Journal of Radiotherapy in Practice

Journal of Radiotherapy in Practice (2006)
5, 177–185

doi: 10.1017/S1460396906000240

Abstracts

Abstracts for papers presented at the Radiotherapy in Practice 3 Conference, Sheffield Hallam University, UK

9th/10th September 2006

DEVELOPING SPATIAL COGNITION OF COMPLEX ANATOMY USING AN IMMERSIVE VISUALISATION ENVIRONMENT

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Introduction and Purpose

The success of many clinical tasks is dependent upon good spatial anatomical knowledge. There have been attempts at using virtual reality environments (VRE's) to facilitate the development of such knowledge[1–3] but various limitations in this previous work means it is difficult to draw any conclusions as to the value of immersive visualisation technologies in enhancing spatial cognition.

The purpose of our work was to develop a virtual, interactive model of a complex 3D anatomical structure (the brain) using an immersive visualisation environment and to evaluate its educational potential through assessing the extent to which it enhances the development of a 3D mental map.

Method

A pragmatic randomised controlled trial compared the IVE model with a conventional plastic model of equivalent detail and complexity for enhancing spatial cognition of brain anatomy. Pre-registration students from radiotherapy and diagnostic imaging at Sheffield Hallam University were randomised to undertake a simple self-directed tutorial using one of these methods. Based on methods described by Garg et al.,[1] students were assessed on their anatomical spatial knowledge before and after the self-directed tutorial. Independent t-tests compared differences in both interventions. Pre- and post-questionnaires collected further quantitative and qualitative data and follow up interviews explored and established the student experience in more detail.

Results and Conclusions

Results and conclusions are not yet available but will be presented.

Contents of Presentation

(1) Description and discussion of the application. (2) Discussion of results of the study. (3) Conclusions, implications for curricular design and indications of future research.

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INVOLVING SERVICE USERS IN EDUCATION – DRIVERS AND BARRIERS

Helen Armitage

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Although service user involvement and patient and public participation have been on the policy agenda for the best part of a decade, very little attention has to date been given to practical mechanisms for systematically embedding meaningful involvement of patients, service users and carers in education as delivered by Higher and Further Education (DoH, 2001, 2004).

Recent government publications (DoH, 2005a, 2006) have emphasised the significance of service user involvement in the planning and delivery of health and social care services and the need for meaningful choice (DoH, 2005b). As educators of the future workforce we are one step removed from those receiving these services. Consequently, we have to find creative ways of ensuring that learning is patient focussed and set in the reality of practice.

Most qualified staff can remember learning something profound and illuminating from a former service user or carer. These kinds of experiences tend to be the most memorable and are the ones that students refer back to at the end of their training. Service users and carers have a unique contribution to make to training in core skills such as listening, empathy and advocacy.

The Faculty of Health and Wellbeing at Sheffield Hallam University seeks to involve patients, service users and carers in interprofessional learning that is meaningful and in touch with reality. This paper will describe how we have integrated service users into our interprofessional learning program and the challenges this poses for staff, students and service users themselves.

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THE ROLE OF THE RADIATION THERAPIST IN BRACHYTHERAPY

Catherine Beaufort

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The role of the radiation therapist in the area of Brachytherapy has changed considerably over the last ten years. At the Alfred Hospital in Melbourne, Australia we, as radiation therapists, have a major role in the Brachytherapy area, as planners, treaters and coordinators.

At the Alfred the majority of the Brachytherapy workload is treating prostate cancer. The treatment options include a permanent iodine seed implant or high dose rate Brachytherapy. We occasionally treat different sites with HDRB such as tongue, rectum and gynaecological cancers.

Our role involves coordinating the workload for the brachy team, which comprises booking theatre, urologists, radiation oncologists, physicists, nurses and radiation therapists. We are involved in planning Brachytherapy treatments, both iodine seed implants and HDR Brachytherapy. We operate the ultrasound machine for volume studies and we CT patients one month after they have had a seed implant.

