












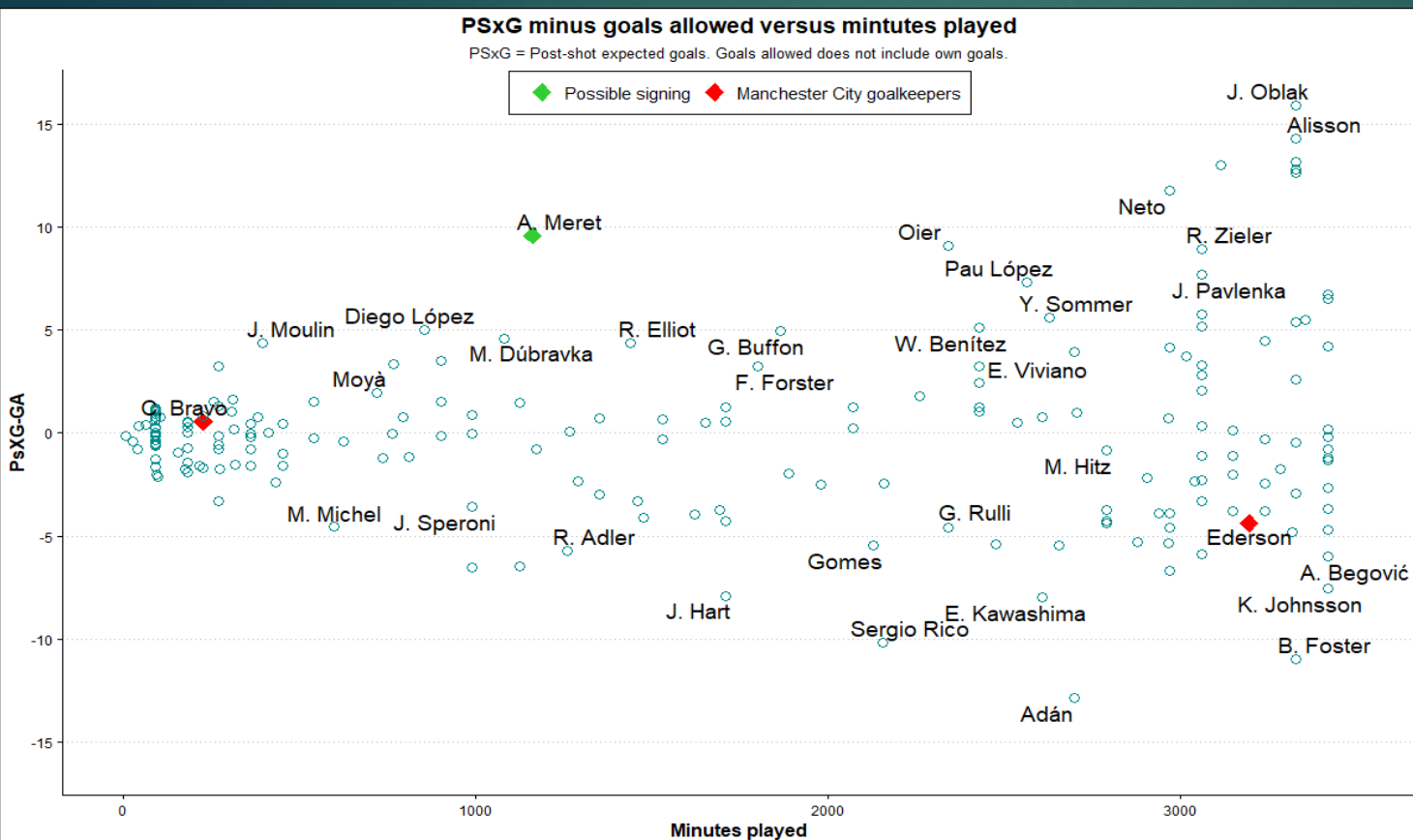
## Post-Shot Expected Goals minus Goals Allowed: The make or break metric for evaluating goalkeepers?

