observed in these parameters beyond standing when activity was progressed to walking on the spot for one minute. When supine values were compared with walking on the spot for one minute, inspiratory flow rates (VT/Ti) increased significantly from 683 ± 131.8 ml/sec to 985.1 ± 162.3 ml/sec (p = 0.001) with significant increases in rib cage displacement (p = 0.001) and no significant increase in abdominal displacement (p = 0.23). Arterial blood gases displayed no improvements following mobilization. Changes in VT, fR, and VE were largely due to positional changes when moving from supine to standing.

Stephen AE, Berger DL (2003), conducted study on Shortened length of stay and hospital cost reduction with implementation of an accelerated clinical care pathway after elective colon resection. Patient care pathways have been developed for operative procedures with documented improvements in length of stay and cost without compromising outcome. The average hospital stay after colonic resection is 5 to 10 days. This study describes a clinical pathway for colon resections and examines patient outcome before and after institution of the pathway. One hundred thirty-eight patients underwent elective colon resections at our institution by a single surgeon before (n = 52) and after (n = 86) introduction of a clinical pathway. Length of stay, postoperative complications, readmissions, and cost per patient were compared between the 2 groups. Mean total length of stay (+/- standard deviation [SD]) was less in the post clinical pathway patients (3.7 +/- 1.5 days) compared to preclinical pathway patients (6.6 +/- 3.3 days) (P <.001). When adjusted for age, sex, diagnosis, and type of operation, the difference in length of stay remains statistically significant (P <.001). There was 1 readmission in the prepathway group and 8 readmissions in the post pathway group. When the readmissions were added to the original admissions, the mean length of stay
in the post pathway patients was 4.2 +/- 2.8 days and in the prepathway patients was 6.9 +/- 4.1 days (P <.001). The average cost per patient (+/- standard error of the mean), with readmission costs added, was 9310 +/- 5170 US dollars in the prepathway group and 7070 +/- 3670 US dollars in the post pathway group (P =.002). The study concluded that the clinical pathway for elective, open colon resections can be done safely with improvements in cost and length of stay.

Delaney CP and Fazio VW (2003), Prospective, randomized, controlled trial between a pathway of controlled rehabilitation with early ambulation and diet and traditional postoperative care after laparotomy and intestinal resection. Sixty-four patients undergoing laparotomy and intestinal or rectal resection were randomly assigned to a pathway of controlled rehabilitation with early ambulation and diet or to traditional postoperative care. Time to discharge from hospital, complication and readmission rates, pain level, quality of life, and patient satisfaction scores were determined at the time of discharge and at 10 and 30 days after surgery. Subgroups were defined to evaluate those who derived the optimal benefit from the protocol. Pathway patients spent less total time in the hospital after surgery (5.4 vs. 7.1 days; \( P < 0.02 \)) and less time in the hospital during the primary admission than traditional patients. Patients younger than 70 years old had greater benefits than the overall study group (5 vs. 7.1 days; \( P < 0.01 \)). Patients treated by surgeons with the most experience with the pathway spent significantly less time in the hospital than did those whose surgeons were less experienced with the pathway (\( P < 0.01 \)). There was no difference between pathway and traditional patients for readmission or complication rates, pain score, and quality of life after surgery, or overall satisfaction with the hospital stay. The study concluded that the patients scheduled for a laparotomy and major intestinal colorectal resection are suitable for management by a pathway of controlled rehabilitation with early ambulation.
and diet. Pathway patients have a shorter hospital stay, with no adverse effect on patient satisfaction, pain scores, or complication rates. Patients younger than 70 years of age derive the optimal benefit, and increased surgeon experience improves outcome.

