An audit of enhanced recovery with integrated care assessment in head and neck cancer surgery

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**Abstract**

**Introduction:** Enhanced Recovery (ER) is an established care pathway in several surgical specialties but not widely used for head and neck cancer surgery. There is still widespread variation in parameter inclusion, data collection, and cost/benefit of such a programme.

**Method:** By utilising what is already known of the advantages of ER the aim of this study was to initially carry out a retrospective audit of the head & neck cancer service in one regional oncology center over 12 months recording diagnosis, details of resection, reconstruction, histology, length of stay, morbidity and mortality. This was followed by a 6 month prospective audit assessing the same parameters with the introduction of the Enhanced Recovery with Integrated Care Assessment (ERICA). ERICA offers a detailed pre-operative assessment, multi-disciplinary team (MDT) discussion, co-morbidity screening and management, early anaesthetic assessment, carbohydrate loading drink, dietician and speech and language therapy input to ensure a safe, smooth recovery after major head and neck cancer surgery.

**Conclusion:** We present our findings and highlight the importance and advantages of ERICA. We have shown that optimising the patient’s health prior to surgery and providing a structured MDT recovery pathway reduces the number of complications by 25% and average length of hospital stay by 6.5 days.

**Background**

Enhanced recovery pathways have been developed over a decade with aims to minimise stress responses during and after major surgery by optimisation of pre-operative co-morbidities and improving peri and post-operative care through a structured pathway. In 2011 the national audit undertaken by the Royal College of Anaesthetists reported that in the UK 2.9 million operations are carried out under a general anaesthetic each year, with numbers rapidly increasing with demand.1

Enhanced recovery protocols involve multi-disciplinary interventions during pre-operative, per-operative and post-operative periods to maintain physiological function and reduce stress associated with major surgery with aim to improve patient outcomes and accelerate recovery.2,3 A review of the literature suggests that enhanced recovery has been mainly focused on patients undergoing colorectal surgery, followed by gynaecology with all other specialty reports in the minority.4

The aim of this service improvement project was to initially retrospectively review the data of patients having had head and neck cancer surgery at the Royal Devon & Exeter NHSFT over a period of 12 months. This was to be followed by the implementation of the Enhanced Recovery pathway over a period of time. To quantify the impact of ERICA data was prospectively collected over 6 months from a similar group of patients.

**Methods**

**Enhanced Recovery with Integrated Care Assessment (ERICA)**

Development of the ERICA protocol involved a 12 month process with monthly meetings that were chaired by the lead ERICA Oral & Maxillofacial Surgery Consultant. Input was received from ENT, Anaesthetists, Specialist services managers, Psychologists, Psychiatrists, Geriatricians, Dieticians, Speech and language therapists (SALT), Specialist Head & Neck Nurses, Physiotherapists, Senior ward nurse practitioners, Clinical governance and Patient representatives. Patient representatives who have been through treatment for head and neck cancer are invited to join the focus group for a holistic approach to the development of this pathway. The meetings, now monthly, assess compliance and improvements with the protocol. The implementation of ERICA has been a slow process due to compliance and co-ordination required across multiple disciplines.

**Development of ERICA**

The general perception was that with growing number of head & neck cancer operations being performed, no formal coordinated pathway existed ensuring that all patients received the same high level of pre-assessment, intra-operative care and post-operative course. To monitor current standard practice a retrospective study was carried out to quantify number of major head and neck cancer operations, length of stay, complications, delays in discharge and nutritional status over a 12 month period. The data presented here helped to identify the pitfalls in the process and put steps into place to facilitate a smooth transit through diagnosis, operation and discharge.

**Data collection**

Data was recovered from the Clinical Governance database, which is updated monthly using coded data provided by multi-disciplinary meetings (MDT) and discharge summaries. All data from the database was crosschecked with clinical records to ensure accuracy and minimise errors. The period analysed was October 2014-15, prior to the start of the ERICA pathway which was gradually implemented in stages over six months. For the post ERICA re-audit, data was collected from March - August 2016 to quantify improvements in service, if any.

