

DISCUSSION PAPER: 24-HOUR SHIFTS IN FIRE DEPARTMENTS

**Ontario Association of Fire Chiefs
and
Ontario Municipal Human Resources
Association**



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EXECUTIVE SUMMARY

This study examines the health and safety, personal, legal and operational effects of implementing a 24-hour shift program in the fire service. The goal of the study is to identify the positives and negatives of a 24-hour shift rotation, identify potential areas of concern, and to determine the conditions and policies needed to make the 24-hour shift operationally viable.

Over 280 journal articles were reviewed in preparing this discussion paper. Although much has been written about 24-hour shifts and related issues, there were no objective studies found analyzing the improvements or deterioration to organizational performance that results from changing to a 24-hour shift schedule in the fire service or other occupations.

We also held discussions with the five Ontario fire departments that are operating or have run trials with 24-hour shifts. They indicated that moving to 24-hour shifts has an impact on operations that requires the negotiation of other changes to the collective agreement.

We identified some concerns with the 24-hour shift schedule. Individuals' cognitive and physical performance tends to decline after 24 hours without sleep. Occupational health and safety studies indicate longer shifts and shorter rest periods increase the probability that accidents will occur. Moving to a 24-hour shift may increase exposure to legal liability.

Fire departments considering a change to the 24-hour shift schedule should proceed with caution. They need to gather current shift performance statistics, establish a letter of understanding outlining the terms and conditions of a trial period, negotiate language changes and issues before the trial period, install a monitoring mechanism, and establish corrective action for any variances in targeted organizational, individual, and operational performance.

1. PROJECT PURPOSE

This study was undertaken by the Ontario Association of Fire Chiefs and the Ontario Municipal Human Resource Association to provide municipal fire departments with a comprehensive report that will assist them in determining whether or not 24-hour shifts are appropriate for their municipality. Over the last few of years a number of local Professional Fire Fighter Associations in Ontario have requested a change from the current 10/14 shift schedule to a 24-hour shift rotation.

We examined the health and safety, personal, legal and operational effects of implementing a 24-hour shift program in the fire service and other occupations. Our goal was to identify the positives and negatives of a 24-hour shift rotation, identify potential areas of concern, and to determine the conditions and policies needed to make the 24-hour shift operationally viable.

2. METHODOLOGY

There were three components of our research:

1. We reviewed research studies investigating the organizational behaviour, health and safety, and physiological effects of implementing a 24-hour shift schedule.
2. We conducted legal research on cases dealing with sleep-related accidents and liability.
3. We met with Fire Chiefs and employees within Ontario operating under the 24-hour shift schedule (Kingston, London, Toronto, Windsor, Woodstock) to obtain information on their experiences with extended shifts, to ask detailed questions that may not have been considered when originally implementing the program, to gather departmental data and to review specific contract language.

3. BACKGROUND

The 24-hour shift has been a norm in many parts of the Fire Service in the United States. In some areas, such as Minneapolis, the 24-hour shift has been used for over 50 years.ⁱ Typically, the 24-hour shift has been used as a way to manage the 56-hour work week of American firefighters operating under a three platoon system. With the 56-hour work week, the 24-hour schedule is considered the best system for aligning hours of work and call volume for both management and employees.

The Ontario experience with the 24-hour shifts is more limited. The fire departments that currently operate or have operated on 24-hour shift schedules include Windsor, Woodstock, London, Kingston, and Toronto.

In 1965, Windsor Fire and Rescue became the first Canadian fire department to operate under a 24-hour shift schedule, and still operates under such a schedule today. Windsor is unique in Ontario in that it also operates under a 48-hour work week rather than the standard Ontario 42-hour work week.

On January 1, 1996, the Woodstock Fire Suppression Division started working the 24-hour shift schedule. Its initial goal was to reduce absenteeism on weekends.

On January 1, 1997, the London Fire Services began using the 24-hour shift schedule. At the time the City of London was faced with fiscal pressures and would have had to lay-off upwards of eight fire fighters. The London Professional Fire Fighters Association (LPFFA) proposed the implementation of a 24-hour shift schedule to avoid lay-offs. By accepting the LPFFA request for 24-hour shifts, the City of London hoped it could achieve the savings necessary to avoid lay-offs.

In 2004, the Kingston Fire and Rescue Department started a 2-year trial of the 24-hour shift schedule, but it terminated the experiment near the end of 2005 as a result of operational concerns. We discuss these concerns later in this paper.

On January 1, 2005, the Toronto Fire Service launched a pilot study investigating the effects of 24-hour shift schedule on Toronto firefighters in one district. On January 1, 2006, all of Toronto entered into a one-year trial period.