Delaney CP and Ramzi FH (2001) studied on fast track postoperative management protocol for patients with high co-morbidity undergoing complex abdominal and pelvic colorectal surgery. The studied conducted in department of colorectal surgery, Cleveland clinic foundation, Ohio, USA. A combination factors has emphasized the need to reduce postoperative stay after surgery. Multimodal care plans shorten hospital stay, but has been associated with high readmission rates and are generally reserved for straightforward, non-complicated colonic (not rectal) resections. This study evaluated a fast track protocol in patients undergoing major colonic and rectal surgery. Sixty consecutive patients (median age 44.5 (range 13-70 years) underwent major procedures over a 5 week period on one colorectal service. Nasogastric tubes and epidural anesthesia were not used. Patients participated in a protocol early diet and early ambulation, and were discharged after meeting defined criteria. Fifty-eight patients (97 per cent) were deemed suitable for the fast track approach at the time of surgery and stayed for mean (SD) of 4.3 (1.6) days after operation. Patients in diagnosis-related group (DRG) 148 (colorectal resection with co-morbidity, n=40) stayed for 4.6 (1.7) days, which was longer than those in DRG 149 (without co-morbidity, n=18) who stayed 3.5 (0.8) days (P=0.01). There patients (5 per cent) required a nasogastic tube for vomiting. There were no readmission directly attribute to fast track failure, although four patients (7 per cent) were readmitted with 30 days of operation for other reasons. Eight poorly compliant patients stayed for 5.1 (1.1) days (P=0.02 versus compliant patients). Fast tract patients had a shorter length of stay than patients receiving traditional care on other colorectal services during the same time period (compared by DRG 148, DRG 149
and for all patients) (P<0.0001). The fast track protocol allows patients with high levels of comorbidity undergoing complex colorectal and reoperative pelvic surgery to benefit from a rapid recovery and early discharge from hospital. The approach is safe and low readmission rates.

Linda Basse and Kehiet, MD, PhD (2000) A Clinical Pathway to Accelerate Recovery After Colonic Resection. The objective was to investigate the feasibility of a 48-hour postoperative stay program after colonic resection. Postoperative hospital stay after colonic resection is usually 6 to 12 days, with a complication rate of 10% to 20%. Limiting factors for early recovery include stress-induced organ dysfunction, paralytic ileus pain, and fatigue. It has been hypothesized that an accelerated multimodal rehabilitation program with optimal pain relief, stress reduction with regional anesthesia, early enteral nutrition, and early mobilization may enhance recovery and reduces the complication rate. Sixty consecutive patients undergoing elective colonic resection were prospectively studied using a well defined postoperative care program including continuous thoracic epidural analgesia and enforced early mobilization and enteral nutrition, and a planned 48-hour postoperative hospital stay. Postoperative follow-up was scheduled at 8 and 30 days. Median age was 74 years, with 20 patients. Normal gastrointestinal function (defecation) occurred within 48 hours in 57 patients, and the median hospital stay was 2 days, with 32 patients staying 2 days after surgery. There were no cardiopulmonary complications. The readmission rate was 15%, including two patients with anastomotic dehiscence (one treated conservatively, one with colostomy); other readmissions required only short-term observation. A multimodal rehabilitation program may significantly reduce the postoperative hospital stay in high-risk patients undergoing colonic resection.
Timothy A and Linda V. Flesch (1990) study done on implementation of a Clinical Pathway Decreases Length of Stay and Cost for Bowel Resection. The study conducted at Department of Surgery, University of Cincinnati Medical Center, Cincinnati, Ohio. The study objective was to examine the effect of a clinical pathway for small and large bowel resection on cost and length of hospital stay. Clinical pathways are designed to streamline patient care delivery and maximize efficiency while minimizing cost. Theoretically, they should be most effective in commonly performed procedures, in which volume and familiarity are high.

A clinical pathway to assist in the management of patients undergoing bowel resection was developed by a multidisciplinary team and implemented. Data about length of stay and cost was collected for all patients undergoing bowel resection 1 year before and 1 year after pathway implementation. Three groups were compared: patients undergoing bowel resection in the year prior to pathway implementation (prepathway), patients in the year after pathway implementation but not included on the pathway (nonpathway), and patients included in the pathway (pathway). The mean cost per hospital stay was $19,997.35 ± 1244.61 for patients in the prepathway group, $20,835.28 ± 2286.26 for those in the nonpathway group, and $13,908.53 ± 1113.01 for those in the pathway group (p, 0.05 vs. other groups). Mean postoperative length of stay was 9.98 ± 0.62 days (prepathway), 9.68 ± 0.88 days for (nonpathway), and 7.71 ± 0.37 days (pathway) (p, 0.05 vs. other groups). The study concluded that Implementation of the pathway produced significant decreases in length of stay and cost in the pathway group as compared to the prepathway group. These results support the further development of clinical pathways for general surgical procedures.
2.1.5. Studies on early ambulation and prevention of complications:

There are many complications might occur following abdominal surgery. Some of the common complications that could be named include postoperative ileus, anastomotic leakage, and infection. Besides that, the typical complications after operation in general such as electrolyte imbalance, delirium, respiratory failure, etc., could also occur among abdominal surgery population (Deters, 1987; Zinner & Asley, 2007).

