Defending the Pass While Shorthanded

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Introduction

When a penalty is drawn, the increased open ice means the advantaged team is given an easier opportunity to move the puck, string passes together, and generate scoring chances. A dynamic penalty-killing group may be able to use predictive factors or preemptive strategies to decrease their opponent's chances of creating offensive progress and putting shots on goal. This paper will aim to observe any coachable differences in how a team can defend the pass when shorthanded, relative to their even-strength formations.

Data

The provided data set included four games between the Canada and United States women's hockey teams, featuring 7,459 tracked events including shots, takeaways, and zone entries. 3,106 of the events were pass attempts, 2,333 of which were successful. Pass distance was calculated using the distance between two points formula, given by $\sqrt{((x2 - x1)^2 + (y2 - y1)^2)}$ where $x2$ and $y2$ are the respective coordinates of a pass target location, and $x1$ and $y1$ are the respective coordinates where a pass was released. Passes were also categorized into the three zones of the ice (offensive, defensive, or neutral) based on the coordinates of the release. Play strength was determined by the number of possessing team skaters relative to defending team skaters, and plays were categorized (W, L, or Even) based on possessing team goals and defending team goals. Some other calculations were examined in this project's exploratory data analysis phase such as play sequence numbers using loss of possession and face-off wins as indicators to change, pass recovery zones determined by the target coordinates of a pass, and grouped per-sequence totals of shots, successful passes, and pass attempts.

Related Study

Previous analysis from Ian Astalosh found that stretch and breakout passes “provide a significant amount of value” in generating offense even if they do not turn into assists as regularly. Further, the author suggests that “teams should [attempt] longer, quicker passes when breaking out from their own end.” He also states that while high reward passes come with an increased risk of turnover, and safer passes mean you are more likely to retain possession, high percentage passing does not appear to increase scoring chances (Astalosh, 2021). The following analysis will consider these ideas when viewing passing from the perspective of the defending team.

Methodology

Using the calculated fields, and attributing the X and Y coordinates to distance in feet on a hockey rink, this analysis will observe how the average distance of a pass changes in various shorthanded game situations. Seeking to answer the report’s main question, we will observe successful pass distance and rate for both teams at even-strength and while shorthanded, considering various combinations of pass release zone and score state while observing some more closely where trends appear.

Results

First, we observed the pass details by strength state to contextualize the sample size. 20% of all pass attempts occurred on the power play, with 22% of successful passes being completed in advantaged situations. The average successful pass target was 2.2 feet shorter on the power play than at even-strength, and 1.6 feet shorter when including unsuccessful pass attempts.

Total Passes and Average Distances

Grouped by strength

Strength	Passes	Avg. Dist.
EV	1763	37.0
PK	56	33.3
PP	514	34.8

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Figure 1: Minimal pass distance variance was observable when simply sorting by strength.

When examining targeted distance on successful passes sorted by zone, we start to see a hint of an interesting trend. Successful passes in advantaged situations are similar in distance to those at even-strength in the offensive and neutral zones, with a difference of under two feet for each, while those released in the defensive zone were shorter by just over seven feet.

Total Passes and Average Distances

Grouped by strength and zone

Zone	Passes	Avg. Dist.
EV		
DEF	891	38.6
NEU	261	31.3
OFF	611	37.2
PP		
DEF	133	31.4
NEU	69	32.7
OFF	312	36.7

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Figure 2: The trend of shorter defensive zone power play passing begins to appear.

Further, successful passes released in the defensive zone were shown to be shorter on the power play regardless of score state.

Average Successful Pass Distance

Grouped by strength and score state

Score State	# Passes	Avg. Dist.
EV		
Even	537	38.4
L	167	41.0
W	187	37.0
PP		
Even	66	32.7
L	26	28.9
W	41	31.1

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Figure 3: Powerplay pass totals were much smaller, but the average pass was noticeably shorter in all score situations.

Looking deeper into factors that may impact the possessing team's strategy and urgency, we saw that defensive zone power play passes were just over 12 feet shorter than those at even-strength when the possessing team was losing, while the offensive and neutral zone remained similar with differences of under 2.5 feet.

Insights

Overall, there is minimal change in pass distance when a team is on the power play, especially when considering that an average of an extra few feet added to a pass is unlikely to regularly increase the chance that a forechecking player observes, reacts, and intercepts in the short additional time. There is a more noticeable difference on passes released in the defensive zone, and the two factors that appear to have the greatest combined impact on predicting power

play pass distance are score state and release zone. While a drop in average pass distance is seen across all three score states, man-advantage passes released in the defensive zone while trailing were shorter by a significant margin.

The idea that bucking the trend and attempting longer passes may counter the penalty-killing team's defensive expectation supplements the ideas in Astalosh's work. Further, these conclusions create two general options for the shorthanded team to evaluate when defending: restrict passing lanes that could lead to longer, high-danger passes that will likely be more plentiful to a team with a player advantage, or try to increase the turnover rate by pressuring the offense to make uncharacteristically long passes. A successful shorthanded formation may involve tandem pressure from the two forwards, increasing the likelihood of one of three following outcomes: an extended delay in the offense's breakout which will decrease their power play time, an expectedly short pass which the pressuring forwards will be in motion to challenge, or an increased chance of a takeaway when the offense is forced into a long-distance pass attempt.

Closing

There are a number of factors outside of breakout strategy that could decrease the average length of a pass in the defensive zone, such as the lack of urgent defensive presence and increased hand-off style passes during line changes. Seeking similar trends in other women's leagues and even men's leagues could reveal if these trends are universal or more specific to the teams in the given data set. This would provide insight on whether or not these conclusions are coachable at different levels of opponent quality, opponent variety, and game speed. Additionally, larger sample size would of course be beneficial for testing an idea like this when smaller groups of passes can be more easily skewed by dramatic outliers of single-game trends.

References

Astalosh, I. (2021). *Teamwork Makes the Dream Work - Determining Which Pass Types Create High Quality Chances in Women's Hockey*. https://github.com/ianastalosh/big_data_cup_2021/blob/main/report.pdf