4. RESEARCH FINDINGS: AREAS OF CONCERN

4.1 Introduction

Despite the fact that a number of American fire departments have been working the 24-hour shift for a number of years no detailed analysis has been done on the effects of 24-hour shifts on the organizations and employees.ⁱⁱ There has also been no detailed objective analysis on the effects of the 24-shifts based on the more limited Ontario experience.

Beyond the Fire Service, we found very few research studies which measured the impact of extended shifts on employees. The studies that do exist were conducted more recently and focus primarily on social and mental health issues rather than physical health.ⁱⁱⁱ

Our findings below – which we have divided into health and safety, personal, legal and operational findings – discuss the conclusions in some of the limited but available research and are also based on our discussions with the five Ontario fire services with 24-hour shift experience.

4.2 Health and Safety Impact

Conclusions

1. An individual's physical performance declines after long periods without sleep. This is particularly prevalent in jobs that require self pacing and self motivation.
2. An individual's cognitive (problem solving) performance declines after 24-hours without sleep. This decline is faster than the decline in physical performance.
3. The reduction in physical and cognitive performance is greater during periods of sustained operations.
4. Individuals working 24 hours or more make more mental and technical errors than those working no more than 16 hours.
5. The decline in individual performance happens sooner as worker age increases.
6. Positions in communications operations should not work more than 12 to 14 hour shifts.

We found no objective scientific studies that assessed whether individual performance in the fire service improved or deteriorated as a result of working a 24-hour shift schedule. We found studies of extended shift scheduling in other professions, however, that raised some significant performance concerns.

A journal article written by Tom McLellan indicates that there are reductions in an individual's cognitive (mental, problem solving) and physical performance after 24-hours of sleep deprivation.^{iv} These reductions were increased during periods of sustained operations.^v Physical performance is more resistant than cognitive performance, but

physical tasks that involve self-pacing and motivational efforts to continue are negatively impacted by sleep deprivation.^{vi}

Dr. Christopher P. Landrigan compared medical interns working traditional schedules (24 hours or more) with those working an intervention schedule (no more than 16 hours). He found that there were 35.9% more serious medical errors during 24-hour shifts than during 16-hour shifts.^{vii} Dr. Landrigan concluded that reducing the number of daily and weekly hours worked had a positive impact on performance.

Similarly, Doctors Eastridge and Hamilton found that surgical residents made twice the number of technical errors in simulated surgical skills during extended (24-hour) shifts.^{viii}

Researchers have also determined that the length of shifts and the length of rest between shifts act as possible risk determinants for industrial accidents.^{ix} In other words, longer shifts increase the probability of an accident. Dr. Dembe found that working at least 12 hours per day was associated with a 61% higher injury hazard rate. Working 60 hours per week was associated with a 23% increased hazard rate.^x

Consistent with this research, Transport Canada has decreased the maximum on-duty time allowed for truckers in any consecutive 24 hour period from 16 hours to 14 hours. This decision was based on a Driver Fatigue and Alertness Study which showed that performance scores were lower at the end of trips than at the start.^{xi} In addition, another driving-related research study found that sleep deprivation of 24 hours was equivalent to a blood alcohol level of 0.10%.^{xii}

The age of the worker on extended shifts is also a factor. Studies in other areas show that as age increases low performance levels are reached sooner when operating under 24-hour sleep deprivation.^{xiii}

In recognition of the need for cognitive alertness Woodstock and London fire departments have negotiated a clause in their collective agreements requiring 12-hour shifts in their communications operations (See Appendix 7.21 and 7.22).

4.3 Personal Impact of Extended Work

Conclusions

7. Schedule changes may positively or negatively affect morale depending on employee perceptions of their initial schedules.
8. Any improvements to the employees' mental health and well being resulting from a change in shift schedule seems to be short lived and disappears within one year.
9. Recent studies conclude that you cannot really adjust an individual's biological clock to shift changes, regardless of the shift pattern. The impact can be minimized but not eliminated.

There are two well-known studies on the impact of 24-hour shifts on employee mental health and well-being. The first study outlines the positive benefits of changing to a 24-hour shift and has been cited in some fire fighter association shift modification requests. The second study reports opposite conclusions.

In a study for the Toronto Fire Department, "Effect of Shiftwork on Health and Circadian Rhythm in 24-Hour Fire Fighters", Dr. Glazner reported improvements in fire fighter eating patterns, reduced overall sleep deficit, improved relations with family members, and increased feelings of good health when fire departments shifted from a 10/14 hour shift to a 24-hour shift (See Appendix 7.7). These findings led her to recommend a trial period for 24-hour shifts.

