



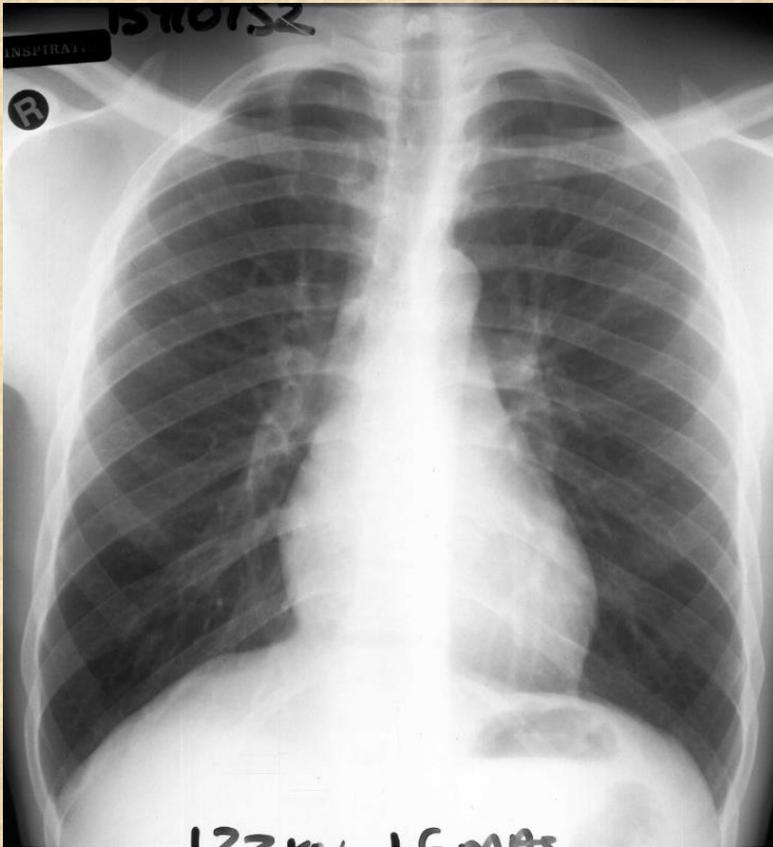
Improving efficiency of assessing (ex)miners for tuberculosis (TB) and silicosis: Innovations to promote social justice

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Funding: Canadian Institutes of Health Research and UK Department for International Development

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Normal



Silicosis

Silica dust exposures: various health effects including **silicosis** (a chronic disease), and increases lifetime risk for **tuberculosis** (an infectious disease of considerable public health concern)

Overall premise: “Justice Delayed is Justice Denied”

Processing compensation claims

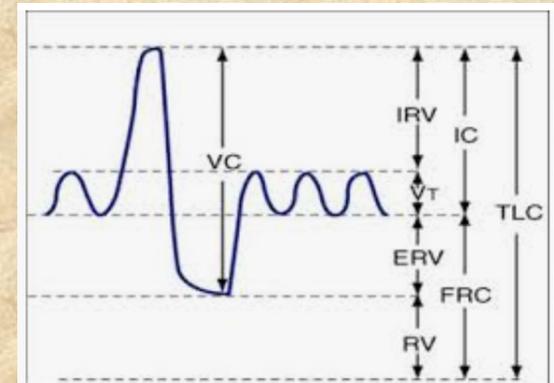
Exposure history

- Years of exposure
- Years of service
- Years since first service
- Age
- Occupation (risk for silica dust exposure)



Clinical assessment

- Questionnaire to screen for symptoms
- to trigger testing for active TB



- Chest X-ray
- Plus previous history/assessments

- Lung function tests -- to determine impairment

i.e. Very labour intensive!

Objectives of the “efficiency” study

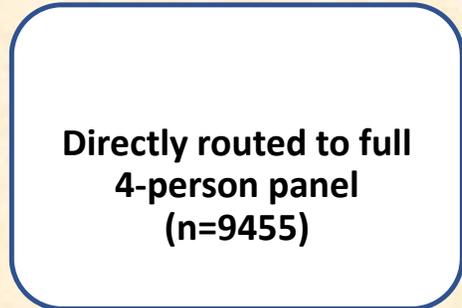
1. To measure the efficiency achieved by the **current triage process**
2. To ascertain the **potential and way forward for further gains**
 - (i) reducing unnecessary *assignment* to the full panel and/or
 - (ii) reducing unnecessary *referrals* to the full panel

Of particular interest:

- i) potential for pre-identification of normal CXRs via **CAD**; and
- ii) whether **adjusting** the <10 years could improve efficiency, based on modeling alternatives with various demographic and exposure variables.