Massey RL (2012), Conducted study on randomized trial of rocking chair motion on the effect of postoperative ileus duration in patients with cancer recovering from abdominal surgery. The patients undergo abdominal surgery commonly experience postoperative ileus. The study used sample of 66 underwent randomized trial divided into 34 patients in the experimental group and 32 patients in the control group. The experiment group received standard care (moved out of bed, sit in a chair and begin ambulating) and racking chair intervention in the first postoperative day. The control group received only standard care. Participants in the experimental group had shorter duration of postoperative ileus, no effect on medication use and time to discharge.

Patil LS, Vijayanath V & Surpur Rajeshwari (2012) studied on postoperative complications after elective abdominal surgery, the study conducted on department of surgical oncology, SS Institute of medical sciences and research center, Davangere, Karnataka. Studied the incidence of postoperative pulmonary infection vary according to the definition of postoperative complications and the surgical site. A total 103 patients has elective abdominal surgery were assessed for complications. Among 103 patients 24.27% developed postoperative pulmonary complications. More commonly elderly men, obese, smoker, prolonged surgery time and midline vertical incision was other determinants for developing complications. The study results concluded that
preoperative evaluation of pulmonary function can reduce pulmonary morbidity in a high risk patient's undergone elective abdominal surgery.

Serejo LG, Silva-Junior FP (2007), conducted a prospective cohort study to identify the risk factors for pulmonary complications after emergency abdominal surgery. The aim of this study was to determine the incidence and predictors of pulmonary complications following emergency abdominal surgery. Pre and intra operative data were collected through interview and chart review and their association with the occurrence of postoperative pulmonary complications (PPC) were analyzed. Two hundred and sixty consecutive adult patients were included and seventy five (28.2%) developed PPC. Age >50 years (adjusted or $=3.86; P< 0.001$) body mass index (BMI) $<21 \text{ kg} / \text{m}^2$ or $30 \text{ kg} / \text{m}^2$ (adjusted or $= 2.57; P = 0.027$) were independently associated with PPC (adjusted or $1.73; P = 0.079$). The development of PPC was associated with prolonged hospital stay ($P<0.001$) and increased death rate ($P <0.001$). Pulmonary complications are frequent among patients undergoing abdominal surgery and lead to increased length of hospital stay and death rate. Old age, abnormal BMI, upper or lower abdominal incision and multiple procedures are predicates of PPC in this setting.

Silva Y, Li F (2007), conducted a study on randomized controlled pilot study comparing physiotherapy techniques of breathing and mobility after abdominal surgery at Concord hospital, Sydney, Australia. Results from this study may provide evidence which can be applied to postoperative physiotherapy practice. 44 subjects undergoing open abdominal surgeries at high risk of developing post pulmonary complications (PPC) were recruited, Subjects were randomly assigned to three groups. Group A only received physiotherapy directed early mobility. Group B in addition to early
mobility received deep breathing and coughing. Group C received deep breathing and coughing, but were only mobilized by the physiotherapist on day 3. The PPC rates were 25%, 42% and 10% and the day restoration of independent mobility were 5.6, 11.6, 9.11 for group A, B, C. Post Pulmonary complications develops in high risk patients after abdominal surgery and physiotherapy techniques of an addition of deep breathing to an early mobility or mobilizing on day three is equally effective in improving recovery.

