IOC WORLD CONFERENCE
ON PREVENTION OF INJURY AND ILLNESS IN SPORT

MONACO, 16-18 MARCH 2017
GRIMALDI FORUM

Comparing Adductor Squeeze Tests: Detection = Prevention

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Richard Clark (Brentford Football Club, UK)

University of Chichester

BRENTFORD Founded 1889 Football Club

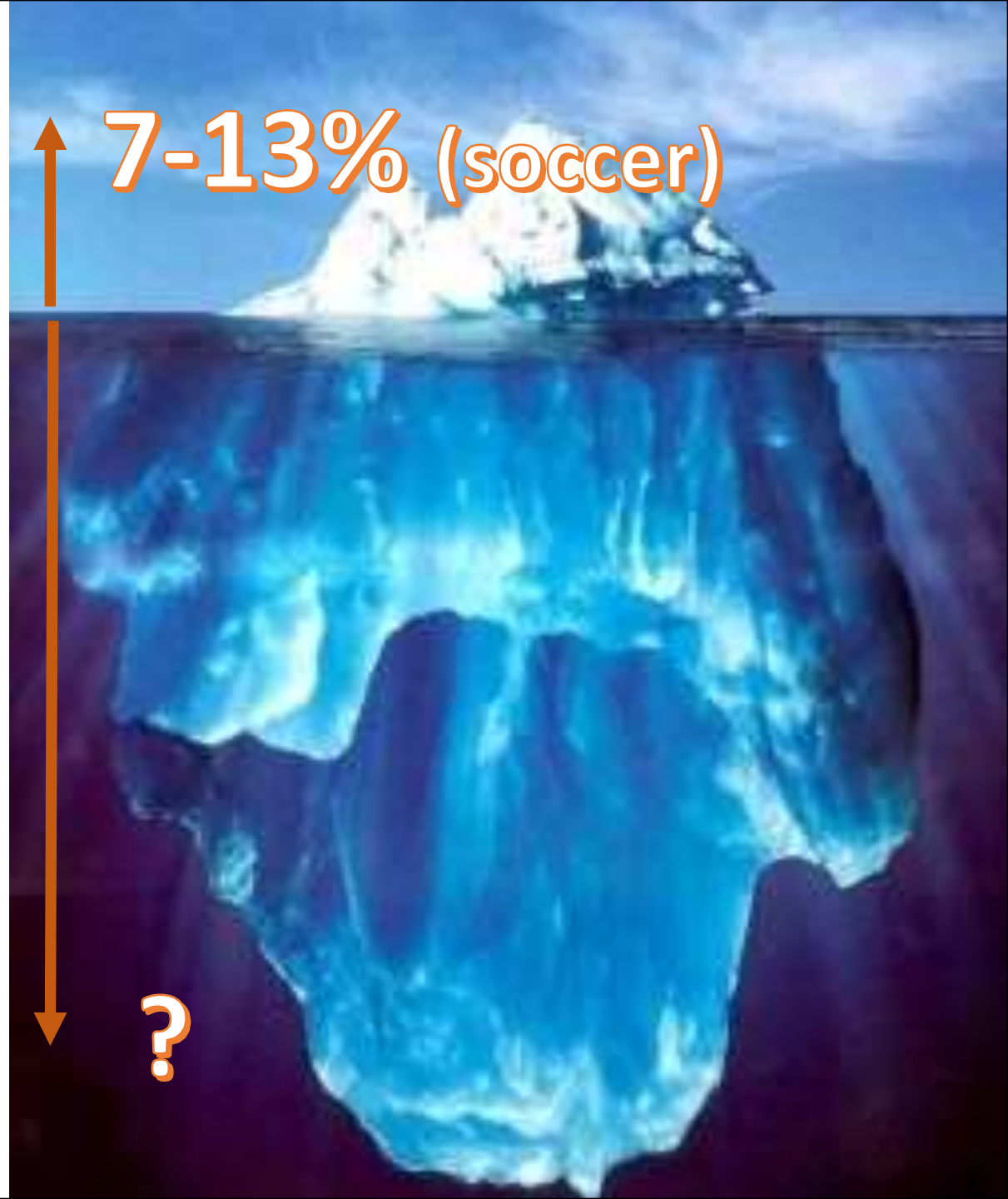
- Workshop format:

Researcher / Practitioner view (NL)

Practitioner / Researcher view (RC)

- Lower HAGOS (PRO) scores if injured in previous season
- EVERY week approx 30% of male footballers have symptoms
- Lower baseline scores may be predictive of injury (sport function subscale)
- Low squad average and high individual scores on pre-season DAY ONE! (not published data)

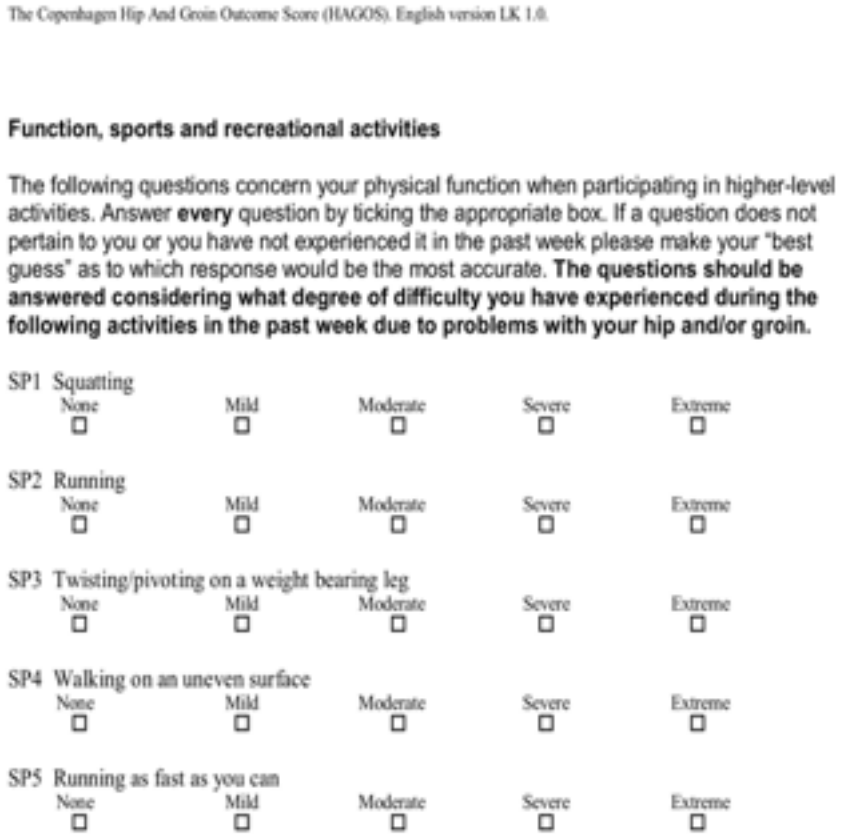
Walden et al. (2015)
Thorborg et al (2014)
Haroy et al (2017)
Delahunt, Fitzpatrick & Blake (2017)



Risk factors :

- PMH

- Pain / Reduced **Strength** on Adductor squeeze testing
- Reduced Hip Internal **ROM**
- Reduced Bent Knee Fall Out **FLEX (?)**
- Low **Patient Reported Outcome**



The Copenhagen Hip And Groin Outcome Score (HAGOS). English version LK 1.0.