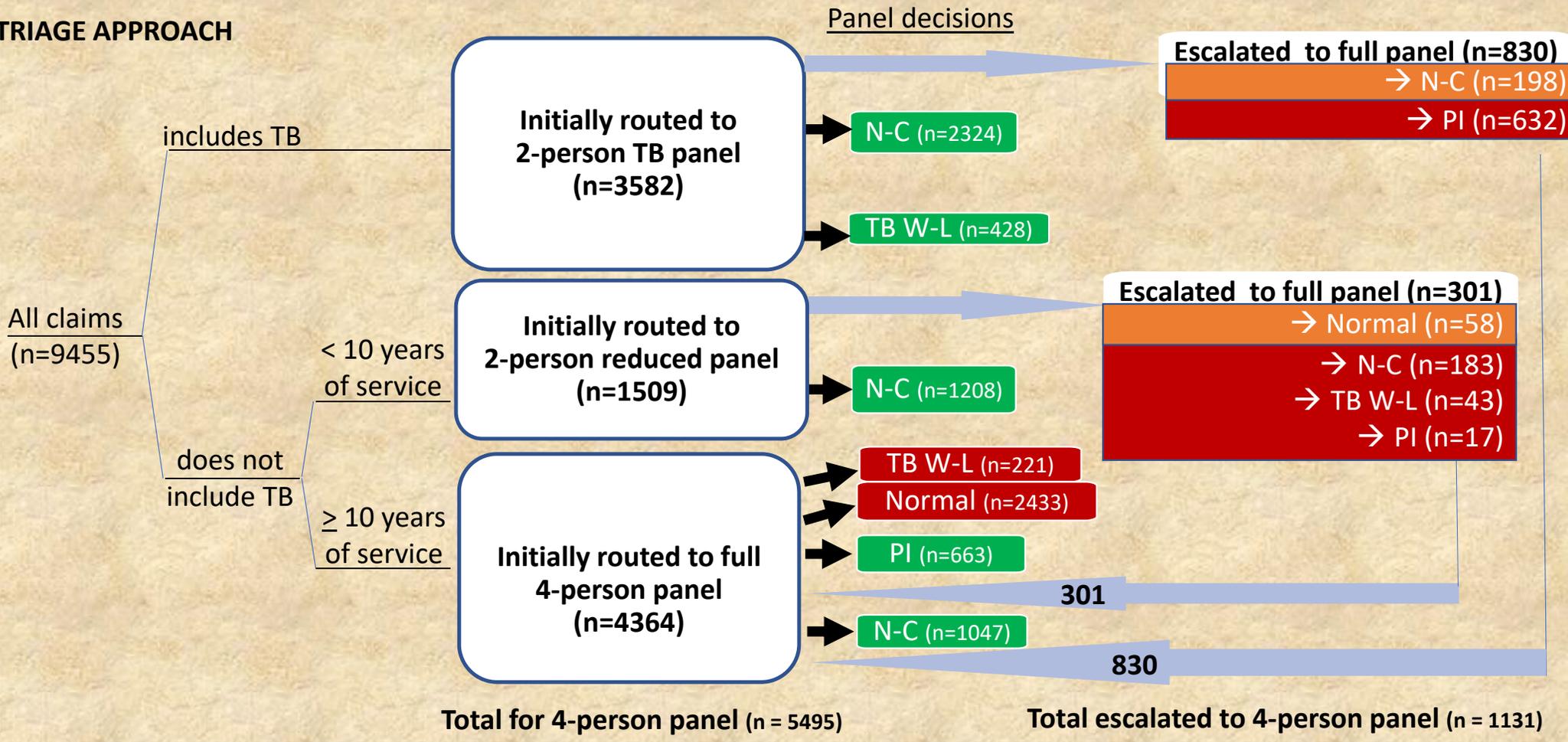
STATUS QUO APPROACH

All claims
(n=9455)



Total for 4-person panel (n = 9455)

TRIAGE APPROACH



LEGEND:

Correct initial routing
 Potentially unneeded escalation
 Incorrect initial routing
 ← Escalated to Full Panel
 → Decision by Assigned Panel

N-C: Non-Compensable TB W-L: TB Wage-Loss PI: Permanent Impairment

Summary of main findings:

1. Increase in efficiency, both in **person-time resources** and **reduction of delay in certification from** currently piloted triage system *alone*. (79.7% of staffing-time needs of traditional system). Gain in efficiency ~**20%** (both in reduction of human resources needed and reduction in delay)
2. Modelling **the application of CAD** to *pre-identify CXRs with neither silicosis nor TB*, for routing to reduced panel, we estimated **a further substantial gain in efficiency**.

Depending on thresholds for sensitivity and specificity, gain in efficiency (compared to non-triaged situation) would be ~ **27-36%**. (*RE to discuss*)

continued

3. Regression analysis of databases (MBOD as well as QT database, plus field study) indicated **that years of service on its own was the best predictor of certified silicosis**, with no substantial further gains to be had from adding in age, latency or other variables. (*SB to discuss*)

4. Without the use of CAD, the change of triage threshold from the 10 years to 15 years, for example, would see a slight efficiency gain (2.0% fewer expert-reviews than 10-year threshold); moving to 20 years would add an additional 1.8% efficiency gain from the 15-year threshold.

5. A surprising finding was that the **largest potential gain would be to route all non-TB cases from living claimants to the reduced 2-person panel** (7.7% fewer expert-reviews than using the 10-year threshold). The overall gain in efficiency compared to the previous 4-panel approach would be **28.0%**.