A.T. Polgar Associates reviewed Dr. Glazner's study and raised concerns with her methodology and conclusions (See Appendix 7.24).

In a different study Dr. Boudreaux measured the same variables as Dr. Glazner, but reported opposite results (see Appendix 7.8 “From 24 to 12: The Benefits of Shift Modification”). He concluded that shortening EMT work schedules from 24-hour shifts to 12-hour shifts leads to: an improvement in attitudes toward work schedules, an improvement in overall happiness and physical well-being, and fewer family and social disruptions.^{xiv} He stated, “Analysis also revealed that participants endorsed less emotional exhaustion and feelings of burnout when working on the 12-hour schedule. It is well established that working 24-hour shifts can foster feelings of fatigue and exhaustion because of the effects of sleep deprivation and disruption in circadian rhythms.”^{xv} Dr. Boudreaux also reported that since job related stressors did not change, overall job satisfaction remained the same. Dr. Boudreaux concluded that the 12-hour schedule was the preferable schedule and appeared to be far less disruptive to participants’ overall quality of life.

Dr. Boudreaux conducted follow-up studies after participating EMT’s work schedules were modified from 24 to 12-hour shifts. At two month and one year intervals, he measured job satisfaction, occupational burnout, and attitude toward work schedules. Two months after the change, the reduction in the length of shift was associated with an improvement in general attitudes toward work schedules, less disruption of social and family life and decreased levels of emotional exhaustion. One year after the change the improvements attitude toward work schedules persisted but the measure of emotional exhaustion returned to the baseline – i.e. what it was before the schedule change. This suggests that morale can be positively or negatively affected by schedule changes depending on employee perceptions of initial schedules. The impact on morale, mental health, and well-being from changing shifts appears to be temporary. After approximately one year, morale levels appear to return to the levels that they were at prior to the change.

Apart from these two conflicting Ontario studies, others have studied the general health impact of working extended shifts. One study on EMS workers suggests that unconventional hours increase the secretion of stress hormones and cause changes in such factors as blood pressure, heart rate, coagulation, and lipid and glucose

metabolism.^{xvi} Another study associated extended work schedules with an increased risk of hypertension, cardiovascular disease, fatigue, stress, depression, diabetes, and general health complaints.^{xvii} Extended shifts in the fire service may exacerbate these health issues.

Conventional wisdom once held that a person's circadian rhythms could essentially be reset, but contemporary research has demonstrated that this is generally untrue. These recent medical studies indicate that an individual's biological clock cannot adjust to changes in shifts.^{xviii}

4.4 Legal Risks

Conclusions

10. A 24-hour shift is illegal in Ontario outside the Fire Service.
11. There are legal precedents for an employer being held liable for employee fatigue-related accidents.
12. Fire Departments should have due diligence systems in place to comply with occupational health and safety regulation and to protect them from civil liability.

When discussing the 24-hour shift it is important to remember that for most other workers in Ontario, a 24-hour shift is illegal. The Ontario *Employment Standards Act, 2000* (the ESA) places strict limits on hours of work. For example, section 18(1) of the ESA requires at least 11 consecutive hours free from performing work in each day. Although the *Fire Prevention and Protection Act* exempts fire service employers from this restriction, the section 18(1) of the ESA nonetheless indicates that a 24-hour shift is far greater than the normative shift length in Ontario.

Under the Ontario *Occupational Health and Safety Act* requires all employers and supervisors (i.e. Fire Chiefs) to “take every precaution reasonable in the circumstances for the protection of a worker”. Likewise, the *Criminal Code* now requires employers and supervisors take reasonable steps to prevent bodily harm to employees. Failure to meet these duties may lead to criminal liability.

Although occupational health and safety charges for a fatigue-related accident are certainly possible, we did not find any Ontario cases on such charges. We did, however, find two negligence cases from jurisdictions outside of Ontario in which employers were made responsible for fatigue-related accidents by tired employees.

Two other cases, in which drivers were held liable for driving while fatigued also raise the spectre of civil liability for employers who do not vigilantly manage the risks associated with working employees for long hours.

Faverty v. McDonald's

This case, although American, is an example of an employer being held liable for working an employee to the point at which he became so tired that he was a hazard to himself and others.

Matt Theurer was juggling work, school, and extracurricular activities. He had worked the preceding Sunday, attended school on Monday, and then worked at the McDonald's restaurant on Monday evening from 3:30 to 7:30 p.m. At the end of his scheduled shift he volunteered to come back to work for a special clean-up shift beginning at midnight. Theurer drove home from work at 8:21 am on Tuesday, he fell asleep at the wheel and was in a head-on-collision with Faverty. Theurer died instantly and Faverty was injured.