Function, sports and recreational activities

The following questions concern your physical function when participating in higher-level activities. Answer **every** question by ticking the appropriate box. If a question does not pertain to you or you have not experienced it in the past week please make your "best guess" as to which response would be the most accurate. **The questions should be answered considering what degree of difficulty you have experienced during the following activities in the past week due to problems with your hip and/or groin.**

	None	Mild	Moderate	Severe	Extreme
SP1 Squatting	☐	☐	☐	☐	☐
SP2 Running	☐	☐	☐	☐	☐
SP3 Twisting/pivoting on a weight bearing leg	☐	☐	☐	☐	☐
SP4 Walking on an uneven surface	☐	☐	☐	☐	☐
SP5 Running as fast as you can	☐	☐	☐	☐	☐

Mosler et al. (2015)

- Reduced Adductor strength

✓ Extensi tball (unpublished)

Fig. 1. Add test positions: (A) long-lever, (B) short-lever in adduction, (C) short-lever in abduction/external rotation.

- Test-retest design
- N= 20 (21.3 ± 5 yrs)
- Fully fit & no related PMH 6 months
- All outfield positions
- Hand Held Dynamometry

Which one?!

- Reliable
- Precise
- Stressful
- Practical

PROTOCOL

- Jtech HHD
- Supine with arms extended (palms up) / mini bridge
- HHD placed 5cm (3 fingers) superior to Med Malleoli
- No Cx or Trunk flexion / Knees stay extended and toes pointing upwards
- 1 x sub-max prior to tests & 30s rest between MVC
- Build up to max "go ahead – push – push – push –push relax“

Note: to weight adjust values

Lever length (m) & Body mass (kg)

- E.g. 220 (N) X 0.90 (M) / 72 (KG) = 2.75 (Nm/kg)

* lever length is leg length minus 5cm

Results

Table 1
Test position torque values and reliability measures.

Test Position	Test Mean (Nm/kg ± SD)	Retest Mean (Nm/kg ± SD)	Difference (Nm/kg ± SD)	ICC (CI 95%)	SEM	SEM (%)	MDC (%)
Long-lever (R)							
First of 3 reps	2.39 (0.35)	2.41 (0.43)	0.020 (0.16)	0.90 (0.78–0.96)	0.12 (0.08–0.18)	5 (3.3–7.5)	13.7 (9.0–20.2)
Best of 3 reps	2.51 (0.39)	2.53 (0.34)	0.024 (0.11)	0.95 (0.87–0.98)	0.08 (0.05–0.13	3.2 (1.9–5.1)	8.7 (5.2–14.3)
Mean of 3 reps	2.41 (0.36)	2.43 (0.34)	0.016 (0.08)	0.97 (0.93–0.98)	0.06 (0.05–0.13	2.5 (2.1–5.4)	6.6 (5.4–14.8)
Long-lever (L)							
First of 3 reps	2.44 (0.41)	2.43 (0.41)	−0.010 (0.16)	0.92 (0.81–0.97)	0.12 (0.07–0.18)	4.9 (2.9–7.4)	13.6 (7.8–20.2)
Best of 3 reps	2.52 (0.37)	2.54 (0.38)	0.015 (0.14)	0.92 (0.81–0.97)	0.11 (0.07–0.16)	4.3 (2.8–6.3)	11.8 (7.5–17.3)
Mean of 3 reps	2.44 (0.38)	2.43 (0.36)	−0.010 (0.08)	0.97 (0.93–0.99)	0.06 (0.04–0.10)	2.5 (1.6–4.1)	6.6 (4.5–11.1)
Short-lever in Add (R)							
First of 3 reps	1.44 (0.40)	1.45 (0.38)	0.014 (0.13)	0.93 (0.85–0.97)	0.10 (0.06–0.14)	6.9 (4.1–9.7)	18.6 (11.0–26.2)
Best of 3 reps	1.51 (0.38)	1.50 (0.36)	−0.011 (0.10)	0.95 (0.90–0.98)	0.08 (0.05–0.12)	5.3 (3.3–8.0)	14.6 (8.6–21.9)
Mean of 3 reps	1.44 (0.37)	1.44 (0.37)	0.005 (0.08)	0.97 (0.93–0.99)	0.06 (0.04–0.10)	4.2 (2.7–6.9)	11.1 (7.6–18.7)
Short-lever in Add (L)							
First of 3 reps	1.42 (0.37)	1.46 (0.34)	0.031 (0.11)	0.94 (0.87–0.98)	0.08 (0.05–0.13)	5.5 (3.5–9.0)	15.2 (9.0–25.0)
Best of 3 reps	1.51 (0.35)	1.50 (0.33)	−0.009 (0.10)	0.95 (0.88–0.98)	0.07 (0.05–0.12)	4.6 (3.3–8.0)	12.6 (8.6–21.9)
Mean of 3 reps	1.44 (0.35)	1.43 (0.34)	−0.014 (0.10)	0.95 (0.90–0.98)	0.07 (0.05–0.11)	4.9 (3.5–7.7)	13.2 (9.0–20.9)
Short-lever in Abd/ER (R)							
First of 3 reps	2.19 (0.47)	2.16 (0.35)	−0.027(0.07)	0.68 (0.35–0.86)	0.21 (0.13–0.29)	9.6 (6.0–13.3)	26.6 (16.5–36.7)
Best of 3 reps	2.30 (0.40)	2.31 (0.35)	0.007 (0.25)	0.77 (0.52–0.90)	0.18 (0.12–0.26)	7.8 (5.2–11.3)	21.2 (14.3–31.2)
Mean of 3 reps	2.15 (0.39)	2.18 (0.36)	0.029 (0.04)	0.84 (0.65–0.93)	0.15 (0.09–0.21)	6.9 (4.1–9.7)	18.9 (11.0–26.7)
Short-lever in Abd/ER (L)							
First of 3 reps	2.05 (0.39)	2.11 (0.41)	0.059 (0.22)	0.84 (0.64–0.93)	0.15 (0.09–0.22)	7.2 (4.3–10.6)	19.7 (11.5–28.8)
Best of 3 reps	2.18 (0.44)	2.23 (0.45)	0.057 (0.23)	0.86 (0.69–0.94)	0.16 (0.08–0.20)	7.2 (3.6–9.1)	19.9 (9.9–24.9)
Mean of 3 reps	2.07 (0.42)	2.13 (0.41)	0.057 (0.20)	0.87 (0.72–0.95)	0.15 (0.08–0.19)	7.1 (3.8–9.0)	19.5 (10.4–24.7)

Nm/kg, Newton meters per kilogram; SD, standard deviation; ICC, intra-class correlation coefficient; CI, confidence interval; SEM, standard error of measurement; MDC, minimal detectable change; (R), right; (L), left; reps, repetitions.