Predictors of silicosis

we analyzed predictors of silicosis certification in 3 compensation databases:

- a) **An integration of MBOD** claims records with the employment database of assembled in the dataset of the Gold Working Group (5 large companies);
 - b) **Q(h)ubeka Trust (QT)**, a private trust set up following a settled civil suit for silicosis against another South Africa gold mining company;
 - c) **Compensation examinations conducted at rural field sites** in Stilfontein, Alice and Bizana in South Africa.
- Logistic regression was performed to analyze association with the “certification of silicosis” outcome of age, calendar years of service, dust level- risk rankings of job, and years of service.

Logistic regression modeling

- The only variable that significantly predicted certified silicosis was **years of service**
- Odds ratio for a positive silicosis certification **per additional 5-year service period**:
 - **1.39 [95% CI 1.37 – 1.43]** for MBOD database
 - **1.43 [95% CI 1.37 – 1.50]** for Q(h)ubeka Trust database
- Predictive ability:
 - The model provided **41.2% specificity at 90% sensitivity**
 - Corresponding to using **13.1 years as the threshold**
 - **22.0%** reduction in expert-reviews; *only a marginal improvement* when compared with the 20.3% reduction accomplished with the actual triage using 10 years as the threshold.
 - **When CXR CAD scores are included, all variables become insignificant (including years of service)**

Efficiency gains simulating different years of service thresholds for routing decisions, while maintaining initial routing rules (TB claims to TB panel and deceased claims to full panel regardless of years of service)

	Referral rule or threshold	No. of expert reviews	Efficiency gain
1	No triage (reference category): All cases go the full panel	47,275	-
2	Hypothetical maximum: all TB-flagged claims are sent to the TB panel, all normal claims (non-compensable without disease) are sent to the reduced panel, and all other claims are sent to the full panel.	29,144	38.4%
3	10-year service threshold, no CAD (actual triage, not simulated)	37,657	20.3%
4	15-year threshold, no CAD	36,747	22.3%
5	20-year threshold, no CAD	35,865	24.1%
6	No CAD, no triage based on years of service: All TB cases routed to TB panel, all others to reduced panel.	34,015	28.0%
7	CAD triage: sensitivity 98.2%, specificity 98.2%	30,231	36.1%
8	CAD triage: sensitivity 100%, specificity 86.0%	31,504	33.4%
9	CAD triage: sensitivity 90.4% and specificity 60.6%	34,702	26.6%
10	CAD triage: sensitivity 70.5% and specificity 90.4%	32,214	31.9%



Questions so far?

Conclusions and Recommendations

- Implementation of a system with **smaller adjudication panels** and CAD has the potential to reduce costs and relieve the bottleneck in bringing statutory compensation justice to large numbers of mineworkers in Southern Africa.

BUT

- It needs to be **accompanied by** high service levels in the **non-medical aspects of administrative efficiency, training** of outside medical practitioners who may see mineworkers in their practices, and **amendment of ODMWA** to incorporate some of the changes required by the new triage system.

Recommendations

1. **Better assessments in the field**, i.e. when benefit medical examinations are carried out, such that claims that have no history of TB, or likelihood of having had TB based on symptom review +/- microbiology +/- CAD, and no CXR evidence of silicosis – i.e. cases with no other evidence of occupational lung disease, would not be submitted to MBOD.. Unless requested explicitly by the worker
2. Claims that are assessed by the referring physician or field site for **“TB wage loss only”** be clearly marked as such.
3. Look for possible improvements in the **clerical file review of claims to identify those that should go to the TB panel.**

Continued

Recommendations (continued):

4. CAD can be used to support further efficiency gains

- The agreement between CAD and external readers met or were close to WHO screening tests guidelines (90/60) for 2 of the systems.
- **Successful closing of the gap with the top two companies**, both of which performing a bit worse in this field study than was the case in the “curated study”; the third company, however, did quite a bit more poorly: **Identify issues** relate to technology, thresholds chosen, or some other explanation for lack of great performance:
- **Facilitate further system learning in collaboration with CAD suppliers.**

5. A cost analysis can be done to calculate the financial savings in adopting the optimal system described above. Information on costs would be obtained from the MBOD for this analysis; full costs and benefits should be considered (JS to address further).

- continued

Next steps:

Discussion to seek consensus on:

1. **whether a change in claims processing should be implemented**, whereby, for example, **all** claims are routed to either the TB panel or the reduced panel initially, ***with only those determined by those two*** 2-person panels to needing the full-panel assessment referred upwards.
2. use of CAD in the triage – and if so, set at sensitivity of 100% to ensure that no claims that should be referred to the full-panel are missed, at the cost of false positives; or whether a slight decrease in sensitivity is tolerable to improve efficiency, given that this is only an aid.
3. The above results, starting with the two supplemental more detailed analyses, should be submitted for **peer-review** publication.

.... Over to part #2 – a more in-depth look at
the CAD