Faverty alleged that McDonald's was negligent in scheduling Theurer to work too many hours. A jury in Multnomah County, Oregon agreed and awarded Faverty \$400,000 in damages.

McDonald's appealed, arguing that it had broken no labour laws. Theurer had worked his regular 4-hour shift, had 4.5 hours off, and then volunteered to return to work another eight hours. The accident occurred after Theurer had left work. McDonald's argued that it had no duty or ability to control Matt Theurer after he left work, and should not be held liable for Faverty's injuries. The Oregon Court of Appeals disagreed and affirmed the verdict. The court held that the defendant corporation knew or should have known that its employee was a hazard to himself and others when he drove home from the work place after working numerous hours.

Notably, McDonald's was made liable even though some of Theurer's fatigue may have resulted from his activities before reporting to work.

Robertson v. LeMaster

In this West Virginia negligence case, the Supreme Court of West Virginia ruled that the employer had breached a duty of care to a motorists by causing an employee to work unreasonably long hours and sending him onto the highway where there was a foreseeable risk of harm to other motorists.

The 19-year old employee was on a work crew at the site of a train derailment. He had repeatedly told his employer that he was exhausted and wanted to go home, and after 27 hours of work, the employer gave him permission to quit. A co-worker drove him from the work site to his car. The employee began the 50 mile trip to his house, but on the way he fell asleep at the wheel and had an accident with the another motorist, who successfully sued the employer for negligence.

Regina v. Gary Neil Hart

In this case from England, the Court found that a driver was guilty of driving while impaired due to fatigue. The driver fell asleep, his car left the road and stopped on train tracks. The driver fled the vehicle, but his car was hit by a train. Ten people died when the train derailed and was diverted into the path of an oncoming train traveling in the opposite direction.

The driver – who was attempting to drive 140 miles from work to his house after being awake for 17 hours and only having two hours of sleep the previous night – was convicted in Leeds Crown Court on 10 counts of causing death by dangerous driving resulting from fatigue. He was sentence to five years of imprisonment.

Erica Cadieux Case

A Quebec woman has recently been charged with the dangerous operation of a motor vehicle causing death. She was driving an SUV, allegedly fell asleep, jumped a curb in the Montreal suburb of Beaconsfield, and struck Erica Cadieux who was pushing her baby in a stroller. Cadieux died, but the baby was unharmed.

4.5 Operational Issues

We identified a number of operational issues that arise because of 24-hour shift scheduling.

4.5.1 Response To Calls

Conclusions

13. 24-hour shifts require the fire department to have sufficient on duty staff to provide rotation relief in the event of a busy shift or a major lengthy incident.

14. Under the 24 Hour shift the number of fire fighters available for call-in may be less than under the traditional 10-14 shift schedule.

Fire fighters who work at high call stations do not get much rest during a 24-hour shift.^{xix} There have been anecdotal reports of fire fighter fatigue happening during this type of extended shift.^{xx} A high number of calls coupled with a lack of rest also lengthens the individual's recovery time on that shift or the next shift (See Section 4.2 Individual Performance and Section 4.5 Occupational Health and Safety). This is especially important on the second work day if the department is running a cycle of one 24-hour day on, one 24-hour day off and the third 24-hour day back on.

To offset fatigue, the Toronto Fire Service has an unofficial practice of giving all fire fighters two hours of sleep time during their shift.^{xxi} This time is referred to as "core sleep." The fire station will shut down for these two hours and another station will cover the first stations calls during this period. Toronto Fire Service did not provide information on how response times were affected by giving firefighters core sleep hours.

While large municipalities like Toronto may be able to address call volume issues, a smaller municipality with a lower number of stations may not be in a position to do so. Smaller municipalities may face response problems as one station may not be in a

position to relieve another station that has experienced a busy day.^{xxii} For example, if the stations are geographically far apart they will not be able to cover for each other (to provide rest time) and still provide the necessary response time and staff numbers to both areas.^{xxiii} Alternatively, in cases of simultaneous calls, additional employees need to be called in on overtime rates to respond to the incidents.^{xxiv}

A major incident requires a large number of people over an extended time period. People working long shifts will need to be rotated or relieved, as it may be a long time before the next platoon reports for duty.^{xxv}

