

# Development of Medical Standards/Guidelines for Multiple Jobs

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# Historical Background

- Medical Criteria for Selection

- Immigration

- Ellis Island, USA
- Any abnormality led to possible denial of entry



- Military

- Civil war in USA
- WWII-lower extremity amputations excluded due to marching and load carriage



- Civilian and public safety

- Faulty teeth exclusion from personnel job



# Historical Perspective

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- Historical Purpose of Medical Examination
  - Ensure individual had ability to perform the job
  - Ensure individual is not a safety threat to oneself, other workers, or the public
  - Used for selection and return to work
  - Prevent occupational disease
  - Reduce lost time from work and injuries



# Laws - Changed Medical Employment Criteria

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- Rehabilitation Act of 1973
- Americans with Disability Act of 1990
- Americans with Disability Act Amendment (2008)

# Americans with Disabilities Act

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- Protects individuals with impairment that substantially limits major life activity
  - Physical (prosthetic device) & Disease (cancer)
  - Mental (emotional) & Sensory (hearing, vision)
- Requires conditional job offer before exam
- Reasonable Accommodation
  - Qualified for job and can perform with accommodation
  - Modifications (e.g., workplace, equipment, schedules)
  - Employer choose most qualified person, no preferential treatment

# Occupational Safety Laws/Regulations

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- Examples of Government Medical Criteria
  - Occupational Safety and Health Administration (OSHA)
    - Respirator fit test
  - Department of Transportation (DOT)
    - Commercial Drivers
    - Blood pressure  $\leq 140/90$
    - Average hearing loss in better ear  $< 40$  dB
  - Federal Aviation Administration (FAA)
    - Pilots
    - Cardiovascular criteria, vision, hearing, etc. for pilots

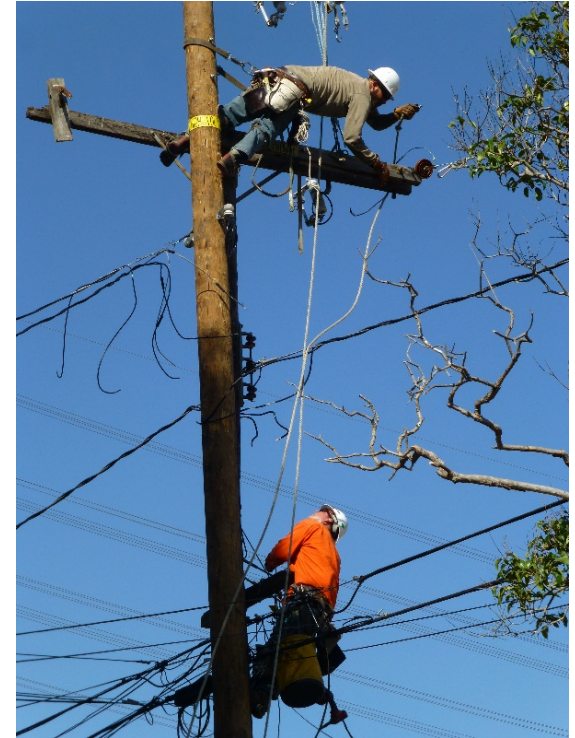
# Defining Job Requirements

- Must identify essential functions/tasks
  - Identify critical tasks based on importance to mission of job and frequency of performance
- Ergonomic/physiological requirements
  - Weights, distances, heights, forces,  $VO_2$ , etc.
  - Body position and others



# Defining Job Requirements

- Work Environment
  - Temperature
  - Time of day
  - Equipment worn
  - Workplace conditions
- Minimum requirements
  - Production rate, stairs climbed