Mackay MR; Ellis E; Johnston C (2005), randomized clinical trial of physiotherapy after open abdominal surgery in high risk patients. Postoperative physiotherapy has been shown to reduce the incidence of postoperative pulmonary complications after open abdominal surgery. This study aimed to determine if the addition of deep breathing exercises and secretion clearing techniques to a standardized physiotherapist-directed program of early mobilization improved clinical outcomes in patients undergoing open abdominal surgery. Fifty-six patients undergoing open abdominal surgery, at high risk of developing postoperative pulmonary complications, were randomized before operation to an early mobilization-only group or an early mobilization-plus-deep breathing and coughing group. Mobility duration, frequency and intensity of breathing interventions were quantified for both groups. All outcomes were assessed by a blinded outcomes researcher using a standardized outcomes measurement tool developed specifically for this population. Outcomes included incidence of clinically significant postoperative pulmonary complications, fever, length of stay, and restoration of mobility. There were no significant differences between groups in mean age, anesthetic time, perioperative morbidity, or postoperative mobility. Outcome data were available for 89% of enrolled subjects. Overall incidence of postoperative pulmonary complications was 16%. The incidence of postoperative pulmonary complications in the non-deep breathing and coughing group was 14%, and the incidence of postoperative pulmonary complications
in the deep breathing and coughing group was 17%, (absolute risk reduction -3%, 95% CI -22 to 19%). There was no significant difference between groups in the incidence of fever, physiotherapist time, or the number of treatments. This study suggests that, in this clinical setting, the addition of deep breathing and coughing exercises to a physiotherapist directed program of early mobilization significantly reduce the incidence of clinically significant postoperative pulmonary complications in high risk open abdominal surgery subjects.

Tippawan Wattanawech, & Suvimol Kimpee (2002) conducted a study on Influence of selected factors and self-care behavior on abdominal distention in patients with abdominal surgery. The study conducted at Rayong Hospital, Rayong, Thailand. The study aim was to investigate factors influencing abdominal distention in patients with abdominal surgery. The study design adopted was Orem’s self-care theory proposes that self-care leads to maintenance of life, health, and well-being. Analgesia, length of surgical period, pain level, anxiety, and self-care behavior were explored in this descriptive, prospective study. The sample size was 111 patients undergoing abdominal surgery. The study results revealed that stepwise multiple regression analysis showed that anxiety, frequency of analgesia dose, self-care behavior, and use of pethidine for analgesia were predictors that accounted for 41.9% of variability of abdominal distention on the third day post-op. The study results concluded that nurses should undertake the role of reduction of postoperative anxiety by adequately instructing patients preoperatively, providing psycho-support, and ensuring pain relief in the postoperative phase. They should also encourage patients to engage in early ambulation as a self-care behavior.
Henderson A, Zernike W. (2001), conducted a study on impact of discharge information for surgical patients. Used open-ended interviews and observations on multiple occasions with 21 patients undergoing either cholecystectomy or herniorraphy. Almost half of the patients reported fear of anesthesia, postoperative pain, and postoperative side effects. They desired more information about discharge and recovery at home in terms of how to improve their physical condition (50%), proper behavior after discharge (40%), time frame for staples/suture removal (40%), and strategies to promote recovery at home (31%). In an interview 1 week after discharge, 50% stated that they received discharge information from the nurse, and 30% received discharge information from the physician; more discharge information was desired by 30% to 50% of patients. The patients complained that they received too much information on the day of admission, but too little on the day of discharge and it was insufficient for their needs. Henderson and Zernike studied the impact of discharge information for patients undergoing an abdominal or colorectal surgical procedure. They were given a written questionnaire to complete within 24 hours of discharge, followed by a telephone interview within 1 to 2 weeks after discharge. Usual or standard information given to patients included descriptions of the surgical procedure, pain management, and wound care. In terms of wound care, 73% indicated that they received the information prior to discharge; 91% stated it was sufficient. Once they were home, only 78% felt that the wound care information was sufficient. Of the 27% of the patients who did not receive wound care information, 57% desired this information. Importantly, 63% of those who did not receive wound care information accessed a healthcare facility after discharge because of wound-related problems that they did not know how to handle, including the drainage and discomfort related to the dressing. Sixty-six percent of the patients stated that they received information about pain management prior to discharge and 91% stated that it was sufficient at the point of discharge; however, only 83% thought it was
sufficient once they were home; and 43% of the patients who did not receive information about pain management accessed a healthcare facility after discharge because of pain.

Kehiet H, Mogensen T (1990), conducted a study on hospital stay of 2 days after open sigmoidectomy with a multimodal rehabilitation programme. Hospital stay after colonic surgery is usually between 5 and 10 days. Sixteen unselected patients scheduled for elective sigmoid resection underwent operation under combined spinal-epidural anesthesia. After operation, epidural anesthesia was continued for 48 hours with immediate oral nutrition and mobilization and with planned discharge 2 day after surgery. The median postoperative hospital stay was 2 (range 2-6) days (48 hrs) patients being mobilized for a median of 5 hours on the second postoperative day (24-48 hours) and for 10 hours on the third day (48-72 hours). Within 48 hours of operation 14 patients had an oral intake of 2000 ml or more and 15 had resumed defecation. Fatigue and pain scores were low during the first 8-9 days after operation, with a median of 13 hours mobilization per day after discharge. There were no medical or surgical complications during 30 days of follow-up, except for two patients who suffered postspinal headache. The results revealed that the postoperative recovery after open colonic surgery may be accelerated by effective pain relief integrated into an accelerated rehabilitation programme.

