N. IRELAND CANCER REGISTRY NEWSLETTER



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Centre for Public Health, Queen's University Belfast

Save the Date

The N. Ireland Cancer Registry will be host to the NCIN 'Cancer Outcomes Conference 2015: United Against Cancer' in Belfast from 8-10 June 2015

N. Ireland Cancer Registry Public Information Video

In June 2014 the N. Ireland Cancer Registry (NICR) launched a public information video presentation with the aim of informing the public about cancer registration in Northern Ireland. This production is less than two minutes in length and includes commentary from NICR Director, Dr Anna Gavin, Chief Medical Officer, Dr Michael McBride and Heather Monteverde, General Manager of Macmillan Cancer Support NI.

The video was directed by Dr Giulio Napolitano with the support of his production team and the Queen's University communication team along with the help of colleagues and friends of the NICR. The video has been reviewed by the NI Cancer Research Consumer Forum and by a focus group



from Age NI. It is currently available on our website http://go.qub.ac.uk/VRbbc (subtitled version also available) If you have any comments or queries, we would be happy to hear from you.

A public consultation on a proposal to introduce primary legislation for the use of health and social care service user identifiable information for secondary purposes in controlled circumstances has commenced. This could mean the introduction of a legislative framework for cancer registration in N. Ireland which the Registry would welcome. Further information can be found on the 'current consultations' page of the DHSS Website (http://www.dhsspsni.gov.uk/consultations/current_consultations.htm). Completed Consultation Response Questionnaires must be received by the DHSSPS by 5.00pm on Friday, 3 October 2014.

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Care of Bladder Cancer Patients Diagnosed in N. Ireland 2010 & 2011

The report "Care of bladder cancer patients diagnosed in Northern Ireland 2010 & 2011" was published in April 2014. It is a comprehensive audit of bladder cancer patients that reports on all aspects of cancer patients' care pathway including, referral and presentation, investigation, diagnosis, treatment & after-care. The audit was funded by *Guidelines and Audit Implementation Network (GAIN)*.

The audit aimed to:

- Document care for bladder cancer patients in N. Ireland and compare with recommended guidance for investigation and treatment.
- 2. Explore reasons for differences in bladder cancer survival in women compared to men.
- 3. Serve as a benchmark for further audits.
- 4. Make recommendations for service improvement.

A data collection proforma, designed by clinicians and Registry staff, was implemented in Microsoft Office Access. A case note review of all bladder cancer patients diagnosed in 2010 & 2011 was performed, supplemented with two electronic sources: Clinical Oncology Information System (COIS), and the Cancer Patient Pathway System (CaPPS).

Included in the audit were data on 362 patients (98 women: 264 men) representing 98.4% of those diagnosed in 2010 & 2011. 21% of patients presented via A&E. Macroscopic haematuria was the most common presenting symptom. Women were more likely than men to present with abdominal pain, lethargy and weight loss, possibly reflecting later stage of disease at presentation. The majority of patients (86%) with Stage 1 had curative bladder-conserving treatment, while 11% had a cystectomy (bladder removal). A third of patients with more advancedstage disease (Stage 2 & 3) underwent cystectomy, 46% of patients had bladderconserving treatment, and 16% had palliative oncological treatment. Two-year net survival of women (47.6%) was poorer than men (57.4%) (see figure); further analysis suggested that stage of disease was responsible for part, but not all, of this survival difference.

The report made the following recommendations:

- 1. The public need to be educated about haematuria as an alarm symptom .
- Reasons for late and delayed presentation of bladder cancer should be investigated.
- 3. Access to urology services should be assessed

regionally.

- 4. The pathways for investigation and treatment should be explored to better stream-line urology services.
- Clinical Nurse Specialists should be available for all patients.
- Efforts to reduce the prevalence of smoking should continue as tobacco use is a major risk factor.

The report and summary are available to download from http://go.qub.ac.uk/hQbbc

Research Team:

Dr Finian Bannon, Dr Lisa Ranaghan, Dr Anna Gavin, Miss Jackie Kelly, Mrs Julie McConnell and Mrs Bernadette Anderson.

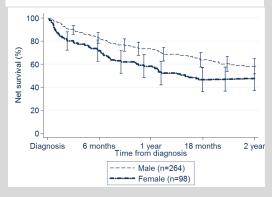








Net survival of male and female bladder cancer patients diagnosed in 2010 and 2011 in N. Ireland



Living with and beyond Prostate Cancer

This All-Ireland study funded by Prostate Cancer UK, R&D Office Northern Ireland and Health Research Board (HRB) in Ireland aims to measure the impact of investigation and treatment for prostate cancer on the physical and psychosocial health of men. Acute and late symptoms and quality of life have been quantified for men receiving different treatments up to 15 years post diagnosis.