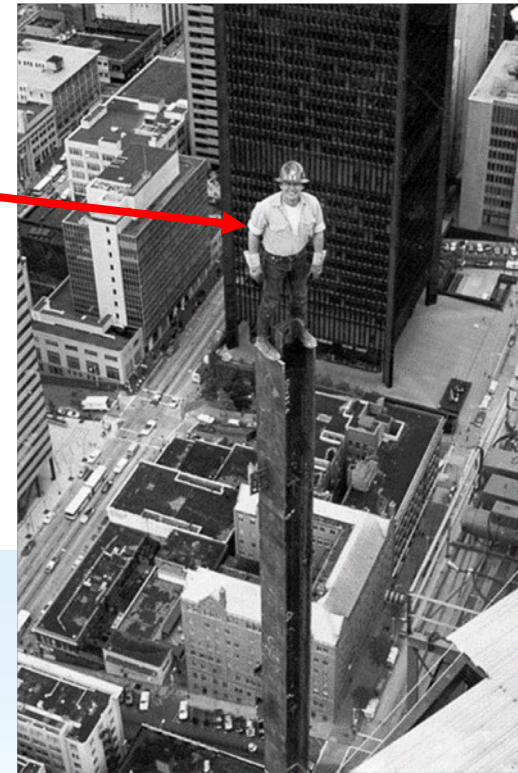




# Highrise Construction



New York City—  
1930s



Iron Workers  
2018



# Grouping Jobs by Type of Task

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- Task types
  - Cognitive demand
  - Physical demand
  - Psychomotor (e.g., drive)
  - Sensory (e.g., hearing, vision)
  - Speech
  - Attention-focus span
- Movement category (e.g., lift, climb, push)
- Task type level identified for each task & job

# Grouping Jobs by Type of Task

- Examples of task types and levels

Lift - lb
0=na
1=10-30
2=30-50
3=55-80
4=80+

Climb		
Climb	Type	Height
0=na	0=na	0=na
1=yes	1=stair	1=short
	2=ladder	2=tall

Hearing			
1=normal 25dB	Alarm, buzzer	Wear head phones	Wear ear or hearing protection
2=decrease 35-40dB	0=na 1=yes	0=na 1=yes	0=na
3=deaf			1=yes

# Grouping Jobs by Type of Task

- Examples of ergonomic levels

Ques #	Supplemental Questions	Response Options						
			Appraiser	Inspector	Code Aide	Museum	Sheriff	Dep
		<b>Check One</b>	n=	7	9	9	63	383
1	How often do you lift and/or carry objects and equipment weighing 30 lb or more? (check ONE with an "x")	Less than 1 time per year or never		5	4	3	19	3
		1 to 6 times per year		1	0	3	21	19
		1 to 3 times per month		1	4	1	11	38
		1 to 3 times per week		0	0	1	13	104
		1 or more times per day		0	1	1	6	219
		<b>%</b>	n=	2	7	5	33	267
2	When you lift and carry objects weighing 30 lb or more (e.g., equipment, materials) <b><u>without assistance</u></b> , what percent of the time do the items weigh:	30-39 lb		93	60	82	72	42
		40-49 lb		5	40	12	17	19
		50-59 lb		3	0	5	5	15
		60-69 lb		0	0	1	3	11
		70 lb or greater		0	0	0	3	13

# Grouping Jobs by Type of Task

- Examples of ergonomic levels

Ques #	Supplemental Questions	Response Options						
			Appraiser	Inspector	Code Aide	Museum	Sheriff	Dep
		<b>Check all that apply</b>	n=	0	0	1	2	292
28	Check off all the <b>handheld powered</b> tools you use on the job. (check ALL that apply with an "x")	chain, circular saw, or K-12		0	0	0	2	270
		drill, small		0	0	1	1	224
		hammer drill		0	0	0	0	90
		jackhammer		0	0	0	0	36
		impact wrench		0	0	0	0	73
		sander or grinder		0	0	1	0	100
		sawzall		0	0	1	0	216
		nail gun		0	0	0	0	48
		tree or hedge trimmers		0	0	0	1	12
		weed wacker		0	0	0	1	15
		welding equipment		0	0	0	0	21
		food preparation tools (e.g., hand mixer)		0	0	0	0	126
		leaf blower						
weed wacker		0	0	0	1	81		
other		0	0	0	0	105		