The goalkeeper is arguably the most important piece of a successful defense, since they are the last resort standing between the attacking side and the goal itself. Traditionally, one of the most important aspects when evaluating the quality of a goalkeeper is their ability to stop shots, and one metric which quantifies this ability is post-shot expected goals (PSxG). Based on the expected goals model (xG), which is the probability of scoring a goal from a given position on the pitch only using information prior to the shot, the PSxG model also uses information after the shot has been taken. The results of the subtracting goals allowed (GA) (own goals excluded) from the total PSxG, that are shown in table 1, are based on all shots during the 2017-2018 Premier League that were accurate (i.e. not blocked and on-target). A high PSxG-GA indicate goalkeepers conceding fewer goals than expected and vice versa. The PSxG model is divided for shots with feet, headers and free kicks, and uses information regarding distance to goal, angle of the shot, estimated shot trajectory, whether the shot was taken with their preferred foot and the time from shot until a save attempt was made. With this information, it is estimated how likely the shot is to end in a goal and, with this in mind, it can then be compared to the amount of conceded goals during the season, where a high PSxG +/- indicate goalkeepers conceding fewer goals than expected and vice versa. Some assumptions worth considering is that a constant value of expected goal from a penalty kick has been used (0.76), the fact that time between shot and save attempt is correctly timed, shot trajectory is considered as which part of the goal it is estimated to end up in (rather than actual pitch coordinates of the shot) and that shots are treated as independent of one another, that is, there is no additional correction for shots from rebounds, corners, deflections etc. Another implicit assumption is that the given information is sufficient to calculate these probabilities, and that no weighting is done per minutes played; rather, minutes played can be seen as included since PSxG will (typically) have higher values for player with more played time.

Table 1: Top 10 players of percentile rank of Post-shot expected goals minus goals allowed (own goals excluded) in the 2017-2018 Premier League season.

	Player	Team	PSxG-GA	Percentile
	Nick Pope	Burnley	13.032	100.000
	David de Gea	Manchester United	12.792	97.368
	Matthew Ryan	Brighton	6.494	94.737
	Martin Dúbravka	Newcastle United	4.604	92.105
	Rob Elliot	Newcastle United	4.347	89.474
	Lukasz Fabiański	Swansea City	4.208	86.842
	Karl Darlow	Newcastle United	3.505	84.211
	Fraser Forster	Southampton	3.233	81.579
	Adrián	West Ham	1.232	78.947
	Paulo Gazzaniga	Tottenham	1.181	76.316
⋮	⋮	⋮	⋮	⋮
	<i>Ederson</i>	<i>Manchester City</i>	<i>-4.382</i>	<i>18.421</i>

# Post-Shot Expected Goals minus Goals Allowed (PSxG-GA)

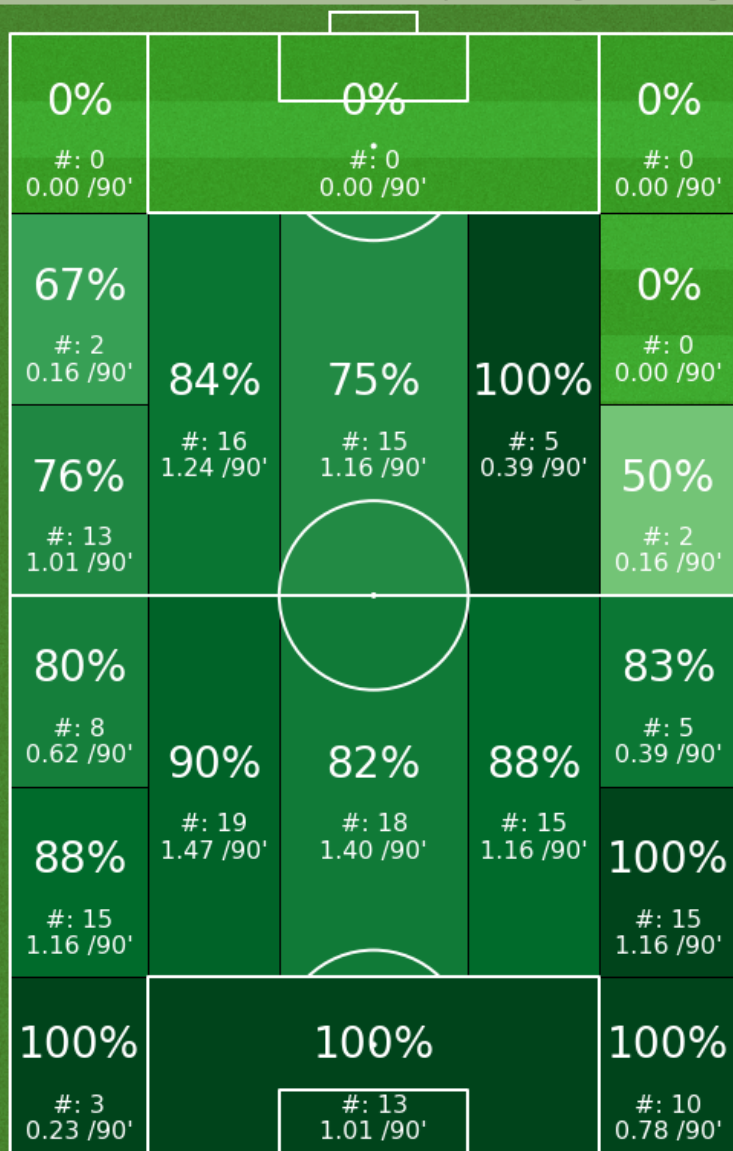


- ▶ High positive values of metric indicate goalkeepers conceding fewer goals than expected.
- ▶ Goals allowed exclude own goals.
- ▶ **Ederson** ranks poorly in this metric while **Alex Meret** ranks highly.
- ▶ Metric is based on how likely a shot on target will be a goal and includes information over:
  - ▶ Distance to goal & angle
  - ▶ Time from shot to save attempt
  - ▶ Estimated shot trajectory

Data from Big 5 European Leagues season 2017-2018. Model trained on data from Premier League.