Research Team:

Dr Anna Gavin, Dr Heather Kinnear, Dr David Donnelly and Mr Conan Donnelly, N. Ireland Cancer Registry.

Prof Linda Sharp, Dr Frances Drummond and Mr Eamonn O'Leary, National Cancer Registry, Ireland.

We are grateful to the funding received from PCUK as we have been able to quantify for the first time a population-based picture of the large amount of adverse physical effects from prostate cancer

treatments. Monitoring and treatment for ongoing adverse physical effects reported and experienced needs to be made a priority in the follow up care of these men.

Future Directions:

Further funding has been awarded by PCUK for an additional year which will allow us to explore men's experiences and physical and emotional wellbeing using data already collected as part of the initial research study. Results are currently being prepared for peer review publication and have been presented as prize winning poster and oral presentations at various national and international conferences.







N. Ireland Cancer Registry Planning & Development Day

The N. Ireland Cancer Registry Planning day was held on 24 March 2014. The day was attended by staff with input early in the day from members of the Registry Steering Group. It provided an opportunity for the team to share best practice, consider challenges and areas for improvement in the year ahead. Areas highlighted for discussion were identified by

staff. The morning session addressed specific business plan areas including data collection processes, data quality and research while the afternoon session focused on communication, process documentation and training.

Feedback from the planning day was positive and a number of initiatives have commenced / been delivered including

refinement of data quality procedures in the Registry, development of a series of standard operating procedures, use of project management tools to deliver core work and the creation of appropriate training facilities within the Registry. Further follow up work will be undertaken to ensure all recommendations from the planning day are realised.

National Awareness & Early Diagnosis Initiative

Over the last year significant progress has been made on the NAEDI (National Awareness & Early Diagnosis Initiative) CRUK funded study which aims to identify targets for early diagnosis interventions for lung and colon cancer. A scoping review to investigate factors associated with early death in lung and colorectal cancer, the potential for systematic review

and the current gaps in the evidence base has been completed. 70 studies were included following a review of over 2,500 articles. Only a few studies focused on diagnostic delay whereas there were many that investigated surgical volume, co-morbidity and age. Of the studies that were included, there was a considerable mix of populations, study design,

outcome measures and control groups. A draft report has been prepared.

Data collection has progressed well over the year with completion of note review for colon expected soon and lung commenced with an expected completion date for early 2015. The first results are expected in late summer 2014.

QUALYCARE-NI Study

The QUALYCARE-NI study funded by Cancer Focus Northern Ireland examines the end of life care of cancer patients in Northern Ireland, with an aim to establish key factors that enable cancer patients to remain at home.

The method and questionnaire were based on a similar study by Cicely Saunders Institute, Kings College London. In Northern Ireland the study was facilitated by the Northern Ireland Statistics and Research Agency (NISRA) and patient

and responder confidentiality was maintained.

Participants completed a questionnaire seeking their views on the care received in the three months before their relative died. 467 questionnaires were completed and the information provided has been analysed.

A summary of preliminary findings was distributed to participants in April and a comprehensive report of results is currently being finalised for

distribution in the summer.

Posters of preliminary results have been presented at conferences in Brighton, Birmingham and Liverpool. We wish to thank all those who participated, as their views have provided us with valuable information to inform health care professionals on how to best meet the needs of their future patients.



CONCORD-2

Dr Finian Bannon from the Registry has been working, on a part-time basis from February 2013 on CONCORD-2 with Professor Michel Coleman and his team in the London School of Hygiene and Tropical Medicine. This period of training has been funded by Cancer Focus Northern Ireland.

CONCORD-2 is estimating and comparing patient survival in the years 1995-2009 from 279 cancer registries in 60+ countries on patients diagnosed from 1995-2009, and in 10 cancer sites (stomach, colon, rectum, liver, lung, female breast, cervix, ovary, prostate and leukaemia). It is the largest study of its kind ever undertaken, and will assist the evaluation and progress to the World Cancer Declaration's goal of major increase in survival by 2020.

It is expected that the first results of the study will be published in late 2014 and follows from the first CONCORD study published in 2008.