# Grouping Jobs by Type of Task

- Master task list & tasks specific to jobs
- Essential tasks link to task type

Burner 1 Carbon Arc	Cableman 2	Carpenter 3	Electric 4 Maint	Joiner 8	Machin 10 Outside	Mech 19 Heavy Duty	Mech 21 Heav Equip Tech	Pipefitter 25	Pipe- welder 26	Rust Machine Operator 16	Shipfitter 28	Test & Trials Mech 31	Welder 32	
														<b>PUSH/PULL</b>
	none		none	none	none	none	none	none		none		none		Pull welding lines/cables to work location for cutting or welding.
none	none								none					Drag air lines/cable to work location for operation of pneumatic tools or removal of dust/debris.
														<b>CLIMB</b>
							none							Climb <u>wooden ladders</u> in the shop, bays, or on the ship to access work area.
		none					none							Climb vertical <u>metal ladders up to 20 feet</u> in the shop, bays, or on the ship to access work area.
none		none				none								Climb <u>4-6-foot step/A-frame ladder</u> to install, repair, or test ship parts or equipment or to access work area.

*Gebhardt, Baker, Volpe, & St. Ville, 2016*

# Development of Medical Guidelines

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- Criteria
  - Evidence based (e.g., research, clinical)
  - Aligned with best practices by medical providers
  - Developed using multidisciplinary approach
  - Formatted to increase reliability

# Evidence Based Medical Criteria

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- Visual acuity-weapon identification
  - Identify items in clutter<sup>1</sup>
    - 100% correct at 20/125, 83% correct at 20/160
  - Identify knife v. comb & other items at 5-7 ft<sup>2</sup>
    - 100% detection at 20/20 & 75% correct item identification
    - 80% detection at 20/100 & 27% correct item identification
- Color vision – Intelligence Analyst jobs<sup>3</sup>
  - Gather examples of imagery for each job
  - Color vision targeted questionnaire
- Other systems not as straight forward
  - Seizures: soldiers & over the road drivers
  - What about ulcerative colitis, joint surgery, & others?

<sup>1</sup>Good & Augsburger, 1987; <sup>2</sup>Johnson & Brintz, 1996; Gebhardt, 2008



# Medical Guidelines Methodology

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- Opinion based
- Consensus
- Likert medical rating scales

# Medical Guidelines Methodology

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- Consensus Method

- One or group of specialty physician panels work independently and generate guidelines
- Review medical literature, other guidelines, & national organizations' criteria
- Approval of specialty group medical criteria reviewed by individual physician, task group, or other stakeholder groups
- Targeted to one job & broad in nature due to application across varied agencies (e.g., large/small, multiple LE jobs)
  - American College of Occupational & Environmental Medicine
  - California Commission on Peace Officer Standards & Training

# Medical Guidelines Methodology

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- Likert Medical Rating Scales
  - Medical specialty panels review job analysis data, medical literature, other guidelines, & national organizations' criteria
  - Medical rating scales define severity levels of diseases/conditions based on function, symptoms, & treatment
  - Specialists independently rate essential job tasks on individual disease/condition rating scales (e.g., diabetes)
  - Compare ratings: disagree = discussion based on job tasks, literature and other factors (e.g., environment)
  - Approached used for
    - Public safety jobs (e.g., fire, law enforcement)
    - Other types of sedentary to heavy jobs (e.g., pipeline worker)

# Medical Guidelines Methodology

## • Medical Rating Scale – Diabetes Mellitus

**0 = No disease -**

**I = Asymptomatic hyperglycemia controlled with diet and exercise [fasting blood glucose in the range of 90 to 130 milligrams/deciliter, HbB-A1C less than or equal to 8%]**

**II = Asymptomatic and requiring oral medication (e.g., hypoglycemic) [fasting blood sugar, hemoglobin HbB-A1C, no history of documented hypoglycemia]**