In the Brachytherapy area, like other areas of radiotherapy, we are continually introducing new equipment and techniques. The RTs work in a multidisciplinary team to assist in implementing this, generally with radiation oncologists, physicists and other RTs. RTs often play a major role in research projects, again working in a multidisciplinary team

https://doi.org/10.1017/S1460396906000240 Published online by Cambridge University Press

with much encouragement to present at conferences, both locally and overseas.

As a whole the role of the Radiation Therapist in Brachytherapy is both diverse and interesting. We are fortunate to work in a multidisciplinary team, which enables us to ultimately provide the best treatment for our patients.

AN IMAGE-GUIDED DEVICE PROVIDING 4D CINÉ MRI SIMULTANEOUS TO RADIOTHERAPY DELIVERY

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We present the design of an image-guided intensity modulated radiation therapy (IGIMRT) device currently under development. The device, named the Renaissance™ (ViewRay, Inc.), consists of the combination of an open split solenoid MRI scanner and a three headed 60Co γ-ray intensity modulated radiation therapy (IMRT) unit. The open MRI is designed to have a vertical gap allowing the center of the MRI field of view (FOV) to coincide with the radiotherapy isocenter of the γ-ray IMRT unit. This combination allows the device to provide the 4D Ciné MRI data necessary to obtain daily: assessment of intra-fraction motion; soft tissue based localization; and a reconstruction the actual daily dose delivered to the patient. The open MRI has a low field to improve the spatial integrity of the MRI data and to avoid perturbations in the dose distribution due to the influence of the magnetic field on the transport of secondary electrons. Computational studies will be presented to demonstrate: the compatibility of the MRI and ferromagnetic 60Co source; the treatment plan quality of the γ-ray IMRT unit; the impact of the MRI magnetic field on delivered dose distribution; and the feasibility of performing accurate heterogeneity dose computations with MRI data. The novel combination of an open MRI and a γ-ray IMRT unit into a single integrated device is technically feasible and promises to enable the first IGIMRT device capable of performing real-time volumetric imaging simultaneous with radiation delivery.

INTRODUCTION OF TOMOTHERAPY INTO A CLINICAL DEPARTMENT

Mark Elsworthy

Treatment Supervisor, Cromwell Hospital, Cromwell Road, London, UK

The Tomotherapy Hi-ART system combines the benefits of helical intensity modulated treatment with on-line volumetric MVCT imaging. A research team from the University of Wisconsin, USA, developed the commercially available Tomotherapy system. These have so far been installed in over 40 centres in the US and Canada since 2002, and are rapidly being installed in centres throughout Europe and Asia. The Cromwell Hospital, London, is the first radiotherapy department in the UK to introduce Tomotherapy and will become the first centre in the world to solely rely on Tomotherapy Hi-ART to provide Megavoltage radiation treatment.

Implementation of Tomotherapy at the Cromwell was carried out as part of a major investment to upgrade cancer services at the hospital. This included the installation of a PET-CT scanner, a new orthovoltage unit and refurbishment of the entire department over an 18-month period. Following initial stage meetings that involved consultant users of radiotherapy services, a multi-disciplinary implementation group was formed to discuss issues including changes to clinical working practice, staff training, staff roles and responsibilities, the commissioning process and promotion of Tomotherapy.

Conforming to rigorous IR(ME)R regulations meant there were many hurdles to overcome, yet in doing so, we were able to use the Tomotherapy system to treat our patients with confidence. Immediate benefits afforded to the patients were evident from the onset and can be demonstrated in the conformity of the dose distributions and through the online verification of patient setup's using MVCT.

https://doi.org/10.1017/S1460396906000240 Published online by Cambridge University Press

THE EFFECT OF AUTO-SETUP AND TREATMENT ROOM DOORS ON RADIOTHERAPY FRACTION TIME

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Use of auto-set for patients where both the risk of collision damage during gantry rotation is minimal and where appropriate quality checks can be made has been introduced. Its effect on fraction time at Cookridge Hospital was examined to predict the potential capacity increase that would accrue if it was used for all techniques without couch rotation. Here the fraction times for four comparable techniques are compared for linacs with doors and those with mazes, and with BTE study results in Australasia where auto set was used. Overall efficiency is also discussed. The time from the first beam on to the last beam switching off was measured in addition to the overall treatment time.