Finian is learning new statistical skills that will enhance the statistical skills in the Registry including:

- 1. Latest methods to estimate and model net survival,
- Smoothing life tables which will facilitate regional net survival estimates within NI, e.g. by Trust area,
- Automation methods, derived due to the size of CONCORD study, which could speed up routine analysis in the registry, and
- Methods to display survival results that account for both the survival estimates and precision of those estimates.

He is also observing how this successful research group functions *in situ* along with meeting other cancer epidemiologists, which may develop into future research collaborations. Professor Coleman will fund a further secondment of Finian from September to December 2014 to continue the work on CONCORD.



Registry completeness compared with GP records

The N. Ireland Cancer Registry (NICR) has recently carried out a study validating the cancer registry's records with data held on cancer patients within GP surgeries. The

results are highly favourable, indicating that the registry data is more than 99% accurate. This study confirmed that the NICR is an accurate inventory of cancer

diagnoses within Northern Ireland and affirmed that the data can be relied on for international comparisons regarding incidence and survival.

Cancer Research Advancing Patient Care Event

Dr Anna Gavin, Registry Director, spoke at the Cancer Research Advancing Patient Care impact event in Riddel Hall, on Wednesday 11 June 2014.

This event highlighted the impact of research and development taking place within the Queen's Faculty of Medicine, Health and Life Sciences to advance cancer patient care.

Dr Gavin outlined the research which is undertaken by the Cancer Registry to improve the health and wellbeing of cancer patients and better understand some of the causes of cancer. The Research covers areas from Early Diagnosis to End of Life Care.





Dr Giulio Napolitano and Dr Therese Kearney providing information on the N. Ireland Cancer Registry at the Cancer Research Advancing Patient Care Event.

Professor Joe O'Sullivan,
Professor Richard Kennedy,
Professor Tracy Robson,
Dr Anna Gavin, Professor
James McElnay and
Professor David Waugh,
speakers at the Cancer
Research Advancing Patient
Care Event

UKIACR Quality and Performance Indicators

The United Kingdom Ireland Association of Cancer Registries (UKIACR) strives to improve quality assurance of data through the development performance ∩f national indicators (PIs). The UKIACR and Performance Indicators are carried out each year and enable comparisons of timeliness, quality and data completeness for England, Scotland, Wales and Northern Ireland. This year for the first time the National Cancer Registry of Ireland is involved.

The information was collated and an annual report produced,

consisting of a series of datasets, with accompanying explanatory commentary from each of the Registries.

In March, PIs for 2012 incidence of malignant cancers (excluding non-melanoma skin cancer (NMS)) were submitted. The N. Ireland Cancer Registry (NICR) is pleased to announce that the staging of our 2012 incident cancers exceeded the UKIACR target of 70%, with 73% of our malignant cancers (excluding NMS cancer) staged; an improvement on our 2011 data, which was 66%. The high level of staging information may

in part be attributed to the increased availability of information from electronic sources such as the Cancer Patient Pathway System (CaPPS), along with expertise of NICR Tumour Verification Officers and the pathological input from Dr Caughley, Dr Loughrey and Dr Venkatraman.

The detail of latest PIs for NICR may be found at:

http://www.qub.ac.uk/researchcentres/nicr/CancerData/ PerformanceIndicators/

International Cancer Benchmarking Partnership

The International Cancer Benchmarking Partnership (ICBP) is a multifaceted work programme aiming to measure variation in International Cancer Survival and explain these differences. The partnership involves twelve jurisdictions internationally including Northern Ireland, England, Sweden. Denmark, Wales. Norway as well as four Canadian provinces and two Australian states. The partnership was established in late 2009 with five main (modules) workstreams specifically focusing on four lung, diseases. breast. colorectal and ovarian cancer.

Module 1, a comparison of registry based data. This reported survival differences using routine data to investigate variation between participating countries. During 2013 papers were published investigating the role of stage at diagnosis in explaining survival differences. This work found problems in comparability of stage diagnosis between countries with the UK overall having lowest recording of stage at diagnosis across the four cancer sites. In the UK survival was poorer for patients diagnosed at the same stage in other countries. While there was evidence of late diagnosis of women in Denmark compared to other countries authors concluded that factors such as differences in treatment or access to treatment, differences in how doctors stage cancers and late diagnosis may partially explain the international cancer survival differences. The team have now turned their attention investigating treatment differences between countries with the first paper on lung cancer due to be published shortly.