**III = Asymptomatic and requiring insulin (with or without oral medication) for control [with hemoglobin HbB-A1C]**

**IV = Asymptomatic and requiring medication for control [HbB-A1C, history of hypoglycemia, history of severe hyperglycemia (e.g., 400 ml/dl), ketoacidosis, and/or hyperosmolar coma]**

**V = Requiring medication for control, with mild symptoms and signs of end organ disease (e.g., arterial sclerosis, peripheral neuropathy).**

**VI = Requiring medication, with severe symptoms and signs of end organ disease (e.g., renal dialysis, renal failure)**

# Example of Ratings by Physicians

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## Law Enforcement Tasks

- 3** Conduct search of premises by stooping, kneeling, and crouching to look for objects.
- 3** Inspect accident scene and damage to vehicles and property to identify and secure evidence.
- 4** Testify as a witness in court.
- 2e3** Without assistance physically restrain suspect by using grips or holds.
- 2e3** Drive through congested area at moderate/high speed to a call or emergency.
- 4** Determine whether individual is under influence of alcohol by using breathalyzer equipment.

# Medical Rating Scale Reliabilities

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<b>Disease/Condition</b>	<b>ICC<sub>(2,2)</sub></b>	<b>ICC<sub>(2,4)</sub></b>
Diabetes Mellitus	<b>.73</b>	<b>.87</b>
Hyperthyroidism	<b>.87</b>	<b>.94</b>
Supraventricular Arrhythmia	<b>.72</b>	<b>.87</b>
Aortic Regurgitation	<b>.77</b>	<b>.89</b>
Irritable Bowel Syndrome	<b>.80</b>	<b>.87</b>

# Medical Guidelines Methodology Summary

Method Type	Evidence Based	Multidisciplinary	Diseases & Conditions Addressed	Formatted for Reliable Decisions
Opinion Based	?	Rarely	Limited	No
Consensus	Yes	Yes	Targeted	Yes/No
Likert Medical Rating Scales	Yes	Yes	More Extensive	Yes

# Job Matrix by Type of Tasks

Job Title	Lift (lb)	Climb			Hand Manipulation			Drive	
	0=na 1=10-30 2=30-50 3=55-80 4=80+	Climb 0=na 1=yes	Type 0=na 1=stair 2=ladder	Height 0=na 1=short 2=tall	Key- board 0=na 1=yes	Use hand tools 0=na 1=yes	Fine motor 0=na 1=yes	Drive 0=na 1=yes	DOT Cert require 0=na 1=yes
Appaiser	0	1	2	1	1	0	0	1	0
Mechanic - Automobile	4	0	0	0	0	1	0	1	0
Bus Driver	2	1	1	0	0	0	0	1	1
Code Inspector	0	1	2	2	1	0	1	1	0
Mail Room Supervisor	0	0	0	0	1	0	0	0	0
Museum Aide	1	1	2	1	1	0	0	0	0
Refuse Worker	3	1	1	1	0	0	0	0	0
Lighting Technician	1	1	2	2	1	1	1	1	0

Job matrix summarizes task types that include cognitive, physical, sensory, psychomotor, speech, environmental, and attention span demands



# HumRRO Medical Database

## *Diabetes Mellitus*

Med #	Task	Building Mechanic	Police Officer	Transport Security Officer	Firefighter
1	Lift and carry items weighing 10-20 lbs. (e.g., boxes, dunnage, equipment) from one location to another (e.g., dock) 20-75 ft.	4	4	4	4
2	Lift & carry items weighing 30-50 lbs. (e.g., computer parts, car parts, small tires, furniture, skids, scrap wire) 20-75 ft.	4		4	3
3	Lift & carry items weighing 60-75 lbs. (e.g., books, furniture, automobile parts, propane tank, coin cases) 20-75 ft.	4		4	3
4	Lift & carry items weighing 80 lbs. or more (e.g., machine parts, cement bags, boxes of clothing, playground equipment) 10-75 ft.				3