**Ethical considerations**

No ethical approval was required for this audit project

**Pre ERICA audit results**

Over a 12 month period (Oct 2014-15) prior to the introduction of ERICA, 40 patients were surgically treated by two Consultant Oral & Maxillofacial Surgeons for oral squamous cell cancer in one unit. Majority of patients were between 60 – 70 years old with the average age being 66 years. The tongue was the most common site for primary tumour (47%) followed by the mandible (15%) as shown in Fig. 1.

  **Fig. 1. Site of primary tumour**

All patients underwent surgery as the primary modality. Following diagnosis all cases were discussed in an MDT meeting and a treatment plan was agreed. Patients who had non-surgical treatment or palliative care were excluded from this study. Cancer staging following histo-pathological analysis was as shown in Fig. 2. Overall 11 patients (27.5%) underwent free flap reconstruction following resection of tumour.

 **Fig.2. TNM staging**

The mean length of hospital stay was 15.5 days with a standard deviation of 2 – 44. The complications recorded during length of hospital stay showed that 55% of patients developed one or more medical or surgical complications as shown in Fig. 3 and 4 below.

|  |  |
| --- | --- |
| **Medical complications** | **Number of patients (n = 40)** |
|  None | 28 |
|  Hospital acquired pneumonia | 4 |
|  Sinus tachycardia | 1 |
|  Urinary tract infection | 1 |
|  Clostridium difficle infection | 1 |
|  Community acquired pneumonia | 1 |
|  Daily hypoglycemia | 1 |
|  Delirium - alcohol withdrawal  | 1 |
|  Pulmonary embolism | 1 |
|  NSTEMI | 1 |

**Fig. 3. Medical complications during hospital admission**

|  |  |
| --- | --- |
| **Surgical complications** | **Number of patients (n = 40)** |
| None | 26 |
| Neck abscess | 5 |
| Dehiscence flap | 4 |
| Venous congestion free flap | 2 |
| Vocal cord palsy  | 2 |
| Facial paralysis | 1 |
| Gaseous pocket in flap | 1 |
| Infected donor site (leg) | 1 |
| Haematoma neck | 1 |
| Respiratory compromise- Tracheostomy | 1 |
| Seroma neck | 1 |
| Bleeding surgical site  | 1 |

**Fig. 4. Surgical complications during hospital admission**

A total of 8 patients (20%) returned to theatre during the primary hospital stay. Two of these patients had their free flaps re-examined under anaesthesia and re-anastomosis of vessels was performed following clinical suspicion of venous congestion. Five patients developed a neck collection and rising CRP, which required return to theatre for incision and drainage and white heads varnish packing. One patient returned to theatre for evacuation of neck haematoma.

Of the 40 patients, 27 (67.5%) remain well with no sign of recurrence. Local recurrence alone was noted in 1 patient (2.5%), regional recurrence alone in 6 patients (18%), distant metastasis alone in 3 patients (7.5%), local and regional metastasis in 2 patients (5%) and local and distant metastasis in 1 patient (2.5%). Over the two year period, 11 patients (27.5%) are now deceased however, the cause of death was not recorded in the database.

The high incidence of morbidity and mortality led to the implementation of ERICA with aim of enhancing the patient journey through head and neck cancer surgery. This was rolled out over a period of 6 months from October 2015 – March 2016. There were a few doubts and delays in compliance along the way by both staff and patients but the pathway is up and running with regular meetings to assess and support progress making continual amendments.

**Stages of ERICA**

The stages of the enhanced care pathway have been divided into pre, peri and post-operative period to highlight the many levels where improvements can take place. Most of the stages listed below are part of standard of care for head and neck cancer surgery but the ones highlighted as \* have been customised to enhance standard care with hope to reducing morbidity, mortality and length of admission.