Waldhausen JH, Schirmer BD (1990), a study conducted to determine the effect of ambulation on recovery from post operative ileus. 34 patients were studied, 10 patients underwent early ambulation regimen on first postoperative day (Group-A). The other 24 patients (Group-C) did not become ambulatory until 4th postoperative day. All the patients underwent placement of seromuscular bipolar recording electrodes on the Roux limb at Laprotomy. Group A was recorded before and after ambulation, so
comparisons were made to determine if ambulation had an acute effect on myoelectric activity. Group A and Group C recordings were compared to judge whether there was an overall effect of ambulation on myoelectric activity. The study results revealed that ambulation is a means to resolve postoperative ileus.

2.1.6. Studies on effectiveness of early ambulation:

Van Wijk R and Bernhardt J (2012) a single-blind, multicenter, randomized control successfully delivers more and earlier therapy to acute stroke patients. The author hypothesized that physical therapy would be significantly different between treatment arms in a trial of very early and frequent mobilization (VEM) and that immobility-related adverse events would be associated with therapy dose. The study methods was single-blind, multicenter, randomized to standard care (SC) or intervention, SC plus additional early out of bed therapy (VEM). Timing, amount and type of therapy recorded throughout the trial adverse events were recorded to 30 months. The study results revealed that total of 71 patients (SC n=33), VEM n=38) received therapy in the first 2 weeks of stroke. Schedule (hours to first mobilization, dose per day, frequency and session duration) and nature (percentage out of bed activity) of therapy differed significantly between groups (p<.001) for all components. Mobilization was earlier, happened average 3 times per day in those receiving VEM, with the proportion of out of bed activity double in VEM session (median SC, VEM with the proportion of out of bed activity double in VEM session (median sc 42.5%, VEM 85.5%) SC consisted of 17 minutes of occupational and physiotherapy per day and was the same between groups. Number of immobility related adverse events 3 months post stroke was not associated with therapy dose of frequency. The study conducted that usual care and intervention therapy provided to patient from admission to 14 days after stroke. The therapy scheduled was markedly different in the intervention.
Beverly A. Morris and Cynthia Koch Rosenthal (2010) the strategic purpose of this project was to develop a patient centered total joint replacement clinical practice guideline (CPG) to maximize interdisciplinary collaboration from all levels of staff. Embedded within the CPG’s purpose was the goal to attain earlier benefits of mobilization by transforming the practice of initiating activity of the joint replacement patient from postoperative Day 1 to the day of surgery. This clinical practice guideline (CPG) is the product of cohesive interdisciplinary collaboration. The impact of this project merits more than routine attention given the lack of published nursing literature. The Department of Nursing acted as the catalyst to improve the quality of patient care. This initiative resulted in a pivotal change in the standard of care, updating outmoded orthopedic nursing practices. The most significant change improved the time patients began their first postoperative activity. Dangling the patient on the day of surgery enhanced the benefits of early activity and reduced the time from 16.8 to 6 hr with no adverse patient consequences. The CPG also demonstrated excellent postoperative pain management, realizing pain scores below 4 (0–10 scale) at multiple time points. In addition, the length of stay improved from 4.3 to 2.8 days. The results support the value of implementing a CPG.

Best DG, Pike R & Carroll K (2010), conducted a study on prospective study of early ambulation 90 minutes post-left heart catheterization using a retrospective comparison group. The study was conducted at Memorial University School of Nursing, St. John's, NL, Canada. Despite a trend toward a reduction in bed rest time after left heart catheterization (LHC) in many Canadian centers, an evidence-based standard of practice has not been established. Canadian bed rest times range from two to four hours post-LHC. Two recent prospective non-randomized studies (n = 1,000) indicate safety of ambulation at 60 and 90 minutes post-LHC. The purpose of this study was to determine
safety of ambulating patients at 90 minutes post-LHC sheath removal compared to the current practice of ambulation at three to four hours post-sheath removal. The study was a prospective non-concurrent design with a retrospective control. Retrospective data from the database and chart reviews were analyzed for a period of six months for the control group on the traditional three to four hour ambulation protocol (n = 402). Prospective data were gathered for six months for the experimental group (n = 193). The study concluded that early ambulation for selected patients at 90 minutes is safe and has the potential to increase both patient comfort and quality of care.

