more than their corresponding subsequent daily treatment times. Radiation oncologists need to be cognizant of these issues in everyday management of their patients.

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**Workflow Management: Impact on the ergonomics of a Radiotherapy department in a developing country**

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**Purpose or Objective:** Integration of multiple technical aspects like treatment prescription, planning, delivery and quality assurance is paramount for smooth and efficient functioning of any radiotherapy department. In the developing world, bearing 60% of global cancer burden, efficient management of available resources assumes even greater importance. Workflow management software is a tool available for effective resource management in radiotherapy. The purpose of this audit is to evaluate the impact of implementation of workflow management on the organisational ergonomics of our department.

**Material and Methods:** Workflow management software (Aria v 11.0™) has been in use in our department since October 2014. Prior to that, on-paper documentation was the predominant mode of communication between physicians and physicists for all forms of conformal treatment planning. Case records of patients who were treated with conformal radiation in the two month period prior to and after the implementation of workflow management were retrospectively evaluated. Proportion of cases for which treatment was started on the day of appointment was taken as a surrogate for work efficiency, which was the primary end point in this study. Other variables, like time available for target delineation (Td), treatment planning (Tp) and plan evaluation (Te) were analysed for different conformal techniques as secondary end points.

**Results:** Of the 343 cases analysed, 190 were treated before implementation of workflow management (group 1), while 153 were treated after that (group 2). The mean gap between planning CT scans and date of treatment (overall planning time, To = Td + Tp + Te) was 5.25 days for group 1 and 6.53 days for group 2 (p=0.104). Among 3D-CRT plans, 29% were not started on the day of appointment in group 1, while 20% were not started on time in group 2 (p=0.13). However, mean time available for planning and evaluation (Tp + Te) increased from 1.3 days in group 1 to 2.8 days in group 2 (p=0.01), without significant increase in overall planning time (To).

In group 1, 71% of IMRT plans were not started on time, while only 27.2% were not started on time in group 2 (p<0.0001). Overall planning time (To) for IMRT decreased from a mean of 9.4 days to 5.9 days, after workflow management. Such improvements in work efficiency are essential for resource management in developing countries.

**Conclusion:** Implementation of workflow management resulted in significant improvement in work efficiency, as evidenced by an increase in proportion of cases started on time; this improvement was more substantial for IMRT planning. Time available for planning and evaluation also significantly increased with workflow management. Such improvements in work efficiency are essential for resource management in developing countries.

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**Analysis on research and cooperation status of heavy ion J. Tian1, Q. Zhang1, X. Wang1, H. Zhang2 1Chinese Academy of Science, Institute of Modern Physics, Lanzhou, China 2Gansu Cancer Hospital, Department of Radiotherapy, Lanzhou, China

**Purpose or Objective:** To analyze the status of research on heavy ion using the social network analysis methods and analytical methods bibliometric methods.

**Material and Methods:** We searched PubMed database by (“heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract]) AND (“heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract]) AND (“heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR “heavy ion radiotherapies”[Title/Abstract] OR “heavy ion radiotherapy”[Title/Abstract] OR “heavy ion therapies”[Title/Abstract] OR (“hellion ion”[Title/Abstract] OR “helium ion”[Title/Abstract] OR “helium ion”[Title/Abstract] OR “heavier ions”[Title/Abstract]) AND (Radiotherapy[Title/Abstract] OR radiotherapies[Title/Abstract] OR radiation therapy [Title/Abstract] OR radiations therapies [Title/Abstract] OR (“radiotherapy”[Subheading] OR “Radiotherapy”[Mesh]) to collect all relevant research on heavy ion. The related software was used to extract the information of author, country, year of publication, publication year,MeSH terms and journal name. SPSS17.0 was used to analyze the frequency and percentage. NetDraw software was used to draw the social network plot.

**Results:** 907 studies were retrieved. The number of studies on heavy ion were increased from 1975 to 2014, the author