Module 2, a population level survey into the general public's cancer awareness and beliefs

was completed in 2011 with the Northern Ireland survey supported by the Public Health Agency NI. Outputs continue to be prepared on the role of cancer awareness and delays in anticipated health seeking, melanoma symptom / risk factor awareness and the relationship between barriers to presentation and anticipated delay in health seeking.

Module 3, a study of GP beliefs and behaviours was undertaken in 2013. 140 NI GPs completed surveys also with PHA funding. Results are due to be published shortly.



Dr Paul Glover received an iPad on behalf of his father Dr Benedict Glover, Antrim Coast Medical Practice from Conan Donnelly in the N. Ireland Cancer Registry for a draw for GPs that participated in the ICBP Module 3 GP Survey.

Module 4 investigates delays in diagnosis and treatment of breast, colorectal, lung and ovarian cancer. Data are being collected from three sources; the patient (postal questionnaire), their GP (postal questionnaire, after patient consent), and from patient secondary care notes (data within the registry). A pilot study was successfully conducted from January 2013 to April 2013. The collection of data for the main study commenced mid June 2013 and will be completed by December 2014, with the exception of ovarian patients, where data collection will be extended until April 2015. Module 4, in combination with other ICBP modules, has significant potential to help improve the understanding of international differences in cancer survival. It also has the potential to inform future interventions aimed at reducing diagnostic intervals relating to patients, their health care providers, and their healthcare systems thereby improving outcomes.

The work in NI for Module 4 has been funded by Macmillan Cancer Support, the Guidelines Audit and Implementation Network (GAIN) and the Public Health Agency.

Module 5 is a high resolution audit into the extent to which variation exists in application of evidence based treatments across countries and the role co -morbidity may have explaining cancer survival. The study will involve data extraction from a range of electronic sources and is currently in the planning phase. Preliminary work has been undertaken in NI with funding from the PHA and data collected through recent GAIN funded audits of care for patients with ovarian cancer will allow successful delivery of this project in NI.







Official Statistics

Since 2012, the N. Ireland Cancer Registry is recognised as the producer of official cancer incidence and survival statistics in Northern Ireland.

Some key statistics:

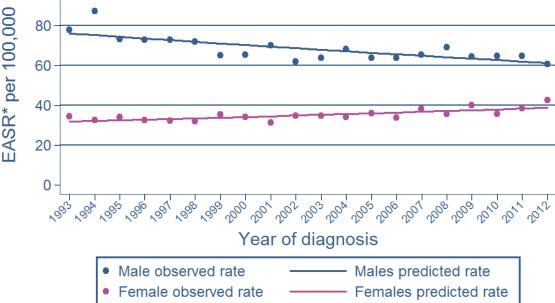
- 1. In 2012, 9,034 cancers were diagnosed in people in NI (this excludes 3,738 cases of the common but not generally serious nonmelanoma skin cancer). The most common types of cancer in men prostate (n=1024),lung and colorectal (n=634),(n=727). In women, the most common cancer types breast (n=1302), were colorectal (n=546) and lung (n=509).
- 2. From 1993 to 2012, femalebreast age-standardised

- cancer rates increased by 1.1% per year, female-lung cancer rates increased by 1.0% while male lung cancer rates decreased by 1.2% over the period. From 1995-2012 male-malignant melanoma rates rose by 2.9% and female-melanoma by 2.6%.
- 2008 3. From to incidence rates were higher in the least-deprived areas than the most-deprived areas for female breast cancer and malignant melanoma. Incidence rates were higher in the mostdeprived areas than the least-deprived for malecolorectal, cervical, and lung cancer. If the lung cancer incidence rates of the most-deprived areas were the same as in the
- least-deprived, there would be 178 fewer cases of lung cancer in women and 176 fewer cases in men diagnosed per year.
- 4. Five-year relative survival rates for patients diagnosed from 2003 to 2007 were as follows: female breast (80.4%), colorectal (52.7%), prostate (85.0%), lung (10.9%). These survival rates have all shown improvement compared to patients diagnosed in the period 1993 to 1996, though only slightly for lung cancer.