Fisher SR and Ostir GV (2010) conducted a study on early ambulation and length of stay in older adults hospitalized for acute illness. The study aim was to understand the association between an early increase in ambulation and length of stay (LOS) in geriatric patients admitted with an acute illness. Early ambulation leading to better recovery in such illnesses as pneumonia and myocardial infarction is well known, as is early ambulation after hip fracture surgery to prevent complications. Study design was prospective, non-blinded study. A total of 162 patients 65 or older were studied. Data were collected during a four-month period in 2009. A Step Activity Monitor (SAM) was placed on admission. Patients were instructed to walk as usual. Investigators measured the number of steps taken per day and change in steps between the first and second day. Patients averaged 662.1 steps per day, with a mean step change of 196.5 steps. The adjusted mean difference in LOS for patients who increased their total steps by 600 or more between the first and second day was 2.13 days (95% CI, 1.05-3.97). Patients who had low or negative changes in steps had longer LOS. The 32 patients who walked more than 600 steps were more likely to be men (P=0.02), independently ambulate (P<0.01), and have admitting orders of “ambulate with assist” (P=0.03). One limitation of this study is that patients who walked more might have been less ill or very
functional on admission. Bottom line: Increasing ambulation early in a hospitalization (first two days) is associated with a decreased LOS in an elderly population.

Morteza Rezaei-Adaryani (2009) conducted a study on the effect of changing position and early ambulation after cardiac catheterization on patients’ outcomes: A single-blind randomized controlled trial. Cardiac catheterization is the gold standard diagnostic test for coronary heart diseases. In order to minimize the post procedure complications, patients were restricted to do prolonged bed rest that is accompanied by fatigue and discomfort. The aim of this study was to assess the effect of changing position and early ambulation on the level of comfort, satisfaction, and fatigue and on the amount of bleeding and hematoma after cardiac catheterization. The study has got the sample of 70 patients, who had undergone a non-emergency 6-French cardiac catheterization via the femoral artery from September to November, 2006. In a single-blind randomized controlled trial, each patient was randomly assigned to either the control or experimental group. The patients’ position in the experimental group was intermittently changed during the first 6 hours after catheterization. Seven hours after the procedure, they were allowed to be ambulated and to undertake their self care activities. A pillow was placed under the patients’ bodies. Patients in the control group were managed as routine; they were restricted to a 10-24 hours bed rest in supine position with the affected leg straighten and immobilized and a sand bag on the puncture site for at least 8 hours. The levels of comfort, satisfaction and fatigue, and the amount of bleeding and hematoma were measured at regular intervals after the procedure. The study results revealed that the patients in the experimental group had significantly higher comfort and satisfaction and lower fatigue levels than the control group at 3rd, 6th, 8th hour and the next morning after catheterization (P<0.01). Changing patients’ position according to the current protocol in the experimental group produced no significant
increase in the amount of bleeding and hematoma when compared with the control group (P>0.05). The study concluded that the levels of comfort, satisfaction and fatigue after catheterization are related to the duration of bed rest and patients' position in bed. Changing patients' position accompanied by early ambulation after cardiac catheterization are associated with increasing comfort and satisfaction levels and decreasing the level of fatigue without increasing the amount of bleeding and hematoma.

Oldemeadow LB and Edwards ER (2006) studied on early ambulation after hip surgery accelerates recovery. The study conducted in department of physiotherapy, the Alfred Melbourne, Australia. Level 3 evidence-based guidelines recommended first walk after hip fracture surgery within 48 hours. Early mobilization is resources and effort intensive and needs rigorous investigation to justify implementation. This study uses a prospective randomized method to investigate the effect of early ambulation (EA) after hip fracture surgery on patient and hospital outcomes. Sixty patients (41 women and 19 male; mean average 79.4 years) admitted between March 2004 through December 2004 to the Alfred hospital, Melbourne for surgical management of a hip fracture were studied. Randomization was either EA (early ambulation) (first walk postoperative day 1 or 2) or delayed ambulation (DA) (first walk postoperative day 3 or 4). Functional levels on day 7 post-surgery. Acute hospital length of stay and destination at discharge were compared. The results revealed at 1 week post-surgery, patients in early ambulation group walked further than those in the delayed ambulation group (P=0.03) and required less assistance to transfer (P=0.009) and negotiate a step (P=0.23). Patients in early ambulation group were more likely to be discharged directly home from the acute care than those in the delayed ambulation (DA) group (26.3 compared with 56%). A failed early ambulation subgroup had significantly more postoperative cardiovascular instability and worse results for all outcome measures. The study conducted that early ambulation
(EA) after hip fracture surgery accelerates functional recovery and is associated with more discharges directly home and less to high-level care.