Results

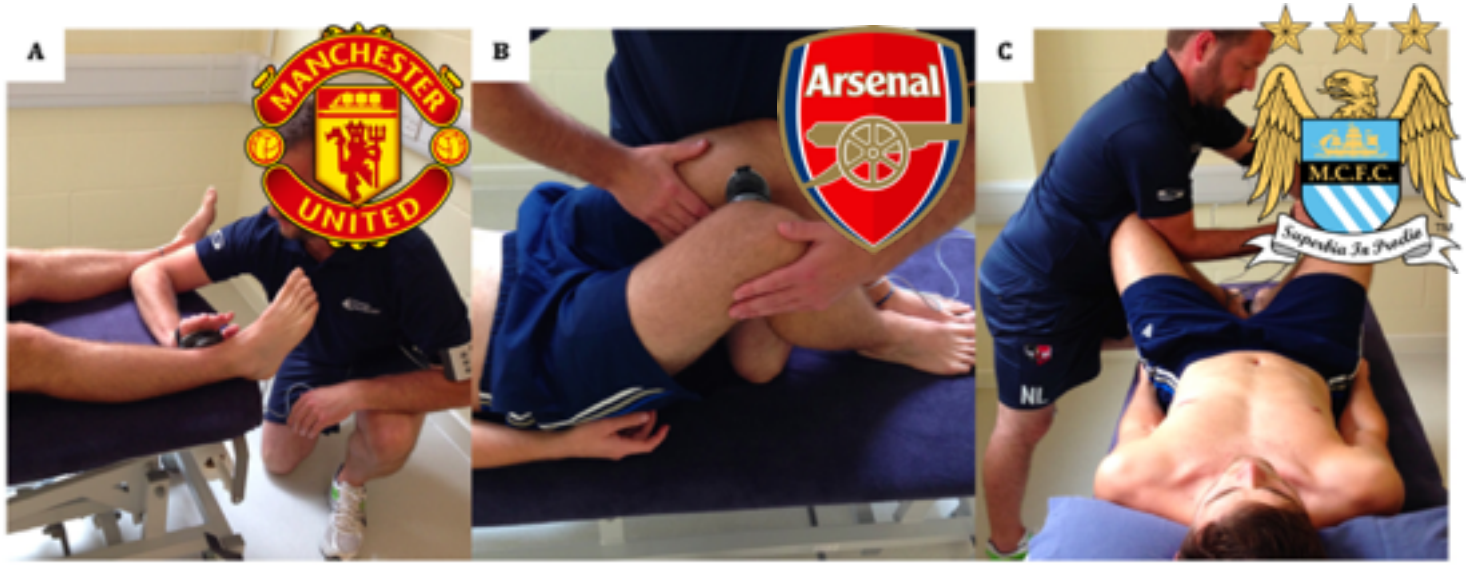
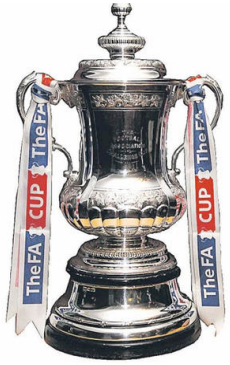


Fig. 1. Add test positions: (A) long-lever, (B) short-lever in adduction, (C) short-lever in abduction/external rotation.

SEM 2.5 (1.6-5.4)

✓ Reliable



MDC 6.6 (4.5-14.8)

✓ Precise

69% & 11% ⬆️ Nm/kg

✓ Stressful

So….choose Long Lever

- Highly reliable and precise (monitoring fluctuations)
- Just 3 reps!! (First measures also reasonably reliable)
- Highest torque level production

BRENTFORD Football Club (Founded 1889)

SCREENING SUMMARY REPORT

DATE:

FIXTURE:

	PHYSICAL TESTING									WELLBEING					
Player Name	L HIP IR	R HIP IR	L BKFO	R BKFO	SQ 0	SQ 45	L N.BOARD	R N.BOARD	CMJ	OSMO	RQ	Hrs Slept	Readiness	IgA	SCORE
a	7%	-7%	20%	19%	-10%	-4%	-6%	1%	G	380	G	8	94	Low	25
b	7%	30%	17%	6%	15%	-5%	-3%	5%	A	430	G	8.45	82.25	Norma	25
c	-9%	-9%	-5%	-11%	9%	3%	0%	16%	G	510	G	8	90	Norma	25
d	-5%	-7%	16%	6%	3%	-1%	-10%	-9%	G	330	G	8	74.75	Norma	26
e	8%	-7%	6%	5%	-13%	6%	-4%	-6%	G	490	G	8	93.5	Norma	25
f	13%	60%	-5%	4%	11%	-12%	5%	20%	G	600	G	7.5	95	High	24
g	5%	7%	5%	6%	-3%	3%	15%	21%	G	780	G	9	88.75	Norma	24
h	13%	2%	-14%	0%	-2%	-1%	12%	17%	A	290	A	7	80	Low	22
i	-2%	0%	-10%	7%	-2%	18%	14%	4%	G	440	G	8	96.25	Low	25
j	8%	-4%	11%	12%	16%	-3%	4%	-6%	G	380	G	9	96	Low	26
k	23%	27%	9%	-5%	-9%	-10%	5%	-2%	G	250	G	9	100	Norma	26
l	14%	14%	-6%	6%	16%	5%	-7%	-15%	G	490	G	9	98.5	High	25
m	11%	26%	-8%	-10%	-3%	-1%	-4%	4%	A	520	R	6	62.59	Norma	21
n	12%	11%	19%	-6%	19%	-4%	4%	-11%	G	580	G	8	98.75	Norma	25
o	20%	-5%	0%	7%	1%	-26%	1%	-4%	G	500	G	8	97.5	Low	24
p	-7%	-9%	35%	20%	-4%	18%	-4%	-3%	G	280	G	7	90	Norma	25
q	-7%	10%	33%	6%	5%	8%	0%	4%	G	210	G	7	78.25	Norma	25
r	-3%	-8%	26%	0%	1%	-15%	-4%	-9%	G	330	G	8	96.75	Norm	25
s	-6%	-9%	21%	13%	-1%	-10%	9%	2%	G	120	G	8	93	Norr	26