2012 Statistics are now available at

http://www.qub.ac.uk/research -centres/nicr/CancerData/

Lung cancer incidence rates in men and women in Northern Ireland 1993-2012



*European age-standardised rate

Recent Peer Reviewed Publications (April 2013 – March 2014)

2014

- 1. **Gavin A**, Rous B, Marcos-Gragera R, **Middleton R**, Steliarova-Foucher E, Maynadie M, Zanetti R, Visser O. Towards optimal clinical and epidemiological registration of Haematological Malignancies: guidelines for recording progressions, transformations and multiple diagnoses. European Journal of Cancer available online March 2014.
- 2. **Bannon FJ**, McCaughan JA, Traynor C, O'Brien K, **Gavin AT**, Maxwell AP, Comber H, Conlon PJ. Surveillance of non-melanoma skin cancer incidence rates in kidney transplant recipients in Ireland. Accepted by Transplantation January 2014.
- 3. Coleman HG, Bhat SK, Murray LJ, McManus DT, O'Neill OM, **Gavin AT**, Johnston BT. Symptoms and endoscopic features at Barrett's esophagus diagnosis: implications for neoplastic progression risk. American Journal of Gastroenterology 2014; 109:527-534.
- 4. Zanetti R, Schmidtmann I, Sacchetto L, Binder-Foucard F, Bordoni A, Coza D, Ferretti S, Galceran J, **Gavin A**, Larranaga N, Robinson D, Tryggvadottir L, Van Eycken E, Zadnik V, Coebergh JWW, Rosso S. Completeness and timeliness: Cancer registries could/should improve their performance. Eur J of Cancer available online January 2014.
- McClements J, Fitzpatrick D, Campbell WF, Gavin A. Changes in Management and outcome of patients with rectal cancer in Northern Ireland: 1996-2006. Colorectal Disease 2014 Feb;16(2):O58-65. doi: 10.1111/codi.12484.

<u>2013</u>

- Donnelly DW, Hegarty A, Sharp L, Carsin AE, Deady S, McCluskey N, Comber H, Gavin AT. The impact of adjustment for socio-economic status on comparisons of cancer incidence between two European countries. Journal of Cancer Epidemiology Volume 2013 http://dx.doi.org/10.1155/2013/612514.
- Quaife SL, Forbes, LFL, Ramirex AJ, Brain KE, Donnelly C, Simon AE, Wardle J. Recognition of cancer warning signs and anticipated delay in help-seeking in a population sample of adults in the UK. Br J Cancer. Jan 7, 2014; 110(1): 12–18 doi: 10.1038/bjc.2013.684.
- 3. Sharp L, **Donnelly D**, Hegarty A, Carsin AE, Deady A, McCluskey N, **Gavin A**, Comber H. Risk of several cancers is higher in urban areas after adjusting for socio-economic status. Results from a two -country population-based study of 18 common cancers. J Urban Health. 2014 Jun;91(3):510-25. doi: 10.1007/s11524-013-9846-3.
- 4. Gatta G, Botta L, Rossi S, Aareleid T, Bielska-Lasota M, Clavel J, Dimitrova N, Jakab Z, Kaatsch P, Lacour B, Mallone S, Marcos-Gragera R, Minicozzi P, Sanchez Perez MJ, Sant M, Santaquilani M, Stiller C, Tavilla A, Trama An, Visser O, Bonet RP and the **Eurocare Working Group**. Childhood cancer survival in Europe 1999-2007: Results of EUROCARE-5-a population-based study. The Lancet Oncology, Volume 15, Issue 1, Pages 35 47, January 2014. doi:10.1016/S1470-2045(13) 70548-5. (Northern Ireland Data included via Cancer Registry and member of Project Steering Group)
- De Angelis R, Sant M, Coleman MP, Francisci S, Baili P, Pierannunzio D, Trama A, Visser O, Brenner H, Ardanaz E, Bielska-Lasota M, Engholm G, Nennecke A, Siesling S, Berrino F, Capocaccia R, Eurocare-5 Working Group. Cancer survival in Europe 1999—2007 by country and age: results of EUROCARE-5—a population-based study. The Lancet Oncology, Volume 15, Issue 1, Pages 23 -34, January 2014. doi:10.1016/S1470-2045(13)70546-1. (Northern Ireland Data included via Cancer Registry and member of Project Steering Group)
- 6. Carney P, **Gavin A**, O'Neill C. The role of private care in the interval between diagnosis and treatment of breast cancer in Northern Ireland: an analysis of Registry data. BMJ Open Access December 2013 Vol 3 No. 12. doi:10.1136/bmjopen-2013-004074.
- 7. **Bannon FJ**, O'Rorke MA, Murray LJ, Hughes CM, **Gavin AT**, Fleming SJ, Cardwell CR. Non-steroidal anti-inflammatory drug use and brain tumour risk: A case-control study within the Clinical Practice Research Datalink. Cancer Causes and Control, 2013 Nov;24(11):2027-34. doi: 10.1007/s10552-013-0279-9.
- 8. McKinley J, Ofterdinger U, Young M, Barsby A, **Gavin A**. Investigating local relationships between trace elements in soils and cancer data. Spatial Statistics Vol. 5, 08.2013, p. 25-41. DOI: 10.1016/j.spasta.2013.05.001.
- Hunter HL, Dolan OM, McMullen E, Donnelly D and Gavin A. Incidence and survival in patients with cutaneous malignant melanoma: experience in a UK population, 1984-2009. Br J Dermatol. 2013 Mar;168(3):676-8. doi: 10.1111/bjd.12046.