If it is necessary to call in extra people the 24-hour shift will reduce the number of people that are available for call backs^{xxvi}. This may result in a situation where the next shift will have to work 36 hours or more continuously.^{xxvii} Firefighters working other shifts may be in the middle of a multiple day off period and may not even be available locally (Some of the fire departments have reported that they are finding that a greater proportion of their fire fighters are living further away or outside the municipal boundaries.)^{xxviii}

The lengthening of the shift rotation delays the arrival of relief firefighters (at regular rates of pay), requiring people to be called in at overtime rates which may lead to an increase in overtime costs.^{xxix}

4.5.2 Training

Conclusions

15. Development of daily work schedules will help to ensure that all necessary training is carried out, that changes to policies and procedures are effectively communicated and that good documentation is maintained.
16. Provisions need to be made in the agreement to modify the shift schedule for training purposes.
17. Use of the platoon system is recommended.

Management of the workplace becomes difficult under a 24-hour shift as the management staff and the fire fighters may be working different shift schedules and there are such large gaps between days on duty.^{xxx} To ensure that all of the necessary fire fighter training is carried out, and that records of which fire fighter took training or was in attendance on any given day of training, the Toronto Fire Service developed a daily work schedule for every day of the year. These schedules were linked back to their departmental policies and procedures, and their health and safety training requirements. It also allows them to effectively communicate changes in policy or new procedures to everyone. In this manner they are able to make sure that every fire fighter is up to date on their training and has all of the latest information. A copy of one of the daily schedules is included in Appendix 7.2.^{xxxi}

Windsor Fire & Rescue reported that the group system causes administrative difficulties and recommended that the Platoon system be used for a 24 Hour shift schedule.^{xxxii}

The London Fire Service has expressed difficulty in the ability to train staff as a result of the 24-hour shift program. The LFS said that there are fewer occasions when the shifts

of the two divisions coincide. Also there is a lack of continuity for the Training Division. This is because the “on platoon” has at least one day off between shifts.^{xxxiii}

Toronto has not experienced problems because they made provisions in their agreement to modify the shift schedule to allow for consecutive training days when deemed necessary by training staff.^{xxxiv}

Woodstock and Kingston did not change their collective agreement language and have found it difficult/expensive to carry out required training activities.^{xxxv}

4.5.3 Hours of Work/Overtime

Conclusions

18. Regular work week hours were not changed in any Ontario fire departments from switching to a 24-hour shift schedule.

19. Overtime costs may increase.

The regular hours of work per week have not been altered by changing to a 24-hour shift schedule. Ontario Fire Fighters operating under the 24-hour shift schedule work either 42 or 48 hours per week (averaged over a five-week period). The number of hours worked per week depends on the number of platoons or groups. Toronto, London, and Woodstock operate on 42 hours per week. Windsor maintains a 48-hour work week (See Appendix 7.1).

In some cases overtime hours have increased. During the 24-hour shift trial in Kingston, the fire department reported that overtime expenditures had increased by 33.8% over the 22-month trial period (See Appendix 7.17). The primary reason for this increase was “staff shortages due to unscheduled absences”.

The Maryville Fire Department’s (IH, U.S.A) overtime costs increased after the conversion to the 24-hour shift trial period because:

- The overtime threshold was calculated at 171 hours of work and not the typical 212 hours (this is over a 28-day period).
- Maryville uses 171 hours since a firefighter is normally paid for 19 hours of work per day (they are not paid for the 5 hours of sleep they have on a 24-hour shift).

- During the 28-day cycle, a firefighter typically works 9 shifts. These 9 shifts multiplied by 19 hours equal 171 hours. Once every 3 months a firefighter works 10 shifts or 190 hours.^{”xxxvi} These additional 19 hours (190-171) are paid at time and a half.
- Fire fighters are given five hours of unpaid sleep time throughout the night. For any call during this period the fire fighter is paid for all five hours at time and a half.

As a result of this clause Maryville’s overtime budget increased dramatically. This highlights some of the potential cost implications of trying to provide guaranteed sleep time during the 24-hour shift.

4.5.4 Absenteeism

Conclusions

20. The absenteeism rate may increase.

21. The cost of absenteeism is greater because one day is equal to 24 hours.

22. Requirements for medical documentation need to be revised.

The following article appeared in the Windsor Star:

City Council Alan Halberstadt rang alarm bells this week over the disturbing propensity of Windsor fire fighters to phone in sick on weekends and holidays, which contributes to a scandalous overtime bill that must be borne by overburdened city taxpayers...Halberstadt said Wednesday he was told 19 fire fighters called in sick over Thanksgiving weekend, costing the city thousands of dollars in overtime because their peers had to pick up the slack....City ratepayers will spend at least \$800,000 this year to cover overtime pay resulting from firefighters' sick days, more than \$300,000 above the budgeted figure for the year. ^{xxxvii}

The ability of fire fighters to take on second jobs and the high absenteeism rates led the Windsor Star to question fire fighters' job commitment.