The most valid data is for 4 field pelvis (higher numbers of patients), with a time saving of 1.88 min on the first beam on to last beam off using auto set, and 2.13 min saved overall per fraction. A saving of 2.08 min beam time and 1.4 min fraction time on two field pelvis (with lower numbers) was also seen. The fact that a saving was seen on two out of four of the comparable techniques, plus a potential saving of 1.5 min on a third, indicates that overall savings on common techniques can be made.

CLINICAL IMPLEMENTATION OF KV IMAGING

Angela Heaton

Research and Development Clinical Specialist Radiographer, Radiotherapy Department, Clatterbridge Centre for Oncology NHS Trust, Wirral, Merseyside, UK

Introduction

The first UK clinical installation of Varian's On Board Imager took place at Clatterbridge Centre for Oncology in May 2205. This presentation details the experience gained implementing kV imaging including suggestions of sites where it may be useful and training issues to consider.

Equipment – On-Board Imager

IGRT techniques aim to improve set-up accuracy, and so potentially allow smaller margins to be applied and/or escalate dose. The On-board imaging equipment is capable of KV imaging for improved quality as well as MV imaging. It is also capable of fluoroscopic imaging and cone beam CT.

Clinical Cases – Current

Examples will be given of current clinical cases including the use of the 2D match facility and development of a supine CNS technique. Respiratory gating has been successfully implemented using the Varian RPM system and the fluoroscopic mode of the OBI will be discussed with reference to this technique. Cone beam CT is now used routinely as part of the verification process for Stereotactic patients. The dose implication of the use of CBCT will be considered and example doses shown. The frequency of CBCT verification is under discussion.

Clinical Cases – Future

The On-board imager will be utilised in a number of future departmental research projects. These will be presented.

Discussion

Planar kV imaging can be successfully introduced as routine practice into the working day of a busy linear accelerator without impacting on treatment times. CBCT is thought to provide the most accurate method to assess positioning accuracy making it particularly useful for stereotactic patients. Issues surrounding successful implementation of kV imaging systems including staff training, resource implications and dose measurements must be considered carefully.

https://doi.org/10.1017/S1460396906000240 Published online by Cambridge University Press

ACADEMIC CLINICAL ONCOLOGY AND RADIOBIOLOGY RESEARCH NETWORK (ACORRN) – WHO ARE WE AND WHAT DO, WE DO?

Gillian Heap

ACORRN Research Manager, Academic Department of Radiation Oncology, The University of Manchester, Christie Hospital NHS Trust, Withington, Manchester, UK

ACORRN (the Academic Clinical Oncology & Radiobiology Research Network) was launched in 2005 by the National Cancer Research Institute to revitalise radiotherapy and radiobiology research in the UK. The network was established in response to the sharp decline over the past ten years in the number of clinical academics and radiation biologists. The decline had left the UK's radiotherapy and radiobiology communities with insufficient infrastructure and capacity, despite radiotherapy seeing one of the most rapid advances in technology and computerisation of any field of medicine.

The aim of ACORRN is to modernise radiotherapy research by establishing networks to support individuals and groups, by developing an integrated UK strategy and by providing the supporting infrastructure. Since its inception ACORRN have seen a number of major developments. A website including a discussion forum and interactive database has been launched and is actively used within the research community, see www.acorrn.org. The website serves as a hub of information allowing researchers to locate and contact each other and search for information on projects, institutions and opportunities, quickly and easily. Research Topic Specific Networks and Working Parties have been set up to fuel research expansion. They are designed to bring like minded researchers together from different centres and disciplines to work on possible grant applications. ACORRN Surveys have also been initiated and reported across the UK. A strategic vision for the future of UK Radiotherapy and Radiobiology research is in development and resulted in a UK wide consultation in collaboration with all ACORRN Committee members.