COMMENTS:

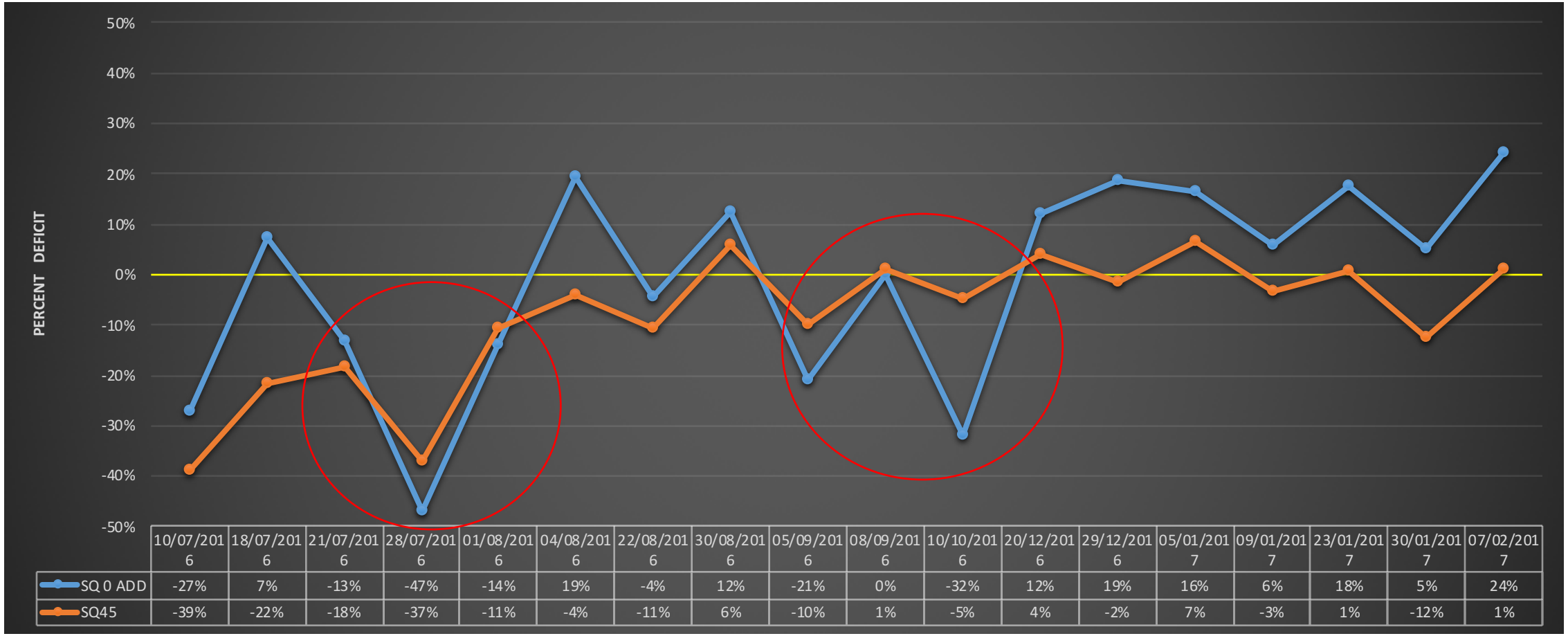
M reports general fatigue and reduced sleep.

General comments across the squad reporting heavy legs.

O Left hip discomfort - Treated pre training

G Elder Hyration re-test 420

H left hip treated pre-training



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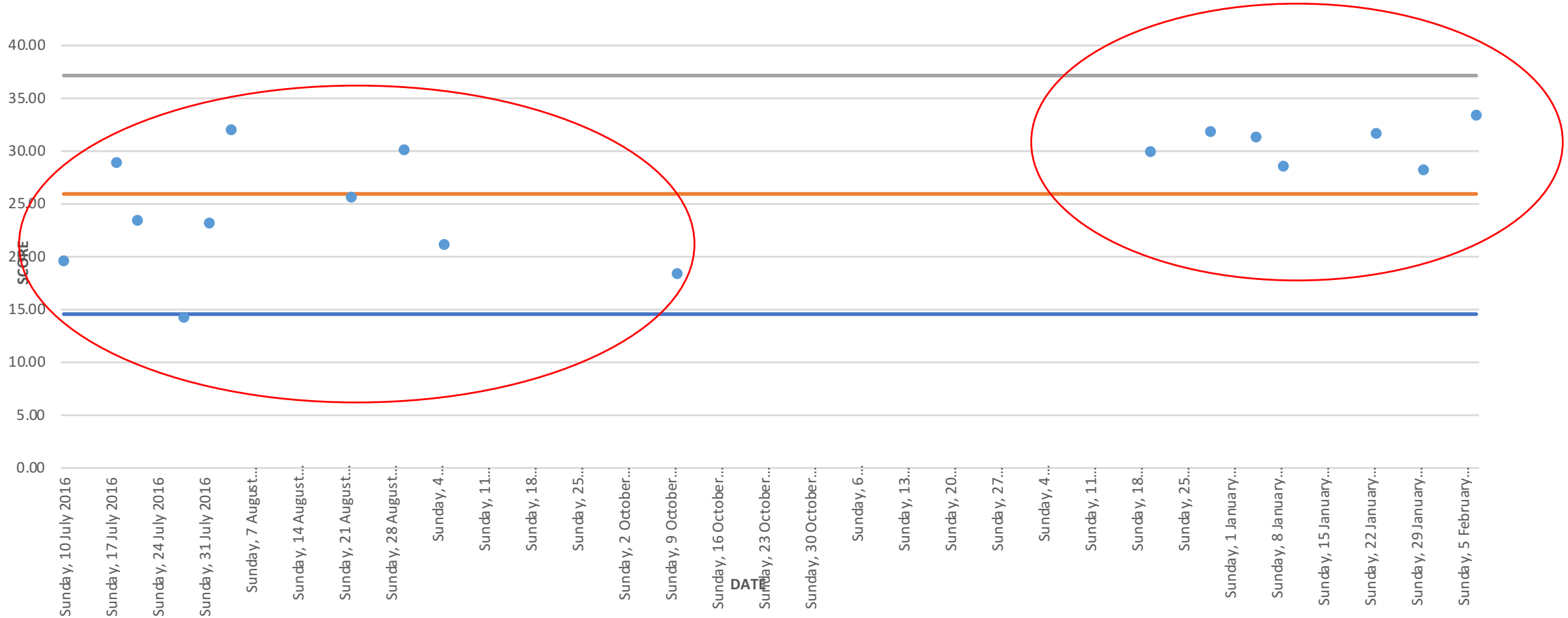
SQ 0 ADD	-27%	7%	-13%	-47%	-14%	19%	-4%	12%	-21%	0%	-32%	12%	19%	16%	6%	18%	5%	24%
SQ45	-39%	-22%	-18%	-37%	-11%	-4%	-11%	6%	-10%	1%	-5%	4%	-2%	7%	-3%	1%	-12%	1%