Y. Murata, M. Yamagata, S. Ogata, K. Shimizu, Y. Ikeda, J. Hirayama, H. Yamada (2003) to determine the influence of early ambulation and other factors on headaches occurring after lumbar mylography randomized 207 patients (127 men and 80 women) into two groups. Following the investigation, we allowed the 101 patients (65 men and 36 women) in group A to sit or stand freely; there were 106 patients (62 men and 44 women) in group B to bed for 20 hours. The nine patients in group B who could not maintain bed rest were excluded. There was no significant difference between the two groups as regards the prevalence of spinal headache (8.9% in group A v 14.4% in group B). Patients who reported headaches, however, were significantly more likely to be women (18.7%) than men (7.3%), be younger (mean age 45 years v 56 years), have a higher cerebrospinal pressure before removal of fluid (mean values 172 v 137 mm H$_2$O) and a lower systolic (mean values 120 v 134 mmHg) and diastolic blood pressure. The study concluded that, although other factors may be associated with headaches, late ambulation is not effective in preventing spinal headaches after lumbar myelography.

Ke Jiang and Jun Nie (2009) studied on fast track clinical pathway implications in esophageogastrectomy. The study conducted in department of thoracic surgery, union hospital, Tongi Medical College, China. The aim to investigate the feasibility of fast track clinical pathway for esophageal tumor resections. One hundred and fourteen patients with esophageal carcinoma who underwent esophagogastrectomy from January 2006 to October 2007 in our department were studied. Fast track clinical pathway included analgesia control, fluid infusion volume control, early ambulation and enteral nutrition.
Nasogastric tube was removed 3 days after operation and chest tube was removed 4 days after operation as a routine and full liquid diet 5 d after operation. Among 114 patients (84 men and 30 women), 26 patients underwent fast track surgery, including 17 patients over 65 years old and 9 under 65 (P = 0.014); 18 patients who had preoperative complications could not bear fast track surgery (P <0.001). No significant differences in tolerance of fast track surgery were attributed to differences in gender, differentiated degree or stage of tumor, pathological type of tumor, or operative incision. The median length of hospital stay was 7 d (5-28 d), 4% patients were readmitted to hospital within 30 days of discharge. Three patients died and postoperative mortality was 2.6%. All 3 patients had no determinacy to fast track surgery approach. The study concluded that majority of patients with esophageal carcinoma can tolerate fast track surgery. Patients younger than 65 or who have no preoperative diseases have the best results. Median length of hospital stay has been reduced to 7 days.

2.1.7. Studies on early ambulation and psychological wellbeing:

Nguyen Hoang Long (2010) conducted a study on factors related to postoperative symptoms among patients undergone abdominal surgery. The study conducted in nursing science of Burapha University three teaching hospitals in Ha Noi, Vietnam. The Symptoms following abdominal surgery are problematic characterized by both high prevalence and severity. The presence of symptoms prolongs recovery and increases complications. This study aimed to explore postoperative symptoms occurred during three days after abdominal surgery and to examine relationships between patients age, gender, length of operative procedure, incision length, preoperative anxiety, and social support and postoperative symptoms. The Hospital Anxiety and Depression Scale were used to measure the level of preoperative anxiety. To evaluate social support, the Multidimensional Support Scale was used. The Memorial Symptoms
Assessment Scale was also modified to examine patients’ postoperative symptoms. Structured interview was conducted with 147 patients undergoing major elective abdominal surgery in three teaching hospitals in Ha Noi, Vietnam. Data was analyzed by using descriptive statistics and Pearson’s Product Moment Correlation. The results identified seven postoperative symptoms occurred during three days after surgery including pain, tiredness, sleeplessness, abdominal distension, urinary retention, anxiety, and dizziness. The overall mean score of symptoms was high on the first day (mean = 40.47) after surgery then was decreased on the second (mean = 26.33) and the third day (mean = 19.16). Pain, tiredness, and sleeplessness appeared as the cluster of the most problematic symptoms entire three days. In addition, length of operative procedure was positively related to postoperative symptoms during three days (r = .48, .48, and .30; p < .01, consecutively). Incision length associated with symptoms on day one (r = .27, p < .01) and day three (r = .31, p < .01). Similarly, age also was related to symptoms on day one and day three (r = -.25, p < .01 and -.18, p < .05, respectively). However, preoperative anxiety associated with symptoms only on day one (r = .16, p < .05). Interestingly, no significant relationships were found between social support and postoperative symptoms entire three days. The findings indicate several symptoms occurring postoperatively. There is a need for appropriate managements of postoperative symptoms, especially for the most problematic symptoms. Nursing interventions should be individualized; additionally, a proper consideration for the factors related to symptoms following surgery should be included in nursing therapeutic.