Staff News

Excellence in Innovation Award



Dr Giulio Napolitano received the Excellence in Innovation Award at the School Annual Celebration of Excellence in March. Giulio led international team in the development of CanStaging, a web tool to facilitate the staging of cancers, originally with Dr designed Lisa Ranaghan in the Registry. The tool calculates cancer staging

even when partial information is entered. This will improve availability, standardisation and comparability of cancer staging internationally.

CanStaging was released in May and a new release, with additional features,

is expected at the beginning of July.

The project represents a joint effort of the N. Ireland Cancer Registry (NICR) and the Global Initiative for Cancer Registry Development of the International Agency for Research on Cancer (WHO) and the TNM Working Group of the Union for International

Cancer Control. The NICR and the QUB profiles have been positively impacted by the tool, which is hosted on a QUB server. Over 50 organisations from 39 countries requested access to the tool and Giulio receives new requests weekly. Feedback has been enthusiastic from users all over the world and Giulio has been invited to present. demonstrate discuss CanStaging at several past and future international meetings, webinars conferences, including the UICC 2014 World Cancer Congress in December.

Access to the tool may be requested from http://go.gub.ac.uk/CanStaging.

Welcome to New Staff

In November 2013 we welcomed Jacqui Napier and Brid Morris (pictured right) to the Registry working as Tumour Verification Officers. They are both currently assisting with the National Awareness and Early Diagnosis Initiative amongst other routine Registry work.

Dr Kerry Moore (not pictured) was recruited in November 2013 to cover maternity leave and to work on the ICBP Module 4 project. Kerry is also now on maternity leave and we wish to congratulate Kerry and her husband on the birth of their daughter Lara on Tuesday 25 June 2014.



Dr Therese Kearney (pictured left) also joined the Registry in November 2013 as a Research Fellow and completed the final write up of the GP Comparison Study. Therese is currently working on the ICBP Module 4 project.



I-r Jacqui Napier and Brid Morris, Tumour Verification Officers

Farewell



Dr Richard Middleton, the Registry's Data Manager, retired at the end of November 2013. Richard began his 19 years with the Registry in the autumn 1994, with his first engagement taking him to various UK registries to assess their methods and registration processes. He

was the third member to join the Registry at that time. Over the years Richard has provided much valuable advice and assistance to staff within the Registry as well as to colleagues in the UK, Ireland and further afield. He has worked with the European Network of Cancer Registries to promote and share knowledge on automated cancer registration through the organisation and delivery of various workshops. He has also represented the NICR at a UK level, with significant contributions to tumour coding and classification as well as data quality measures. We will greatly miss his presence in the registry

but wish him a long, happy and enjoyable retirement.

In March this year we bid farewell to Kate Donnelly, one of our Tumour Verification Officers, who retired after nearly 16 years service within the Ireland Cancer Kate was a Registry. valued member of staff, whose work contributed to the high quality data that the Registry is known for. Additionally Kate collated data for a



number of cancer services audits and more recently was part of the National Awareness & Early Diagnosis Initiative study team. Kate was not only an extremely diligent person but her great sense of fun brought many a chuckle to the morning tea break. We wish Kate an enjoyable retirement.

Congratulations

Giulio Napolitano has been awarded a PhD by the School of Mathematics and Physics, Queen's University Belfast, with a dissertation titled Ontologybased Information Extraction from Pathology Reports for Cancer Registration. In his parttime research at the Centre for Statistical and Operational Research, he developed an ontology-based technique to exploit the information contained in free-text surgical pathology reports for breast cancer patients.

The techniques combine semantic tools (ontologies) with statistical (machine learning) and pattern searching (regular expression) techniques to find in the reports information to be stored in the N. Ireland Cancer Registry. The main benefits of this research are the resultant cost savings and augmented completeness and accuracy of both routine cancer registrations and study-specific cancer data collection for cancer registries.



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