**Pre-operative**

1. Introduction of dedicated head and neck pre-assessment nurse practitioners trained to take focused history and perform cardio-respiratory examination as soon as the senior clinician ‘thinks’ it may be a cancer, which allows more time for optimisation prior to surgery or adjuvant therapy. As concerns are flagged up, investigations are requested and email notification is forwarded to operating surgeon and anaesthetist for their attention\*
2. Assessing patients capacity and expectations regarding ERICA \*
3. Early referral to smoking cessation service and letter to GP for initial prescription of nicotine substitutes \*
4. Advice for patients who consume more than the recommended units of alcohol – no ‘in-hospital’ service available for alcohol dependence but appropriate treatment commenced on admission as per hospital alcohol policy
5. Nutritional advice leaflets to improve diet and supplement calorie intake with build-up drinks as required following MUST\*
6. Malnutrition universal screening tool (MUST) score for all patients \*
7. Dementia screening using three point mini-cog assessment \*
8. Anxiety and depression screening \*
9. Baseline bloods for all patients, trace elements in patients with low BMI
10. ECG for all patients over 40
11. ECHO request if required
12. Early anaesthetic review
13. Head and neck specialist nurses, SLT’s and Dieticians have pre-treatment sessions just prior to surgery
14. Performance status calculated prior to MDT discussion to enable decision making and accurate coding of co-morbidities \*
15. Informed consent carried out in clinic by Consultant surgeon following MDT decision
16. Intensive care unit informed and booked in advance
17. Admit on day of surgery at 7:30am to dedicated surgical admissions ward, residence accommodation available for patients and relatives who prefer to travel the evening before surgery \*
18. Compression stockings fitted on morning of surgery
19. Pre-load carbohydrate loading drinks given to patient to take 6 hours and 2 hours prior to surgery \*
20. Surgical sites marked and documents checked on morning of surgery to ensure smooth transfer to theatre

**Peri-operative**

1. Consultant surgeon and anaesthetist to see patient on morning of surgery and address any last minute concerns
2. Team briefing to ensure good team work compliance in theatre
3. WHO surgical safety checks
4. Patient warming
5. Appropriate airway control via tracheostomy or naso-endotracheal tube
6. Reduce use of tracheostomy unless absolutely necessary from surgical perspective or complex co-morbidities indicating need \*
7. Avoid blood transfusion unless clinically indicated following senior surgeon/anaesthetic discussion \*
8. Minimise intra-operative blood loss using hypotensive anaesthesia and correct use of diathermy
9. Reduce operative time by simultaneous surgery; resection and reconstruction by separate teams
10. Intra-operative monitoring and control of glucose, lactate and fluid requirements
11. Appropriate intra-operative fluid loading customised for patient \*

**Post-operative**

1. Recovery with 1 to 1 nursing
2. ITU admission for all free flap cases – kept intubated and sedated overnight
3. Free flap monitoring using standardised chart and implantable monitors if fitted. Prompt senior review if concerns
4. Chest X-ray to confirm NG tube position – feeding to commence morning after surgery
5. Early transfer from ITU to ward if patient fit and adequate nursing staff available, ideally transferring to HDU bay on ward with 2 to 1 nursing
6. Daily bloods during week one post-op and then as clinically indicated
7. Removal of tracheostomy tube as soon as possible
8. Early review by Dietician and SALT to optimise nutrition and ensure safe transit to oral intake \*
9. Removal of catheters, drains, cannulas in a timely manner to enable early mobilization
10. Chest physiotherapy if clinically indicated
11. Patient diary to monitor progress – patients plot their course through hospital admission, daily pain scores, entering dates when drains out, mobilising, swallowing, daily dietary intake and to be reviewed by clinicians on ward round \*
12. Standardised ward notes booklet for all major head and neck surgery patients to be entered in daily by all staff including surgeons, nurses and allied healthcare members. Front page to include summary of disease, operation and co-morbidities \*
13. Operation notes on standardised proforma with diagrams to enable data collection for audit, research, governance, coding purposes and ease electronic transfer to parent hospital on discharge \*
14. Customised discharge summary including diagnosis, date of admission, all co-morbidities, all operative procedures, all complications including surgical complications (dates of return to theatre with reasons, wound infections, flap failure etc.) and medical complications (Infections, Pneumonia, Cardiac arrest, Pulmonary Embolism etc.), all medications, details of future follow-up \*
15. Upon discharge if patient is being followed up at local district general hospital then a pack of all of the above documents to be sent to parent hospital \*

The implementation of the ERICA pathway has been successful and majority of the changes are in place. To quantify its effect on performance a re-audit was undertaken assessing the same parameters as in the initial audit and its results are presented herewith.

**Results of re-audit**

Over a 6 month period (Mar – Aug 2016) following the implementation of the ERICA pathway 26 patients were surgically treated for oral squamous cell cancer by the same two Consultant Oral and Maxillofacial surgeons at the same cancer trust.