EVALUATION AND IMPLEMENTATION OF A NEW HEAD AND NECK IMMOBILISATION SYSTEM

Darran Kellett, Julie Massey, Mark Blinkhorn, Mike Kirby

Rosemere Cancer Centre, Preston, UK

The head and neck immobilisation system (ORFIT) currently used at Rosemere Cancer Centre has served the department well for many years. However, as materials and techniques have advanced, it was felt that a new system (S-Frame) was justified. This paper describes the process used to commission, evaluate and clinically implement the new system. The main sections are:

- Measurement of physical properties-thermoplastic, headrests and baseboards.
- Training for the consistent application of the new material.
- Fabrication of "fixing bars" for non-indexed couch tops.
- Evaluation of set-up accuracy using MV portal imaging.
- Comparison with current (ORFIT) and published data.
- Trialling the system using an anthropomorphic phantom.
- Implementation of system for all radical CT H&N patients.
- Imaging studies on the first cohort of radical CT patients.
- Future possible uses of the methodology developed during this project.

Results so far compare very well with ORFIT and published data; 100% (AP) and 97% (CC) of all total positioning errors are within 5mm. "Fixing bars" have been successfully designed, risk-assessed and commissioned for all stages of the radiotherapy process. Initial results from the phantom study show that there should be no significant systematic errors in the chain of shell preparation, CT scanning, simulation and treatment. This has allowed work to begin with radical brain patients.

Our work has used an evidence-based approach for introducing change in a radiotherapy technique. If proven successful, it will be a model for further changes within the department.

https://doi.org/10.1017/S1460396906000240 Published online by Cambridge University Press

CANCER PATIENT'S PERCEPTIONS OF USING A "BREAST GOWN": A QUALITATIVE STUDY

Melanie McLean

Senior 1 Therapy Radiographer, James Cook University Hospital, Marton Road, Middlesbrough, UK

This study aimed to investigate patients' perceptions of the breast gowns using a qualitative, phenomenological approach (Husserl 1859–1938).

The methodology chosen allowed the researcher to explore patient's feelings about their experiences throughout their cancer journey without the influence of the researchers view. A convenient sample size of ten participants was used, five who wore a gown and five who did not for Radiotherapy treatment. This sampling technique allowed the researcher to recruit those patients who were willing and able to discuss their experiences. All participants were asked to complete the Hospital Anxiety and Depression Scale before commencing the study. Ethical approval was sort from all the relevant boards. The data was collected through semi-structured interviews, which were then transcribed and analysed. The transcripts were analysed via content analysis by the researcher and an independent researcher to ensure inter-rater reliability.

The key themes highlighted from the study were: patient's emotions; privacy and dignity issues; exposure; patient choice and possession. The themes that emerged were different to those anticipated before the bracketing process showing that the issues surrounding patients' emotions is still a learning curve.

The results of this study however, cannot be generalised due to the methodology chosen however; the results can aid the development of a multi-centred study to investigate this topic further.

BIN THE SIM? – IS REMOVAL OF THE CONVENTIONAL SIMULATOR A SENSIBLE OPTION?

Alan Needham

Simulator Superintendent, Cookridge Hospital, Leeds, UK

The widespread adoption of CT-based simulation has given rise to a new phenomenon of the Radiotherapy department operating without the facility of a "conventional" simulator. Such departments, few in number, have usually been characterised as being single simulator centres who upon replacing their existing unit have faced an either/or choice with regards to the two modalities. Understandably some have considered that on balance the opportunities afforded by CT simulation were too good to pass by.

However, many larger "multi" simulator departments now find themselves having to make similar decisions. At Cookridge, our 2007 move to a purpose built Oncology centre with four simulation units, has provoked much debate as to the optimal balance between CT-based and conventional simulation, and whether the latter is required (or even desirable). The option of total CT-based simulation, the preferred choice of most simulator radiographers, has inevitably raised concerns over the future ability of the department to provide a service capable of meeting the requirements of all patients, should fluoroscopy be unavailable. It was suggested that a small but significant proportion of patients may be disadvantaged, or that there could be an adverse impact on Linac efficiency if some current simulator functions were transferred to the treatment floor.