Windsor Fire and Rescue reports an annual cost of between \$500,000 and \$1,000,000 in order to maintain staffing levels of 57 throughout a 24-hour period. They have acknowledged that they have higher absence rates on weekends and that absences among long service staff are higher. Since one 24-hour period is equal to one day, an employee can miss two 24-hour days (48 hours) without having to provide a doctors note (48 hours is equal to 4.8 – 10 hour day shifts or 3 – 14 hour night shifts). In addition, these two "sick days" may be five days apart. Requirements for medical documentation need to be revised in the collective agreement and contract wording

should be examined to remove references to days or shifts for absences or redefine the terms so that a one day absence does not constitute 24 hours.^{xxxviii}

The Kingston 24-hour shift trial reported average sick days increased from four to six days per employee per year (See Appendix 7.19).^{xxxix}

London Fire Department has reported an absenteeism problem. In 2005, average annual days missed due to absenteeism was 10.8 (See Appendix 7.26). As a result, the LFD is going to implement an attendance management program.^{xl}

4.5.5 Recruitment and Retention

Conclusions

23. The London Fire Department has experienced difficulties in attracting suppression fire fighters to transfer to their training division as a result of different hours of work regimes.

24. Fire departments with 24 hour shifts report an increase in staff that live outside the municipal boundaries.

The London Fire Department has reported difficulties in having suppression fire fighters wanting to transfer to their training division. The LFD attributes this problem to the training divisions work schedule. Training personnel work 8-hour days, five days a week. According to the LFD, this schedule may be less desirable than the 24-hour shift schedule.^{xli}

For EMS, the issue of workforce recruitment and retention has been cited as one of the top problem areas. Irregular working hours have been cited as a major reason why employees leave many EMS jobs.^{xlii} Some of the EMS departments that were running on the 24-hour shift schedule are now reverting back to a 10/14 hour shift schedule.^{xliii}

In a phone interview, Dr. Boudreaux said EMS crews had a negative attitude towards their work schedule because of fatigue due to call volume.

Woodstock Fire Suppression Division reports that about half of their staff live outside the City of Woodstock.^{xliiv} Both Toronto and London have also reported an increase in staff moving outside of their respective cities since the introduction of 24-hour shifts.^{xli}

4.5.6 Swapping Shifts

Conclusions

25. Allowing employees to swap shifts without approval increases the employer's exposure to liability.

26. Swapping shifts may lead to lower job performance or higher accidents if it does not allow sufficient rest time between shifts.

Many fire departments have a practice of letting fire fighters swap shifts.

Windsor Fire and Rescue's collective agreement allows fire fighters to switch up to six shifts in a row without approval.^{xlvi} This practice could potentially allow a firefighter to work two or more 24-hour shifts in a row.

The following information was published in the Boston Globe:

"The City cannot prevent firefighters from swapping their shifts- even when they work around the clock to work fewer days – without a labour ruling, according to a Suffolk Superior Court order. The ruling sends the debate back to the Labour Relations Commission, where Boston fire fighters have already filed a grievance over a March 24, 2001 city order that would halt the 24-hour shift swap."^{xlvii}

Allowing fire fighters to swap 24-hour shifts without approval may not only have a negative impact on personal performance (See Section 4.2), but it may increase the possibility of accidents and may also increase the employer's exposure to liability (See Section 4.4). Clear policies need to be developed around what is an acceptable shift swap (back-to-back 24-hour shifts present the greatest danger) or language needs to be put in the collective agreement that requires all swaps to be approved by the employer.

4.5.7 Contract Administration

Conclusions

27. In changing to a 24-hour shift all contract clauses must be inspected for possible changes. References to days and shifts may need to be re written.

28. Grievance timelines need to be examined to reflect what is possible under the shift schedule.

29. Vacation policies may need to be instituted to maintain staffing levels during peak vacation time.

30. Bereavement leave policies may need to be re-examined.

31. London has experienced an increase in bereavement time.

Grievances. We found no studies measuring an increase or decrease in grievance activity after changing to a 24-hour shift schedule.

The timelines for grievances in standard collective agreements are difficult to meet when changing to a 24-hour shift schedule. If a grievance occurs with a fire fighter on Thursday of Week 1, there may be up to five days before that firefighter is on duty again so that the grievance can get dealt with. This time lag is compounded if the fire fighter has swapped shifts (See Appendix 7.2).