Comparing Adductor Squeeze Tests: Detection = Prevention (N. Light & R. Clark)



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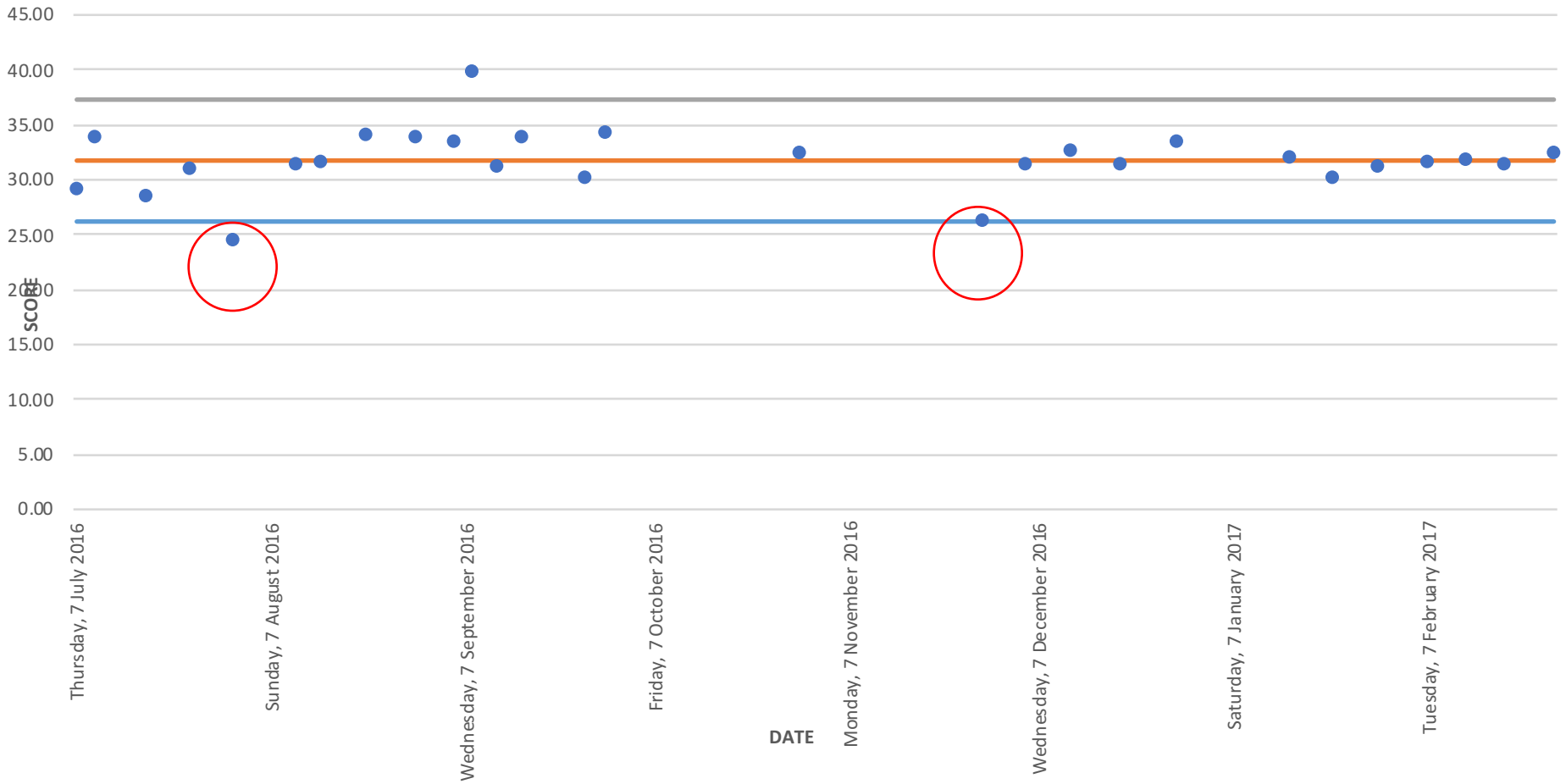

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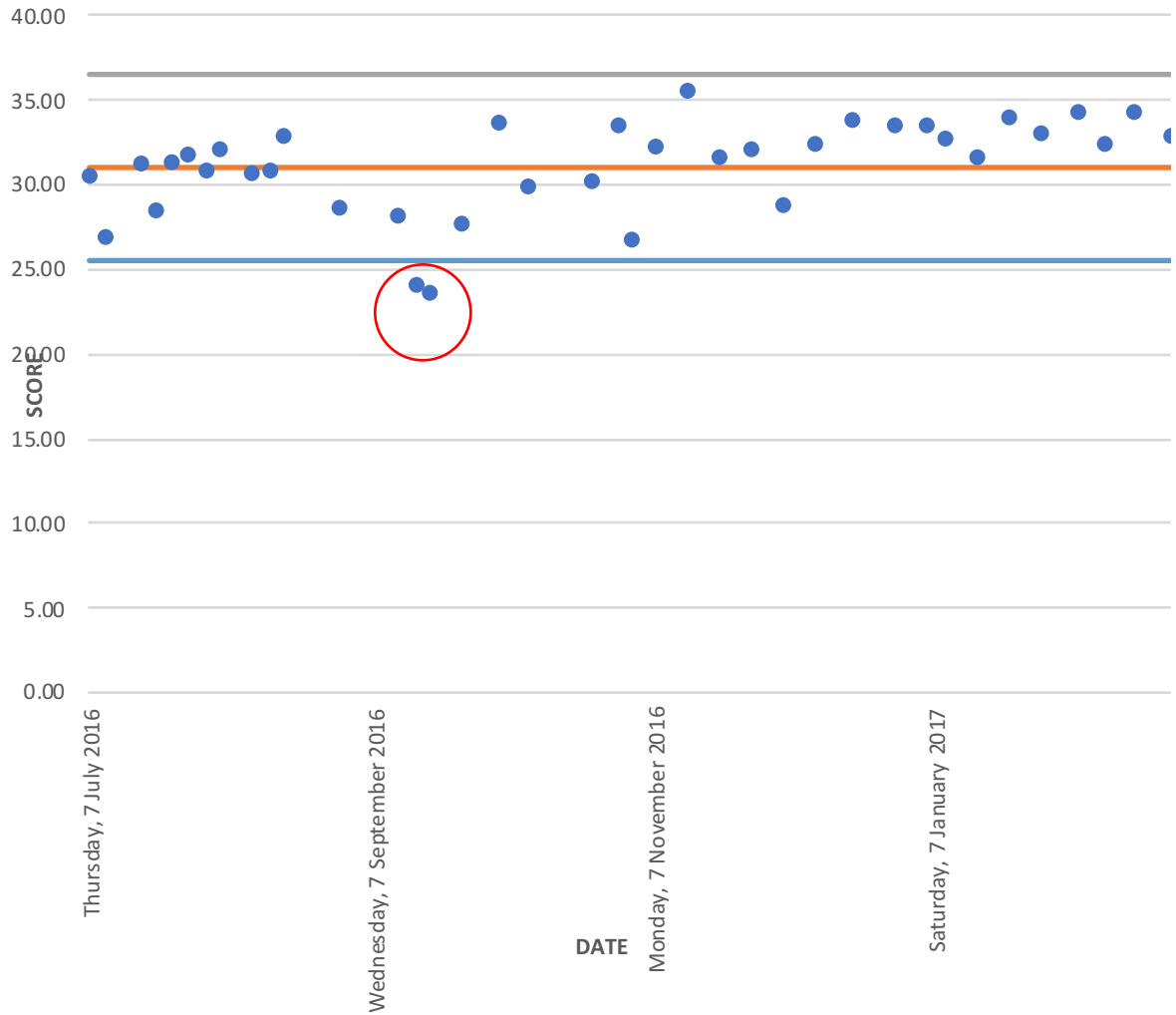