# Medical Guidelines Format

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- Three formats
  - Provides narrative with background information, no definitive accept or disqualify; may provide diagnostic tests
  - Lists disqualify disease/condition defined (e.g., Level A) with evaluate for remaining diseases/conditions (e.g., Level B)
  - Defines acceptable, evaluate, and disqualify levels of diseases/conditions

# Medical Guidelines Format

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## Narrative

### **Partial Amputation of Thumb at or Distal to Interphalangeal (IP) Joint**

LEOs with adequate length of the thumb to form a side pinch against the index finger will likely be able to generate adequate grip and have adequate dexterity to safely and effectively perform law enforcement job functions. If due to the length of the remaining digit, there is a question about dexterity, it may be necessary to evaluate the LEO's performance on task simulations.

*ACOEM, 2017*

# Medical Guidelines Format

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- **Disqualify (A) and Evaluate (B) Levels Blood and Blood Forming Organs**

**6.19.1** Category A medical conditions shall include the following:

- (1) Hemorrhagic states requiring replacement therapy
- (2) Sickle cell disease (homozygous)
- (3) Clotting disorders
- (4) Any hematological condition that results in inability to safely perform one or more of the essential job tasks

**6.19.2** Category B medical conditions shall include the following:

- (1) Anemia
- (2) Leukopenia
- (3) Polycythemia vera
- (4) Splenomegaly
- (5) History of thromboembolic disease
- (6) Any other hematological condition that results in inability to safely perform essential job tasks

*NFPA, 2013*

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# Medical Guidelines Format - Equilibrium Disorders

1 C	2 B	3 A	4 A	5 B	6 B	7 B	8 B	9 B	10 B	11 B	12 B	13 B	14 B	15 B
26 B	27 B	28 A	29 A	30 C	31 B	32 B	33 B	34 A	35 A	36 A	37 A	38 C	39 C	40 C
51 B	52 A	53 A	54 B	55 B	56 C	57 B	58 B	59 B	60 C	61 C	62 C	63 C	64 B	65 B
76 A	77 A	78 B	79 B	80 A	81 A	82 C	83 C	84 A	85 A	86 B	87 C	88 A	89 C	90 B

A	B	C
<p><b>Accept</b> with history of one attack of vertigo that lasted two hours to two weeks (vestibular neuronitis or labyrinthitis) with no residual effects for more than one year.</p> <p><b>Evaluate</b> with history of one attack of vertigo less than one year ago with no residuals and determine if episode was true vertigo, or with successfully controlled Meniere's disease (e.g., medication, surgery).</p> <p><b>Evaluate</b> with history or presence of benign paroxysmal (positional) vertigo.</p> <p><b>Evaluate</b> with interventional therapies (e.g., nerve section/vestibular neuroectomy, labyrinthectomy, radiation) for disease processes other than Menieres.</p> <p><b>Disqualify</b> with recurrent attacks of vertigo or uncontrolled Meniere's disease (e.g., 3 or more attacks per year).</p>	<p><b>Accept</b> with history of one attack of vertigo that lasted two hours to two weeks (vestibular neuronitis or labyrinthitis) with no residual effects for more than one year.</p> <p><b>Accept</b> with history of one attack of vertigo less than one year ago with no residuals and determine if episode was true vertigo, or with successfully controlled Meniere's disease (e.g., medication, surgery).</p> <p><b>Evaluate</b> with history or presence of benign paroxysmal (positional) vertigo.</p> <p><b>Evaluate</b> with interventional therapies (e.g., nerve section/vestibular neuroectomy, labyrinthectomy, radiation) for disease processes other than Menieres.</p> <p><b>Disqualify</b> with recurrent attacks of vertigo or uncontrolled Meniere's disease (e.g., 3 or more attacks per year).</p>	<p><b>Accept</b> with history of one attack of vertigo that lasted two hours to two weeks (vestibular neuronitis or labyrinthitis) with no residual effects for more than one year.</p> <p><b>Accept</b> with history of one attack of vertigo less than one year ago with no residuals and determine if episode was true vertigo, or with successfully controlled Meniere's disease (e.g., medication, surgery).</p> <p><b>Accept</b> with history or presence of benign paroxysmal (positional) vertigo.</p> <p><b>Evaluate</b> with interventional therapies (e.g., nerve section/vestibular neuroectomy, labyrinthectomy, radiation) for disease processes other than Menieres.</p> <p><b>Evaluate</b> with recurrent attacks of vertigo or uncontrolled Meniere's disease (e.g., 3 or more attacks per year).</p>