This has not been an issue for both Toronto and Windsor because their timelines are not disputed.^{xlviii} Fire departments that have stringent grievance timelines should look to renegotiate this clause.

Vacation time. London negotiated a reduction in vacation hours with the introduction of the 24-hour shift. London also negotiated fewer staff to cover vacation leave. Prior to the 24-hour shift schedule, a maximum of 10 staff members were permitted to be on

vacation at the same time. Under the 24-hour shift schedule only eight members are allowed to be off at the same time in the off seasons and only nine in the peak summer period.^{xlix}

Bereavement time. In shifting to the 24-hour shift London Fire Services experienced the following issue with respect to bereavement leave. The contract stipulated the number of “days” for bereavement leave depending on the relationship. Under the 24-hour system the use of days results in a large increase in the number of hours away from work. Again the spacing of the days on days off on a 24-hour shift schedule raises the question of whether the multiple days off for bereavement is required.¹

10/14 Shift	Time Off (hours)	24-Hour Shift	Time Off Hours (Now)	Increase in Time Off (hours)
1 day	10 or 14	1 day	24	14 or 10
2 days	20 or 28	2 days	48	28 or 20
3 days	30 or 42	2 days ⁱ	48	18 or 6
4 days	40 or 56	2 days ⁱⁱ	48	8 or (8) ⁱⁱⁱ

ⁱ With 3 days bereavement leave, on an 8 day cycle, employees will on miss a maximum of 2 shifts.

ⁱⁱ With 4 days bereavement leave, on an 8 day cycle, employees will on miss a maximum of 2 shifts.

ⁱⁱⁱ (8) means a decrease in time off by 8 hours

5. CONCLUSIONS

Although we reached 31 conclusions as part of our study, additional evidence is required to conclusively determine whether the 24-hour shift is a positive or detrimental model for Ontario municipalities and their fire services. There are certainly potential negotiated benefits that may outweigh any drawbacks associated with the 24-hour shift. Toronto, for example, negotiated a greater ability to schedule municipal, college, and medical training events. Likewise, London negotiated a reduction in vacation hours. Before municipalities negotiate for collective agreement improvements by agreeing to move to a 24-hour shift, we suggest that they carefully consider some of the costs and risks discussed in this paper. We have created the checklist below to assist in this exercise.

6. CHECKLIST

The following is a checklist of items to be dealt with prior to considering a change to a 24 Hour shift schedule.

1. Collect data and Conduct an Individual/Fire Station Assessment. This information will serve as a baseline for comparison at the end of the trial period.
 - 1.1 Gather Information on Individual and Organizational Performance while operating under the 10/14 shift schedule: emergency response times, endurance while on the fire scene, alertness while conducting emergency medical treatment, and reaction time while doing rescue operation drills.
 - 1.2 Gather Information on Call Volume
 - 1.3 Gather Demographic/Employee Information: distance from home to work, daily commute information, and age.
 - 1.4 Gather Financial Information: current levels of overtime and number of paid working hours.
 - 1.5 Gather Employee Relations Information: number of annual sick days, number of grievances, annual transfer requests, medical aid lost time, medical aid only, and incidents with no medical aid or lost time.
 - 1.6 Gather Social, Mental, and Physical Health Information.
2. Review All Contract Language to Look For Clauses Affected by the 24-hour Shift Program
 - 2.1 This information should examine the current collective agreement for all references to days or shifts and other collective agreements operating under the 24-hour shift program. Negotiate the contract language changes before the trial begins.

- 2.2 Establish that a *workday* is a 12-hour period beginning at 08:00-20:00 or 20:00-08:00, a *workweek* is one calendar week starting on Sunday 08:00 and ending on the following Sunday at 08:00, a *shift* is a 24-hour period from 08:00-08:00, a *lieu day* is a 12 hours, and a *sick day* is 12 hours (See Appendix 7.19). If these variables are not properly defined a sick day for example could be assumed to be one 24-hour shift.
3. Establish Adequate Rehabilitation Time
 - 3.1 Fire fighters should have a minimum of 48-hours of off time between 24-hour shifts to recover.
 - 3.2 Since the employer may be held liable for an accident caused by fatigue, it is important that management includes clauses, in both the initial letter of understanding and collective agreement, that employees will sign an agreement before each shift indicating they are well rested or have had adequate sleep (not less than 7.5 hours, the night before a shift).
 - 3.3 If an employee did not sleep for at least 7.5 hours the manager will have the authority to send the employee home if they can not carry out their duties at any time throughout the shift.
 - 3.4 The employer may also have to ensure that the employee is well rested before they drive home after their shift. This may require the fire fighter to get 2 hours of sleep (unpaid) after the end of a busy shift and before they can drive home. Failure to manage this properly may result in a legal liability for the employer if an accident occurs.
 - 3.5 Since these regulations are to protect the safety and wellbeing of the employees and given that they will not be called upon to work during this sleep time, these hours should be unpaid.