This paper will seek to identify arguments for and against the maintained provision of a conventional simulator, and to identify CT-Sim solutions for those "techniques" and patient cohorts for whom such a unit represents the current modality of choice.

https://doi.org/10.1017/S1460396906000240 Published online by Cambridge University Press

RETENTION OF THERAPY RADIOGRAPHERS: AN NVESTIGATION OF THE FACTORS THAT INFLUENCE INTENTIONS TO LEAVE

Heidi Probst
Sheffield Hallam University, Sheffield, UK

Background
High vacancy rates and an unsatisfied workforce significantly limit the access of cancer patients to appropriate care that has deleterious effects on health outcomes through delays in treatment. Vacancy rates for therapy radiographers rose from 7.1% in 2000 to 10.7 in 2003.[1] Despite recent improvements in vacancies, current rates for therapy radiographers are still double that for nurses, midwives and allied health professions as a whole.[2] So what are the factors that influence therapists' job satisfaction and ultimately their intentions to leave? This presentation will outline the Phase I results of a prospective case study investigation.

Method
A Grounded Theory approach was used to analyse data from individual interviews held with therapy radiographers (n = 18) across three participating institutions. The purposive sample included radiographers across all clinical grades including staff in specialist and generalist posts, those within one year of qualification to individuals with more than 20 years of experience. Sampling continued until data saturation was achieved (that is no further new themes emerged from the interviews).

Results
A model to explain job satisfaction in therapy radiographers is hypothesised based on the themes identified from the analysis of the transcribed interviews. Specific themes were consolidated into three main areas of importance:

1. Leadership and Organisational Governance.
2. Job design.
3. Stress or burnout.

The proposed model will be tested within a quantitative longitudinal study (phase II). The results of phase I may be useful for key stakeholders, including radiotherapy managers, those responsible for workforce commissioning, radiotherapy educators and radiotherapy practitioners.

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THE ONCOLOGY HEALTH CENTRES: PSYCHO-ONCOLOGY RESEARCH IN THE REAL-WORLD NHS

Donald M. Sharp
University of Hull, Hull, UK

The Oncology Health Centres are an established part of the cancer services in Hull and East Yorkshire Hospitals NHS Trust. The Centres which were established in the year 2000 provide a fully integrated psycho-oncology support and intervention service which is available for all patients with cancer and their families in Hull and the East Riding of Yorkshire. The Centres are staffed by a multidisciplinary team including specialist nurses and clinical psychologists. In addition to the clinical service the Centres have been designed to provide a research infrastructure which supports an extensive portfolio of ongoing studies.

The Oncology Health Centres will be described and some of our recent research findings presented. Particular emphasis will be given to the findings of our recently completed large scale randomised controlled trial on the psychoneuroimmunological effects of reflexology in women with early breast carcinoma. In this study women with early breast cancer were randomised to self-initiated support (SIS) (comparator intervention), SIS plus reflexology, or SIS plus scalp massage (control for physical and social contact). Patients randomised to reflexology and massage had eight sessions at weekly intervals. The primary and secondary endpoints were 18 and 24 weeks post-surgery, respectively. Pre-randomisation, and at the two endpoints, blood was taken to assess hormonal and immune system function. Mood, coping and quality of life were assessed at the same time points using standardised tests. The implications of these research findings for future clinical service development will be discussed.

https://doi.org/10.1017/S1460396906000240 Published online by Cambridge University Press

A STUDY ON RADIATION THERAPISTS' PERCEPTION OF A SUPPORTIVE CARE INITIATIVE POST-RADIATION THERAPY

Marcia Smoke, Lindsay Huff
Head of Radiation Therapy/Manager of Radiation Therapy, Juravinski Cancer Centre, Hamilton, Ontario, Canada

Aims
During the weeks following the completion of radiation therapy and before a patient's follow-up appointment, a patient experiences a number of stresses as a result of the treatment. Acute radiation side effects peak two weeks following treatment completion. This is a time when patients are no longer interacting daily with radiation therapists. Patients also undergo psychological, social and spiritual transitions. These physical and psychosocial adjustments can cause increased anxiety for patients.

In Hamilton, Ontario, Canada, currently no support system exists for radiation therapy patients post-treatment, and therefore there is a lack of knowledge of patients' needs and experiences.

This study's objective was to determine radiation therapists' perception of the supportive care needs of patients after the completion of radiation therapy. The study also investigated the therapists' perspective and attitude of the practice of telephoning patients post treatment.

Methodology
A cross-sectional quantitative survey was administered to radiation therapists at the Cancer Centre (n = 98); the response rate was 73%.