# Medical Guidelines Format – Physician’s Manual

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- Physician’s Manual includes
  - Introduction about the purpose of the manual and duties of the examining physician
  - Overview of the types of decisions to be made
  - A description of the job(s) and listing of the essential tasks
  - Medical guidelines
- Format of the manual
  - Information easily located with table of contents and/or index (e.g., physician’s desk reference)

# Medical Guidelines Implementation

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- Examining physician qualifications
  - Physician-Board Certified in occupational medicine
  - Familiar & has seen job(s)
- Medical Examination
  - Include assessment of baseline health at job entry
  - Include job specific assessment, as needed
    - Firefighter job requires graded exercise/stress test
    - Public health workers require tuberculosis screening
  - Ensure all personnel following same protocol
  - Ensure consistent documentation by personnel
  - Establish protocols for processing applicants

# ROI for Medical Guidelines & Exams

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- Positive ROI

- Health costs per employee/year estimated at \$18,000 & 17.9% of the GDP in the USA
- When targeted to specific job, decreases in injury, illness absence, and disease occurred
- Savings of \$1,000/employee/year (Bank One)
- Savings of \$1.95 million/year for fire departments
  - Instituted medical exams, selection tests, & WI
  - 28% decline in lost days from work

- Negative ROI

- Valid criteria for supporting medical examinations are difficult to obtain for all medical conditions
- Most look at the big picture



# Litigation-Defendant Prevails

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- Chevron USA v. Echazabal, 2002
  - Denied permanent employment - liver damage
  - Chevron claimed direct threat exposure to Echazabal
- Albertson's Inc. v. Kirkingburg, 1999
  - Re-employment truck driver
  - Visual acuity of 20/200 not correctable to 20/40
  - Followed DOT standard
- Huber v. Wal-Mart Stores Inc., 2007
  - Grocery orderfiller sustained permanent arm injury wanted accommodation to router job at equal pay
  - Court found for Walmart followed their non-discriminatory policy-hire most qualified person

# Litigation-Plaintiff Prevails

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- **Xavier M. Doun v. US Postal Service, 1998**
  - Denied postal service lifting job due to past back surgery
  - Unable to do job due to lifting restriction (20 lb)
  - USPS conducted illegal pre-offer medical examination
- **EEOC v. CEC Entertainment Inc., 2000**
  - Mentally handicapped/autistic worker at Chuck E Cheese
  - District manager did not want “those people” working at CEC
  - Worker performance satisfactory (janitorial duties)

# Conclusions

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- Generating medical guidelines involves
  - Job analysis that addresses essential tasks, ergonomic parameters, and environmental conditions
  - Review of evidence based medical criteria (e.g., research)
  - Multidisciplinary teams to establish medical guidelines
  - Medical guidelines that define levels of severity of a medical condition
- Likert medical scales defining levels of severity of conditions increase physician agreement when establishing medical guidelines

# Conclusions

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- Groupings and matrices by task type allow for effective and efficient development of medical guidelines across multiple jobs
  - Cognitive, physical, psychomotor, sensory, speech, environmental, and attention span demands
- Examining physician's make consistent decisions when provided with information about the job and severity level of medical conditions
- Medical guidelines lead to ROI

# Thank You