Majority of patients were aged between 70 – 80 years with an average age of 67 years. The most common site for primary tumour was the tongue with 11 cases (42%) followed by the mandible 3 cases (15%) as shown in Fig.6 below.

 Fig. 6. Site of primary tumour

All 26 patients underwent surgical treatment for oral cancer as per MDT decision and staging following histopathological analysis is as shown below in Fig. 7. Overall only 2 patients (8%) received free flap reconstruction following resection of tumour.

 Fig. 7. TNM staging post resection tumour

The mean length of hospital stay was 9 days with a standard deviation of 2 – 22. The complications recorded during length of hospital stay showed that 30% of patients developed medical or surgical complications as shown in Fig. 8 and 9 below.

|  |  |
| --- | --- |
| **Medical complications** | **Number of patients (n = 26)** |
|  None | 23 |
|  Hospital acquired pneumonia | 1 |
|  Urinary tract infection | 2 |

**Fig. 8. Medical complications during hospital admission**

|  |  |
| --- | --- |
| **Surgical complications** | **Number of patients (n = 26)** |
| None | 21 |
| Dehiscence flap | 1 |
| Haematoma cheek | 1 |
| Tracheostomy site infection | 1 |
| Oro-cutaneous fistula | 1 |
| Horner’s syndrome  | 1 |

**Fig. 9. Surgical complications during hospital admission**

Only 1 patient (4%) returned to theatre for further excision following reports of involved margins after primary histopathological analysis. Majority, 25 patients remain alive and well with no sign of recurrence. There has been one recorded mortality over the past 6 months.

**Discussion**

The introduction of the enhanced recovery integrated care assessment pathway has shown significant improvements in overall morbidity and mortality in comparable patient cohorts over a short study period. The average age of the patient group was comparable as was the site for the primary tumour. The TNM staging showed a similar scatter across the two cohorts. The incidence of complications during hospital stay after primary surgery has reduced from 55% to 30% with patients having only one complication each as compared to pre ERICA group where patients had up to three medical and surgical complications each. Nicholson et al conducted a meta-analysis comparing enhanced recovery programmes with standard surgical care. Thirty-eight trials were included in the study and the found the enhanced recovery pathway reduced the length of stay and reduced the risk of complications by 30%.5 This improvement is thought to be attributed to the enhanced recovery pathway and perhaps an improved ‘mind-set’ amongst staff and patients. Only 2 free flap cases were included in the post ERICA patient group as compared to 11 free flaps in the pre ERICA group that may have contributed to the increased morbidity during hospital admission.

The length of hospital stay was noted to reduce from a mean of 15.5 days to 9 days that is in keeping with published literature. Coyle et al compared data of patients undergoing major head and neck cancer surgery with implementation of enhanced recovery pathway and showed a reduction in hospital stay from 18 to 14.5 days.6

The reasons for this may be due to better co-ordination between clinicans and allied healthcare workers and greater patient involvement in their recovery stage. Due to the short time period after the re-audit it is not possible to compare the mortality between the groups but a loop completion audit planned for next year will report findings.

ERICA is constantly evolving and further changes are being made based on the findings in this study. The aim is to keep tight control over the patients journey once a clinical diagnosis of cancer is made ensuring that the patient is kept fully informed of their choices and feel enabled to take part in their recovery process.

**Conclusion**

This audit has highlighted important findings with the introduction of the Enhanced recovery integrated care assessment (ERICA) pathway for patients undergoing surgical management of head and neck cancer. In our study group we report a reduced length of hospital stay and reduction in morbidity following introduction of ERICA. This also has positive implications on Trust waiting times, availability of beds and cost benefits.

**Action plan**

* Extend ERICA to ENT head and neck service
* Encourage pre-assessment in referring hospital using the standardised proforma to reduce patient travel and maximise available resources
* Improve discharge summaries to facilitate transfer of information to parent hospital including correct coding for co-morbidities and complications
* Dental assessment and time to rehabilitation
* Patient satisfaction survey using PROMS
* Psychologist and psychiatrist input with respect to patient anxiety/depression
* Early dementia screening and referral to preparation of old people for surgery (POPS)
* Disseminate findings nationally to encourage introduction of ERICA for all head and neck surgery
* Audit ERICA data annually

**Disclosure**

No conflict of interest to declare

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