Reviewer’s report

Title: Medical complexity and time to lung cancer treatment - a three-year retrospective chart review

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Reviewer: Bill Evans

Reviewer's report:

The article by Stokstad et al. from St Olavs Hospital- Trondheim University Hospital, Trondheim, Norway describes a three-year retrospective review of charts to assess the impact of medical complexity on time to treatment for lung cancer. Norwegian recommendations are that > 70 percent of patients should start surgery or radiotherapy within 42 calendar days and systemic therapy within 35 days. The authors sought to determine the extent to which their hospital achieved the recommended timeframes by treatment modality and, in particular, the proportion of non-complex patients who did not achieve the target. The information was then to be used to improve organizational efficiency.

A retrospective chart review was conducted on all patients diagnosed with lung cancer at the University Hospital from the beginning of 2011 to the end of 2013. The authors defined non-complex patients as patients who had one or fewer tissue diagnostic procedures, no comorbidities, no intercurrent diseases that would delay treatment or complications from diagnostic procedures of more than three days.

The chart review found that 19% of patients received no treatment for lung cancer and 58% of patients were noncomplex. On the other hand, 32% of the 449 cases analyzed had more than one tissue diagnostic procedure; 15% had medical delays greater than three days.

The key finding was that even amongst the noncomplex patients the median number of days until surgery/radiotherapy was 41 and only 56% of noncomplex patients started their radiotherapy or underwent surgery within 42 days. On the other hand, 80% of the noncomplex patients received systemic therapy within the recommended time frame of 35 days.

Given the fact that there is no evidence that shorter wait times lead to better outcomes for patients with lung cancer, the authors should comment on how and why the current Norwegian recommendations were decided upon. They should also comment on whether it is reasonable to use the same metric for both the start of surgery and radiotherapy. The resources needed to
undertake a surgical intervention include access to diagnostic facilities including interventional radiology and PET-CT, the schedule of multidisciplinary case conferences, the timeliness of pathology review, the hospital's OR capacity, number of thoracic surgeons available, availability of OR time, and patient volumes, whereas timely access to radiotherapy is dependent on access to diagnostic resources, consultation with a radiation oncologist, availability and timeliness of treatment planning resources, the complexity of the treatment and the availability of appropriate radiotherapy treatment machines. Timely access to systemic therapy treatment is dependent on many of the same diagnostic resources but also access to molecular diagnostics and the availability of chemotherapy chair time. So understanding what is behind the apparent delays in access to treatment services requires a much greater understanding of the resources available at the St. Olav hospital and these are not described in the paper.

The article would also be strengthened by a better description of the processes of diagnostic workup. The manuscript states (line 69-70 p3) that the first hospital appointment should be offered within seven calendar days of receiving a referral letter. How is the initial consultation organized? To whom would a referral be directed? Is there a centralized intake process for suspected lung cancer cases? Is there a diagnostic assessment unit for lung cancer?

On page 5, reference is made to a weekly regional multidisciplinary tumor board and the various participants are listed including a lung oncologist. Is this individual a radiation oncologist or medical oncologist? Does the pulmonary physician who is the leader of the multidisciplinary team specialize in lung cancer treatment or is lung cancer only one of many interests?

The start time of the diagnostic workup was defined as the date the referral letter for suspected lung cancer was received or alternatively the date when the diagnostic workup started for patients with a single pulmonary nodule. It would seem to this reviewer that these are very different start points with the potential to confound the analysis. It could be expected that using the date of the referral letter might introduce additional time dependent on access to necessary diagnostic procedures. Similarly, the date a treatment decision was arrived at was determined either from documentation in the EMR or the date of the last diagnostic procedure. Again this may confound the analysis as there may be delays until a multidisciplinary case conference occurs or the clinic visit can be arranged to discuss treatment with the patient etc.

On line 146, page 6, reference is made to an adjustment in the multivariate analysis for PET CT which apparently was performed outside of the Central Norway health region during most of the study period. Please provide a description of how this adjustment was made.

In the results section, it is interesting to note that the percentage of patients who are older than 70 years was considerably higher in 2013 than in the preceding two years. The authors should discuss if there was practice change that resulted in more elderly patients being referred for diagnosis and treatment.
It is also noteworthy that 18% of patients diagnosed over the three years received no cancer treatment. In this reviewer's view that percentage is low but perhaps this is due to the fact that St. Olav is a referral hospital and patients with advanced disease, poor performance status and older age may not actually be referred for consideration of treatment.

On pages 9 and 10 where data on time intervals are presented, there is so much data presented that the reader may have difficulty reading and digesting it. The authors might consider reorganizing this section and describe the time intervals for surgery/ radiotherapy altogether and then have a separate section to describe systemic therapy time data. The summary data in this section (lines 243 to 247) is helpful but the explanation for the differences observed, particularly the reasons for palliative treatment being accessed in a more timely fashion than curative treatment deserves explanation.

The discussion would benefit from a more robust interpretation of the results rather than just a summary of the findings and a presentation on guidelines in other jurisdictions. The authors acknowledge that a limitation the study is its retrospective design but it should also be noted that the data are institution-based rather than population-based, which this reviewer considers to be a significant weakness also. Although the authors indicate that they have data on the timelines for each step of the diagnostic workup and that these data will be presented in another manuscript, it would be helpful if the reader was provided with some insights as to where the greatest delays occur and how investigators hope to improve their metrics. Otherwise, the reader can only conclude that in this one institution, timelines for access to treatment of lung cancer cases are less commonly met than expected by Norwegian guidelines. Without some insights into the reasons for the observed data, the data by themselves are likely of limited interest.

Presumably, the authors have plans for next steps such as value stream mapping to determine where the delays are occurring. The discussion in the paper would be enriched by the authors laying out their future plans having obtained this data.

There is one large table and four complex figures. I would suggest omitting Figure 1. Figure 2 suggests that something occurred between 2012 and 2013 that resulted in a much greater proportion of patients achieving the targeted timeframe for systemic therapy. The authors should comment on what may have occurred. Was additional staff hired for example? Similarly, wait time metrics for the surgery/ radiotherapy patients, particularly those who are noncomplex was much better in 2011 than in the following two years. Can the authors offer an explanation?

In my view, the results of this work would be more valuable to readers if the authors made a greater attempt to understand and explain their data. Although wait times measured in days are unlikely to have much impact on clinical outcomes, they are a source of anxiety to patients and their families and are frequently a sensitive political issue. As a result, many jurisdictions are trying to facilitate access to care and reduce wait times. Providing readers with a greater understanding of where delays are likely to occur and how they might best be addressed could be
helpful to those who struggle with this issue. Otherwise, the data set is really only of use to those involved in the care of lung cancer patients at St. Olav where it will serve as the starting point for quality improvement initiatives.

**Are the methods appropriate and well described?**

If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**

If not, please specify which controls are required in your comments to the authors.

Yes

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Yes

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