Watson, Wells & Cox, (1998) found that rocking affects psychosocial wellbeing and balance through stimulation of the vestibular-proprioception system. These researchers used a crossover design to study 25 demented elderly patients over a six-week period, during which the subjects rocked an average of 101 minutes per day, five
days per week, for six weeks. A non-rocking comparison group of subjects sat in non-rocking chairs for at least 60 minutes per day for six weeks. Although there were only small positive changes in scores on psychosocial wellbeing and balance measures in the rocking group, researchers found significant reductions in anxiety scores in the rocking when compared to the scores in the non-rocking group. A unique secondary effect was a decrease in non-scheduled intermittent pain medication doses delivered, suggesting that rocking may be a non-pharmacologic intervention to reduce pain in this study’s sample. Similar findings from studies by other researchers support the hypothesis that the release of endorphins associated with prolonged rhythmic exercise, such as rocking and walking, may effectively reduce pain (Bautch, Malone & Vailas, 1997; McCaffery, 2002; Thomas, Lee, Franks & Paffenbarger, 1981; Thoren, Flora, Hoffman & Seals, 1990).

2.2.0. CONCEPTUAL FRAMEWORK OF THE STUDY:

In this study, the conceptual framework developed was on the system theory. It is one of the first theorists to develop system theory was Ludwig Von Bertalanffy. A system consists of a set of interacting components with a boundary with environment. Systems are composed both structural and functional components. The system theory consists mainly of the interaction between the nurse and the patient. Interaction is looked at three headings namely-input, throughput and output.

Input: Input consists of goals of modified early ambulation, background variables such as: age, sex, education, exercise, source of knowledge and co-morbidity, setting, persons included in care and methods and materials.

Throughput: Throughput is systematic way of performance of modified early ambulation. The modified early ambulation done at 16th hour after abdominal surgery. The modified early ambulation steps are sitting, standing and walking. The modified early ambulation was
assisted and guided by the investigator. The modified early ambulation is active, passive and nurse-patient interaction process.

**Output:** Output measures the outcome of activities of daily living, functional activity and psychological wellbeing.

**Activities of daily living:** the restoration of certain activities of patient who had undergone abdominal surgery is measured by the observational schedule (Part-B). The activities of daily living include oral hygiene, nutrition, elimination, combing and grooming.

**Functional activity:** the restoration of physiological condition of those patients who have undergone abdominal surgery as measured by the items in the observational schedule (Part-C). The functional activity included mobilization, respiratory sounds, presence of bowel sounds, ability for elimination, ability to feed and intake of pain killers.

**Psychological of wellbeing:** the psychological of wellbeing of those patients who had undergone abdominal surgery as measured by the items in the interview guide (Part-D). The psychological wellbeing included the sense of recovery, confidence while walking, pain reduction, sleeping, length of walking and urine flow control.
Goals of Modified Early Ambulation
- To regaining strength
- To increase sense of independence
- To increase mobility
- To increase sense of wellbeing.

Performance of Modified Early Ambulation
Step 1: Turning and sitting at the edge of the bed
Step 2: Standing and limited walking
Step 3: Standing and extended walking

NURSE PATIENT INTERACTION
- Active, passive patient participation
- Active, passive nursing intervention

FIG. 1: CONCEPTUAL FRAMEWORK BASED ON SYSTEMS THEORY