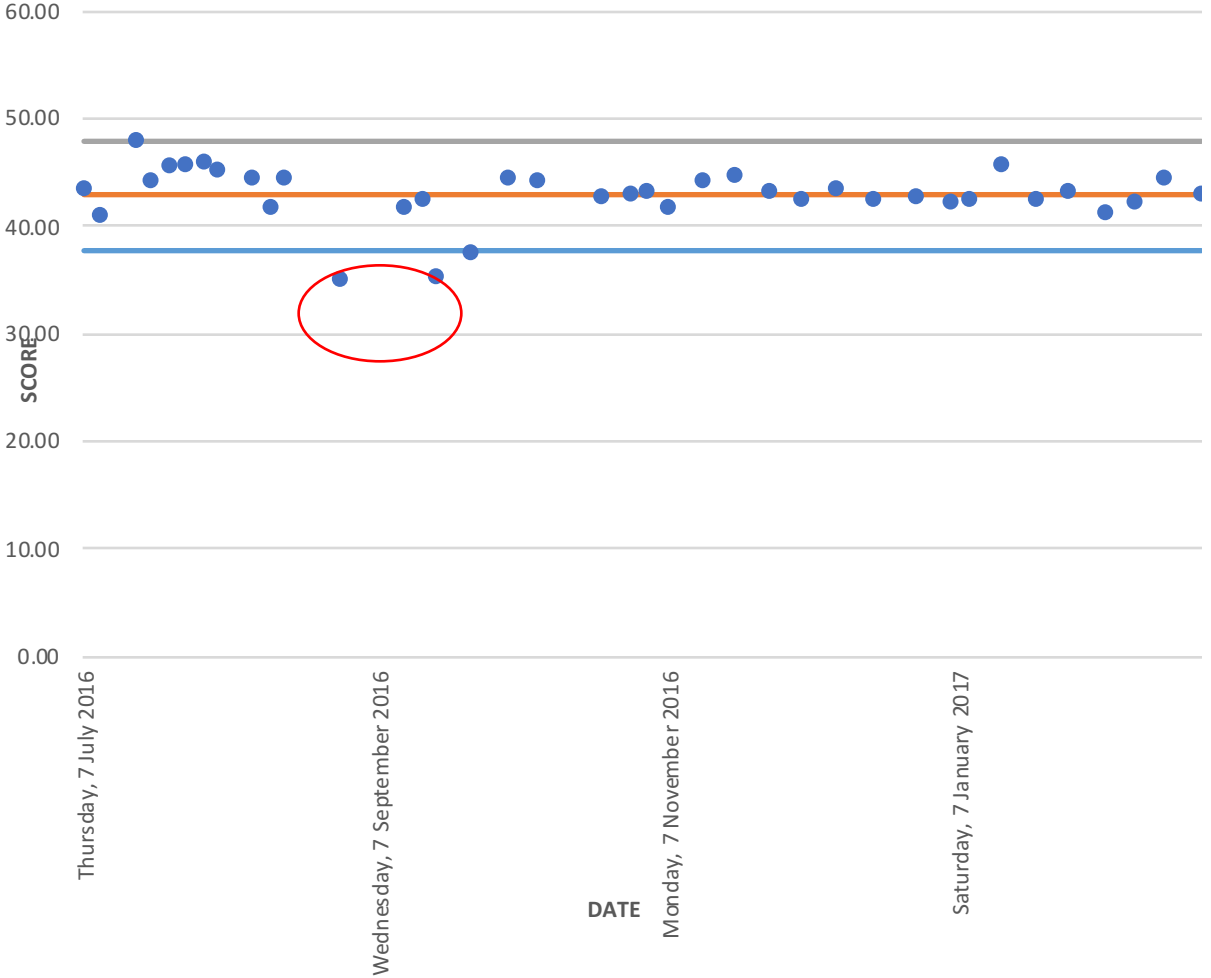

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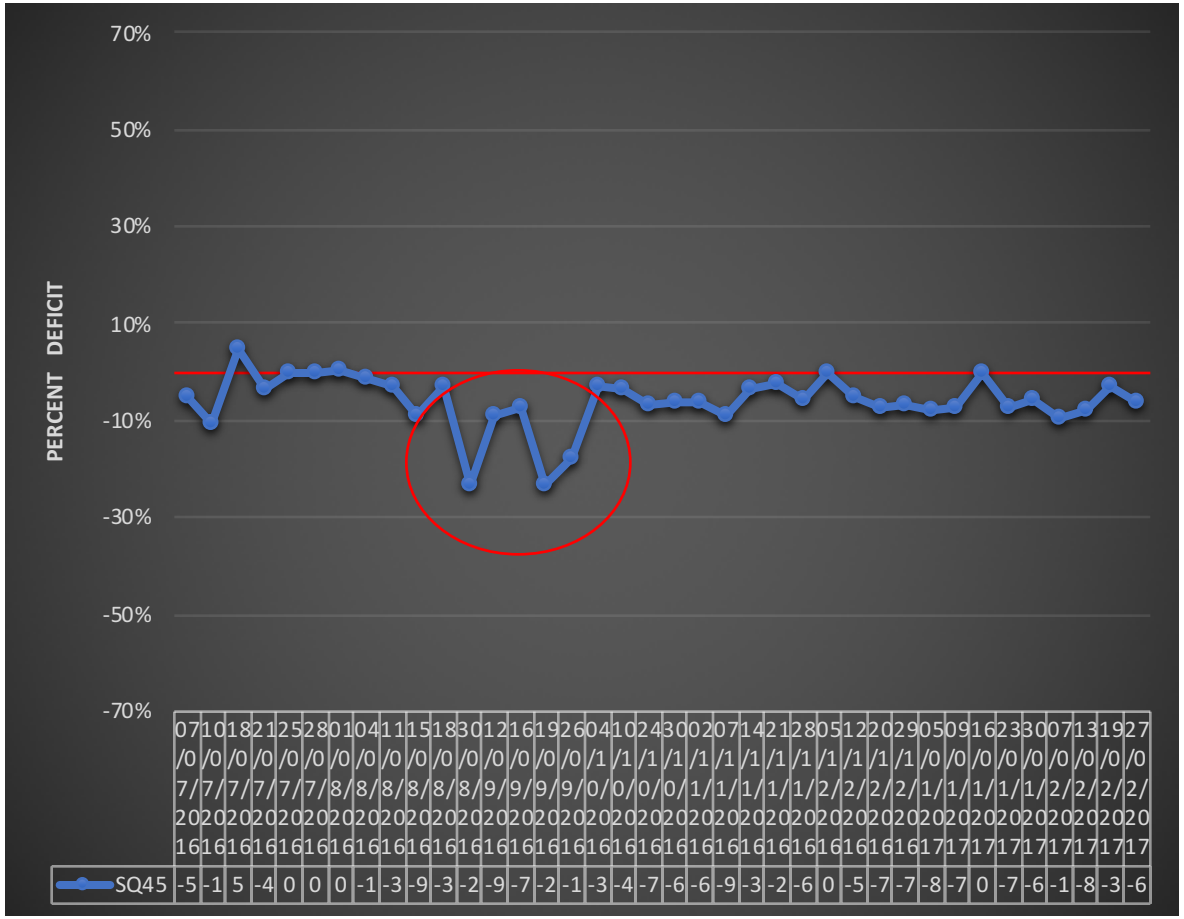

