

income quartile (HR = 0.92, 95% CI = 0.88 to 0.95). Compared to patients who did not undergo surgery or receive definitive RT, surgery and RT combined was associated with a larger decrease in mortality (HR = 0.60, 95% CI = 0.53 to 0.69) than surgery alone (HR = 0.75, 95% CI = 0.71 to 0.80) or RT alone (HR = 0.74, 95% CI = 0.62 to 0.88). Patients with higher Charlson co-morbidity score, Medicaid/Medicare insurance (compared to private insurance), and non-epithelial histology had decreased survival.

Conclusion: The rate of definitive radiation therapy utilization for non-metastatic malignant pleural mesothelioma has remained low over the past decade. Patients who received definitive RT had improved OS compared to patients who did not in this retrospective national cancer registry-based analysis, suggesting a role for increased utilization of this modality, especially in the advent of improved radiation treatment delivery techniques. Surgical resection, receipt of chemotherapy, and treatment at an academic facility were also associated with improved survival.

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Feasibility Study of Outpatient Monitoring by Fitness Activity Trackers in a Radiation Oncology Department

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Purpose/Objective(s): To monitor Radiation Oncology (RO) patient workflow and at to obtain an index of the quality of life of patient during radiation treatment. Information and Communication Technology monitoring devices (ICT-MD), through a Pervasive Computing Approach (PCA), allow the localization of patient and at the same time the archiving of diverse biometrical data such as heart rate, one of the most robust, non-invasive measure of stress response. Here we describe a pilot study on the introduction of ICT-MD in a RO Department.

Materials/Methods: For our application, we focused on *Activity Tracker* (ACT) bracelet (Amiigo, Amiigo Inc., Salt Lake City, UT), an ICT-MD able to measure SpO2 variation, acceleration and skin temperature without any patient interaction according to PCA paradigm. We selected an inexpensive ACT designed mainly for the fitness consumer market that provides a set of application program interfaces (APIs) for direct readout of sensor data, making the raw data available. An in-house software program was developed in Matlab (MathWorks, Natick, MA) for biometric raw data processing for indirect data measurements (heart rate). The built-in Bluetooth connection is used for patient presence detection and transmission of the collected information to the receivers installed in the RO Department. A first detector is used to recognize the patient and to automatically update his/her data in the health record system. A second receiver is in the LINAC room to limit patient exchange and treatment errors. The integrated hardware/software prototype has been accordingly set up at our institution.

Results: Tests on the prototype has been successfully performed for each single component, for each combination of components and for the whole system. More than 50% of the collected biometric series turned out to be clean enough for Matlab post processing. The heart rate estimates were positively assessed against the ECG gold standard (5-10% discrepancies). The accelerometer acquisitions were exploited for a covariate analysis with heart rate series in order to enhance the specificity, e.g. by distinguishing between a physiological heart rate acceleration from a pathological condition. None of the 80 tests performed in RO Department for presence detection and identification failed.

Conclusion: The realized prototype has been fully validated and its performance revealed encouraging to ameliorate the efficiency of RO patient work-flow management. Furthermore, the system is suitable for monitoring patient distress during the whole radiation treatment course.

The proved feasibility of the framework warrants its application in the clinical practice.

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Multidisciplinary Oncology Clinics Deliver Higher Value Care

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Purpose/Objective(s): Multidisciplinary clinics (MDCs) offer patients a simultaneous evaluation by oncologic specialists, radiologists, pathologists, and others. The costs and overall value (defined as quality divided by costs) of care delivered in MDCs have not been explored. For patients with pancreatic cancer, we compared direct care costs, patient retention rates, and outcomes for patients treated in an MDC versus traditional clinics.

Materials/Methods: Two cohorts of patients with pancreatic cancer seen at our institution were analyzed and compared retrospectively: patients evaluated in a pancreatic MDC versus outside the MDC. Demographics, region of origin, disease stage, were collected using electronic health records. Cost information and patient retention rates (defined as >3 encounters) was obtained using claims data for a subset of patients, and compared using Fisher's Exact Tests. Logistic regression compared retention rates between the groups, correcting for region of origin. Cox proportional hazard models calculated hazard ratios of death. Kaplan-Meier curves compared long-term survival between the two groups.

Results: Between 2008 and 2016, 1,842 consecutive MDC patients were compared to 764 non-MDC patients (N = 1100). MDC patients traveled from non-adjacent states (49 vs 23%, $P < 0.001$) more, and had more advanced disease (25/23% of MDC patients with locally advanced/metastatic disease vs 9/18% of non-MDC). Multivariate analysis revealed that MDC patients had 2.8 times the odds of being retained over non-MDC patients ($P < 0.001$). Among the total MDC cohort, 28.5% had their diagnosis changed from previous assessments (66% upstaged). The non-MDC group had a higher hazard ratio for death, trending to, but not reaching statistical significance (HR = 1.2, $P = 0.117$). At three years median follow-up, overall survival rates were approximately 20% for both MDC and non-MDC (Log Rank $P = 0.85$); differences also remained non-significant after stratifying by patient retention. For the analyzed subset of 352 MDC patients, total charges per patient were higher for non-MDC patients (\$58,458 vs \$43,318, $P < 0.001$), and all cost subcategories were higher for non-MDC vs MDC patients except outpatient charges (\$19,762 vs \$22,606, $P = 0.61$).

Conclusion: Outcomes trended toward superior survival for MDC vs. non-MDC patients, and almost 30% of patients had a change in diagnosis. Adjusted for home region, MDC patients were more likely retained, suggesting higher patient satisfaction. Total costs per patient were lower for MDC patients, even with higher retention. Outpatient costs were higher for MDC, suggesting that greater outpatient engagement in MDCs supplant more costly inpatient encounters. Because quality is superior with lower costs, these data suggest multidisciplinary models offer higher-value care.

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