NYC 9/11 Public Portal Document

DESIGNING A CUMULATIVE EXPOSURE MATRIX FOR NYC FIREFIGHTERS EXPOSED TO WORLD TRADE CENTER (WTC) DUST

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Introduction

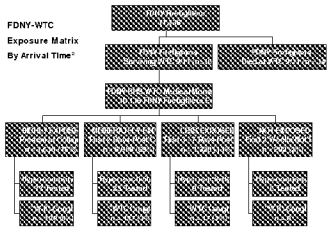
The comprehensive analysis of health outcomes for the nearly 11,000 NYC firefighters who operated at Ground Zero of the World Trade Center requires the creation of a cumulative exposure matrix encompassing the entire rescue/recovery/cleanup effort from 9/11/2001 to 6/30/2002.

Background

On the morning of September 11, 2001, members of the New York City Fire Department responded to Box 5-5-8087. This alarm signaled thousands of New York's Bravest to head to the World Trade Center in lower Manhattan for fires that were burning as the result of a hijacked plane that was flown into WTC Tower 1. Shortly after the initial units responded and initiated interior operations, a second hijacked plane flew into WTC Tower 2. The ensuing collapse of both towers took the lives of 343 NYC firemen. Additionally, it exposed the 1,630 firemen that either survived the collapses or arrived within the next few hours to overwhelming exposures of inorganic dust, products of pyrolysis, and other respirable material.[1] During the afternoon of the 11th and on the 12th an additional 6,988 NYC fireman responded to ground zero, and over the next week another 1,320 responded.[1] For the firemen of NYC, the operations at Ground Zero did not end in that first week, but continued for another nine months, until June 30, 2002. When June 30, 2002 arrived nearly all of the approximately 11,000 NYC Firemen had operated at Ground Zero. The creation of an exposure matrix will facilitate future study of health outcomes and their correlation with various exposures.

Working Hours / Tours

FDNY-WTC Exposure Matrix By Arrival Time[2]



Methods

The creation of the exposure matrix database required the collection and assimilation of data from two primary sources, hand-written supervisor records for each shift, and computerized fiscal records.

The hand-written supervisor records consisted of an attendance sheet for each tour of duty on a given day. There were two tours, a day and a night, each 12 hours long. Each division that was supplying manpower to work at the site hand wrote the names of the firefighters who were scheduled to work and taxed the names to headquarters. Additionally, records of no-shows for each shift were present as well. An excel spreadsheet was created for each month with the following columns: Rank, Last Name, First Name, SSN, Source, Group, Unit, Shift, and Total Hours. The firefighters were entered into individual rows by the same person. This process was completed for all 10 months.

The fiscal files already existed in an excel spreadsheet. The files used were ones for which the hours worked had been coded with a special code indicating that the work was WTC related. Each row represented one shift worked by a given fireman on a given date. This data had to be converted to the same format as that for the supervisor records. This conversion was done by hand by the same person who created the database for the supervisor files.

For comparison of the two sources, a third file was created. This excel file consisted of both sources merged and sorted alphabetically. The file was viewed, and matches were looked for. A match was termed an "identity match" if the firefighter names were identical and additional identifiers, such as rank and unit matched as well. A match was termed a "work hour match" if the

Results

Results for comparisons between the months of November, 2001, and June, 2002, are outlined in the table below.

DATE	FISCAL DATABASE	SUPERVISOR DATABASE	IDENTITY MATCHES	WORK HOUR MATCHES
11/01	972	968	217 (22%)	2 (0.2%)
06/02	160	166	59 (37%)	21 (13%)

These results are depicted above in Figure 2. Based on the results of the initial comparisons of four months, no further comparisons between the two sources was completed.

Conclusions

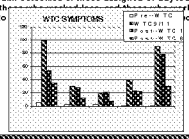
Our initial bias had been that the fiscal records would be more accurate. After interviewing administrators, supervisor chiefs and firefighters, we found that fiscal records over-reported exposures both for numbers of firefighters present and hours worked at Ground Zero. The over reporting was due to the payroll code being used for operations related to WTC, but not actually taking place within the Ground Zero exposure parameter. Supervisor work records provided a more accurate account of Ground Zero exposure, however, firefighter identity and hours worked were frequently missing from the fiscal file because payroll codes used were for regular firefighting duties. After discovering about the different payroll codes, it was not surprising that the percentage of identity matches were greater than the percentage of work hour matches.

After the analysis of four months of data, and the consistent finding that the two sources did not match, it was decided that the exposure matrix database would consist entirely of the supervisor work records.

Looking Forward

The completion of this cumulative exposure matrix will facilitate the analysis of health outcomes, and how those outcomes might possibly relate to specific exposures at Ground Zero. This database will be used to assess the following:

1) The impact of the intensity of initial exposure during the first week among co-horts with similar long term exposure, but differing initial exposure.
2) Differences in health outcomes based on a predominance of day or night tours.
3) Health outcomes of those who worked while fires were still burning (until 12/01), compared to those working after.
4) Health outcomes of those working before the dust control measure of hosing down the pile were initiated compared to those working after.
5) How the health outcomes of those assigned 30 day tours of duty compared to th[illegible]rked more.
6) Follow-up to [illegible]osure, shown below.[3]



Bibliography

Citation for data in background
Citation for figure 1
Citation for further studies bar graph

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