### Pass success for A. Meret during 2017-2018 Serie A season

Success is based on end coordinates of passes made by A. Meret where # denotes number of successful passes to a given rectangle



## Pass success & save percentage

### Strengths

- ▶ **Alex Meret** is accurate when passing the ball.
- ▶ Higher save percentage than **Ederson**.
- ▶ Only 21 years old; a future prospect.

### Weaknesses

- ▶ Inexperienced, only played 13 games last season.
- ▶ Reluctant passer; few passes per 90 minutes.

Player	Type of save	Save percentage
Ederson	Reflexes	60.78 %
Alex Meret	Reflexes	<b>65.00 %</b>
Ederson	Save attempt	81.25 %
Alex Meret	Save attempt	<b>90.90 %</b>

## Making a decision: a replacement or backup?

**The situation at hand:** It is the summer of 2018. Manchester City have been crowned the champions of the Premier League with a record-setting performance, netting a grand total of 100 points in 38 games played. On the goalkeeper front, Ederson just played his first season with the team and played a large part of the league's best defence, only allowing 27 goals for the entire Premier League season. The backup goalkeeper, 34 year old Claudio Bravo, played only three league games with his main contribution being in the domestic cups or filling in the boots of Ederson when he is injured, suspended or otherwise unavailable. With this in mind, a new goalkeeper was to be scouted.

**The initial recommendation:** At first, based on the results of the metric used in first part of this report, it was noted that Ederson was rated as below average for the PSxG-GA metric when considering goalkeepers in the Premier League for the 2017-2018 season. Therefore, the aim was to find a player in another of Europe's Big 5 leagues (Bundesliga, Serie A, La Liga, Ligue 1) who had a higher ranking with respect to this metric. In the presentation on the previous two pages, some noteworthy players stood out, one of them being 21 year old Alex Meret currently playing for SPAL in Serie A on loan from Udinese. Alex Meret ranked highly for PSxG-GA at almost a rating of 10, which ranks 8th overall among all five leagues and worth noting is also that Meret played approximately 2000 minutes ( $\approx 22$  games) less than the other in the top 7 and thus seems like a solid suggestion as a backup goalkeeper for Manchester City given their current goalkeeper situation.

**The discussion outcome:** In the succeeding discussion, the first point brought up was whether the signing should be as a replacement of Ederson or a backup to Ederson. The suggested replacements for Ederson included Jan Oblak and Marc-Andre Ter Stegen, while the backup suggestions concerned Alex Meret and Alphonse Areola. The pros presented for a Ederson replacement highlighted that the suggested players outperformed Ederson across the board in many cases, examples including save percentage, individual mistakes and saves in critical situations. The cons mainly revolved around the proposed players high price tag and the fact that Ederson still is young (24 years old during summer 2018) with still room for potential improvement. In contrast, the advantages of signing a backup were a smaller price tag, future potential and solid performance all around in conceding fewer than expected goals. After evaluating the pros and cons of both of these options, the decision was made to look for a backup keeper due to Ederson being a relatively fresh player at the club with only one season with the club behind him and that left two options: Alex Meret and Alphonse Areola. The strengths of Meret included high ranking for preventing goals, good passing accuracy and potential ability. Meret's weaknesses lie in the passing reluctance, injury history and inexperience. Contrasting this with Areola, who has had more experience playing in European top leagues and has a better passing tendency with an comparably high rate of successful passes, albeit ranking lower in preventing goals and being somewhat older. The final decision among the group was Alphonse Areola, due to the aforementioned pros out-weighting the pros of Alex Meret, and the fact that Areola's club (PSG) style of play (possession football) is more akin to that of Manchester City than SPAL's, which should make the transition period between the two clubs more smooth.

**Final recommendation:** Overall, all of the potential signings presented and discussed had their own strengths and weaknesses worth considering. The decision to aim for signing a backup goalkeeper aligns with the initial recommendation, and thus will be used for making the final recommendation itself. The two suggestions, Alex Meret and Alphonse Areola, had similar market values and a different background so they have to be analyzed more rigorously. However, the final recommendation will align with that of the group discussion; Alphonse Areola is the player who is the best fit as a backup goalkeeper for Manchester City at the current point in time.