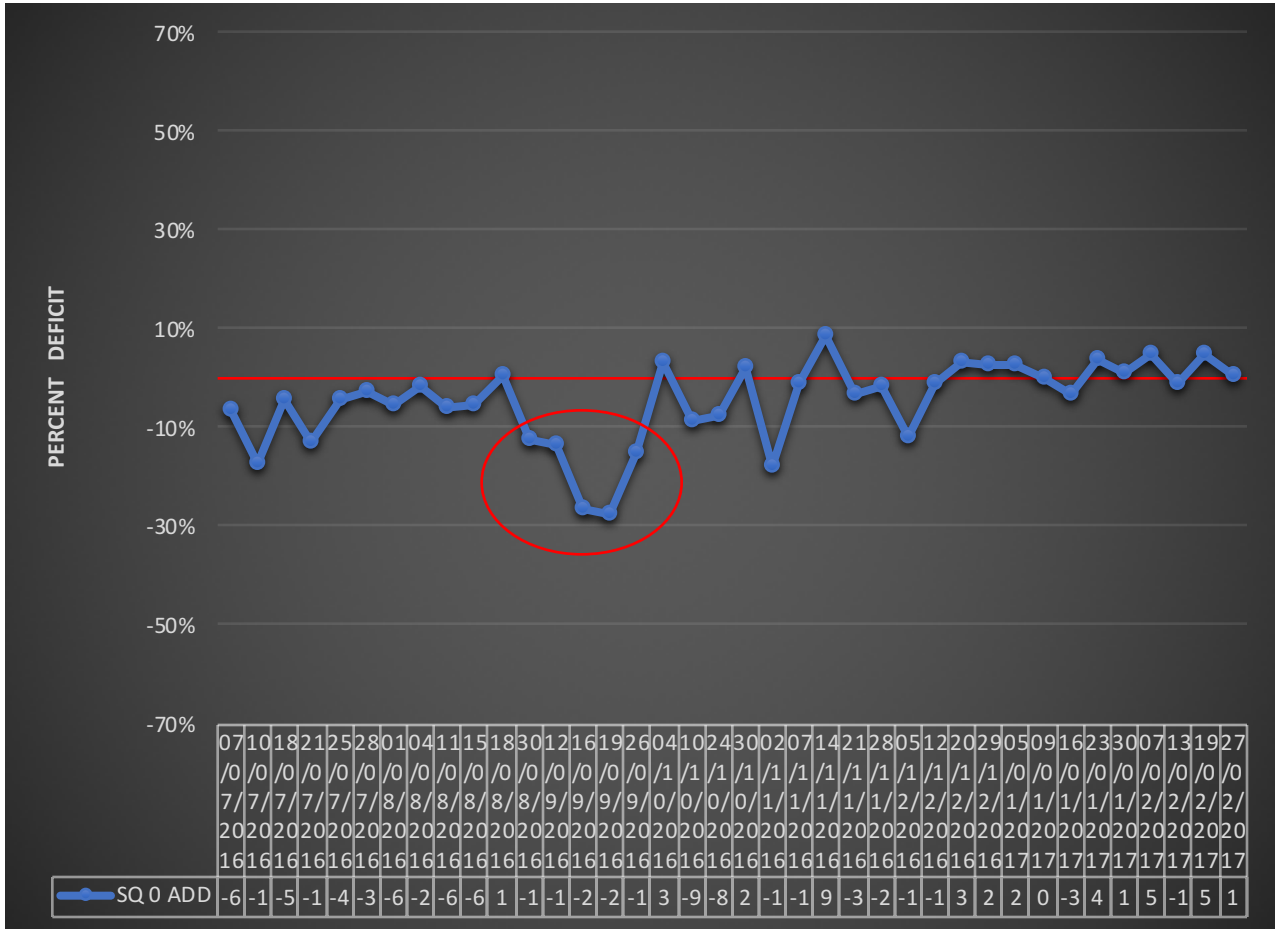

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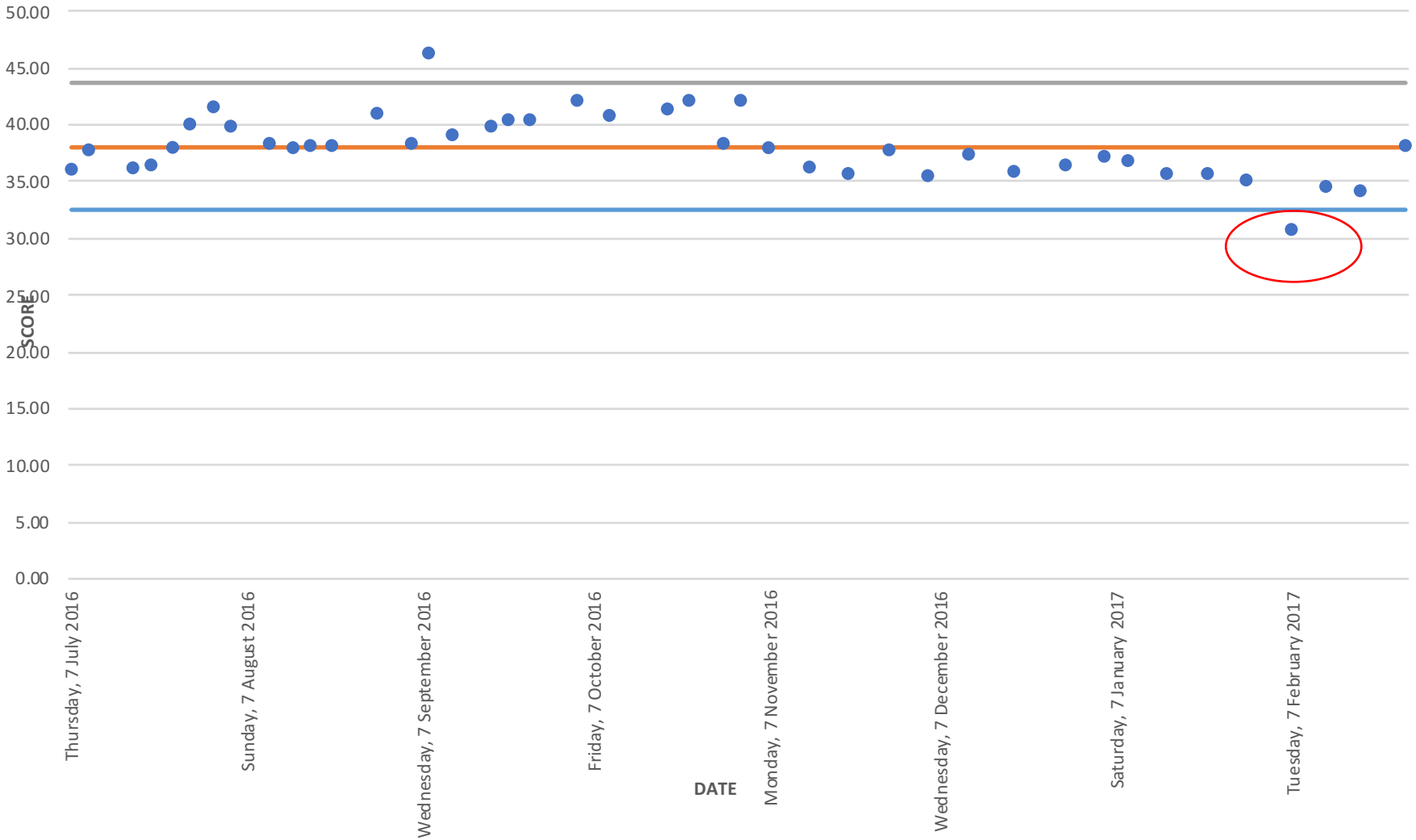