4. Define and Collect Performance Data
 - 4.1 Define the Performance and Organizational Health Variables To Be Measured. Also develop an agreement on how these variables will be measured and recorded. Collect the data.
5. Develop Daily Work Schedules
 - 5.1 Look at all of your policies and procedures, health and safety and training requirements and develop a daily work schedule to ensure that all fire fighters get the necessary training, that of the tasks get done and that good documentation has been kept.
6. Develop a Letter of Understanding for a Trial Period
 - 6.1 The trial period should be a minimum of two years with a two-year extension provision to properly assess the impact of the 24-hour shift program.
 - 6.2 Outline the conditions of the agreement (See Appendix (7.19)).
 - 6.3 Make provisions to allow changes to be made to correct problems during the trial period.
 - 6.4 Develop an Out-Clause that can be used by either the union or management based on changes to any of the previously mentioned variables. Stipulate that all hours of work contract amendments will revert back to those that existed before the introduction of the 24-hour trial period.
7. Schedule Quarterly Meetings
 - 7.1 Every 3 months management and the union representatives should meet to resolve outstanding issues related to the 24-hour shift trial period.

- 7.2 If an increase in absenteeism or worker fatigue has developed management and union members should work together to modify current contract language or resolve the problem.
- 7.3 Regular meetings will allow both management and union members to assess the feasibility of the 24-hour shift schedule.
- 8. Schedule Annual Meetings
 - 8.1 Annual meetings should be scheduled to discuss long-term objectives and to review performance on each of them.
- 9. Prepare a Final Report
 - 9.1 Three months before the end of the Trial Period analyze the data and prepare a report. Before the end of the Trial make a conscious decision to stop the experiment and revert to the previous shift system, to extend the trial (make necessary modifications) or to adopt the 24 hour shift schedule.

ⁱ Clack, James, "Management Effects of Firefighters Working a Consecutive 48-hour shift". Minnesota Fire Chief, July-August 2003. 39; 6 p. 16-19.

ⁱⁱ Ibid.

ⁱⁱⁱ Brewer M, Deschamp C: "Hard Days Night: The Harmful Effects of Shift Work". JEMS. 2006 May;31(5):88-90, 92, 94-7.

^{iv} McLellan T, Bell D, Kamimori G: "Caffeine Improves Physical Performance During 24 h of Active Wakefulness." Aviation, Space, and Environmental Medicine. Vol. 75, No. 8 August 2004.

^v Ibid.

^{vi} Ibid.

^{vii} Landrigan CP, Rothschild JM, Cronin JW, Kaushal R, Burdick E, Katz JT, Lilly CM, Stone PH, Lockley SW, Bates DW, Czeisler CA: "Effect of Reducing Interns' Work Hours on Serious Medical Errors in Intensive Care Units." New England Journal of Medicine. Oct 28;351(18):1838-48.

^{viii} Eastridge BJ, Hamilton EC, O'Keefe GE, et al: "Effect of sleep deprivation on the performance of simulated laparoscopic surgical skill." American Journal of Surgery. 186:169-174, 2003.
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- xv Ibid.
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- xix Phone Interview with London Fire Service.
- xx In person meeting with Toronto Fire Service.
- xxi In person interview with the Toronto Fire Service.
- xxii Phone interview with Woodstock Fire Suppression Division.
- xxiii Phone interview with Woodstock Fire Suppression Division.
- xxiv Phone interview with Woodstock Fire Suppression Division.
- xxv Phone interview with Windsor Fire and Rescue.
- xxvi Phone interview with Woodstock Fire Suppression Division.
- xxvii In person interview with Woodstock Fire Suppression Division.
- xxviii In person interview with Woodstock Fire Suppression Division.
- xxix In person interview with Kingston Fire and Rescue.
- xxx In person interview with London Fire Services.
- xxxi City of Toronto Fire Services: "24-Hour Shift Committee Report: Recommendation for 'City Wide' Trial Period 2006. October 2005.
- xxxii Phone Interview with Windsor Fire and Rescue.
- xxxiii In person Interview with London Fire Service.
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- xliv In person interview with London Fire Department.
- 1 In person interview with London Fire Department.