Results
The study demonstrated a perceived need for the practice of telephone-mediated care post-treatment. The majority (57%) of therapists surveyed believed that patients would benefit from this practice; and 58% thought the practice should be initiated. Also, 74% of the respondents indicated that the practice could have a potential for increasing therapist job satisfaction.

Conclusion
The response received from the study population is promising and encouraging as all hypotheses were proven to be true. The need for telephone-mediated care requires further empirical study to demonstrate patient-related benefits of telephone intervention and support.

INTEGRATION: IS IT POSSIBLE?

Sue Stephenson
Manager Holistic Cancer Care Centre, JCUH

The use of complementary therapies has always received mixed bag of opinions particularly over the last few months. The main debate has been the cost implication and whether they contribute to the well being of patients living with a diagnosis of cancer? In her presentation Sue will cover the following:

- Why and how the Oncology Department in Middlesbrough decided to pursue a holistic approach to patient care?
- Audit findings.
- Cost implications of running such a service.
- Integration into a NHS setting: can it work?
- Benefits to patients.

The Holistic Cancer Care Centre does not profess to know all there is to know about complementary therapies but has gained quite a lot of information and knowledge over the years it has been providing patients with the service and is more than willing to share that with others.

https://doi.org/10.1017/S1460396906000240 Published online by Cambridge University Press

PRECISION OF THE SONARRAY ULTRASOUND DEVICE FOR PATIENTS UNDERGOING RADICAL CONFORMAL RADIOTHERAPY FOR PROSTATE CANCER

James Swinscoe
Research Radiographer, Weston Park Hospital, Sheffield, UK

August 2003 saw the implementation of IMRT into Weston Park Hospital, Sheffield. A number of patients over a variety of sites have now been treated. To assist our IMRT programme we purchased the first SonArray Ultrasound in the UK. This was commissioned in May 2004. Training and subsequent evaluation of images is ongoing.

From 20 September 2004, Weston Park Hospital will be conducting further trials in Prostate treatments using the SonArray. Studies have proven the prostate gland moves significantly depending upon bladder and bowel filling. To implement IMRT prostate treatments, we required a method of daily target localisation. Many papers have been published looking at prostate motion. Centres have used portal images with implanted seeds, others have used multiple CT scans to quantify prostate motion.

A method of daily target localisation has the potential to allow reduction in margins. US offers a non-invasive technique to help achieve this, in comparison to the insertion of radio-opaque seeds with their inherent risk of bleeding, infection and migration.

Assessment of both intra- and inter-observer variability using the SonArray Ultrasound device has now been undertaken. The project recruited 73 patients in the intra-observer and 100 patients for the inter-observation study. A further study involving 20 patients will allow for the quantification of set-up and organ motion variations separately. Orthogonal EPI's will assess the set-up variation alone.

Administrative responsibilities are undertaken by a full time Research Radiographer and a Clinical Research Fellow.

JUSTIFICATION OF MEGA-VOLTAGE CT IMAGING PRIOR TO TOMOTHERAPY

Nadia Walsh
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The Tomotherapy Hi-Art unit is a dedicated helical IMRT system with integrated image guidance facility for online treatment verification. Mega-voltage CT (MVCT) provides 3D visualisation of the target and surrounding soft tissue structures within the patient, prior to treatment delivery. This provides information to allow practitioners to perform online correction for set-up error and/or organ motion that may compromise the desired clinical outcome. However, Ionising Radiation (Medical Exposures) Regulations 2000 clearly state that non-treatment exposures can be justified only if resulting in a direct patient benefit.

Prior to clinical implementation of the Tomotherapy Hi-Art unit into the Cromwell Hospital Cancer Centre, a research-based approach to inform justification of image-guidance was undertaken including review of immobilisation techniques, previous EPI protocols and published organ motion studies. Roles of the referrer, practitioner and operator within the department were re-established to address the application of IR(ME)R 2000 to Tomotherapy's MVCT imaging.

This paper will discuss the departmental procedures for justification of MVCT imaging which have been developed to provide a safe and efficient radiotherapy service for patients at the Cromwell Hospital Cancer Centre.

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