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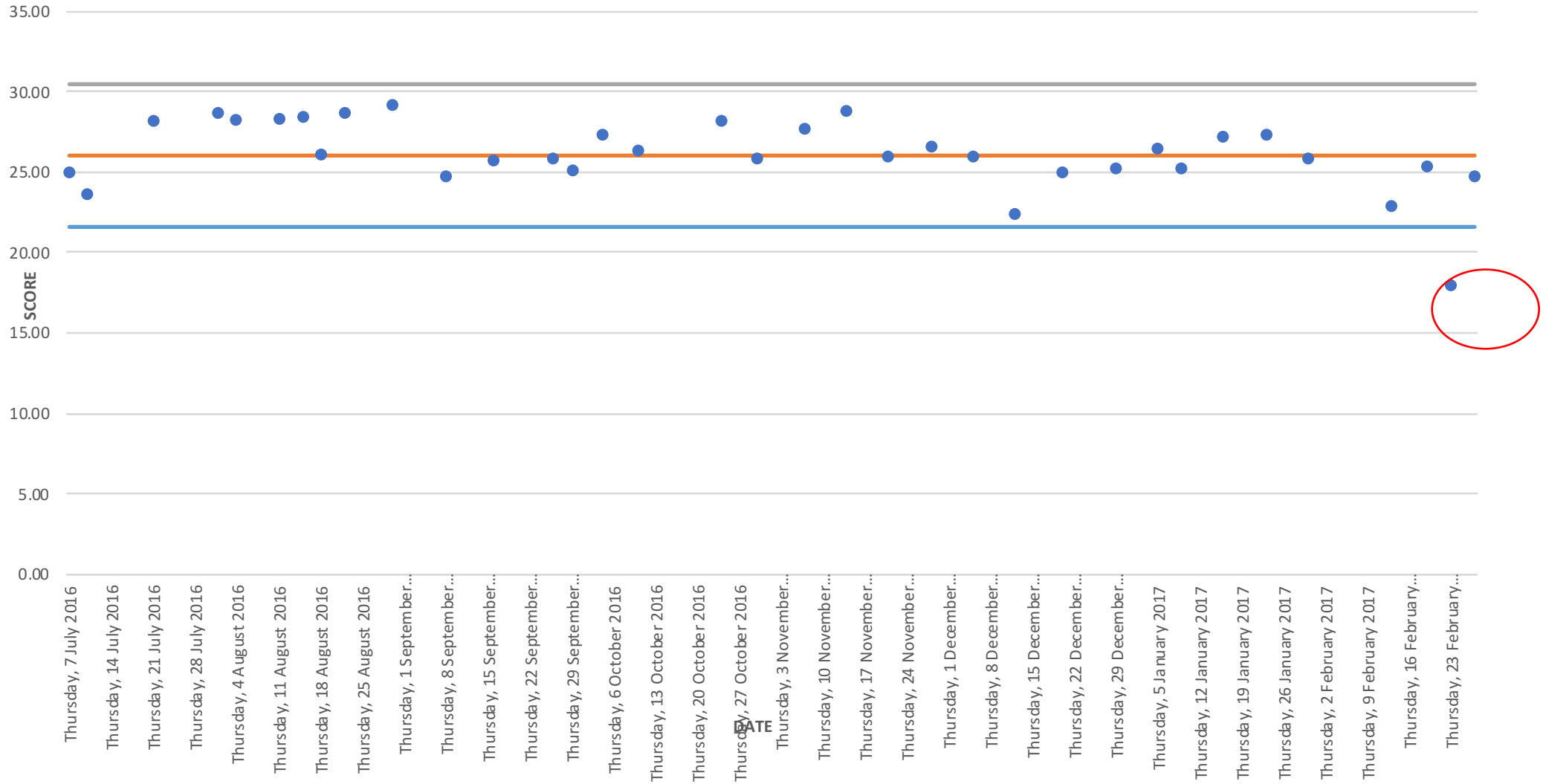

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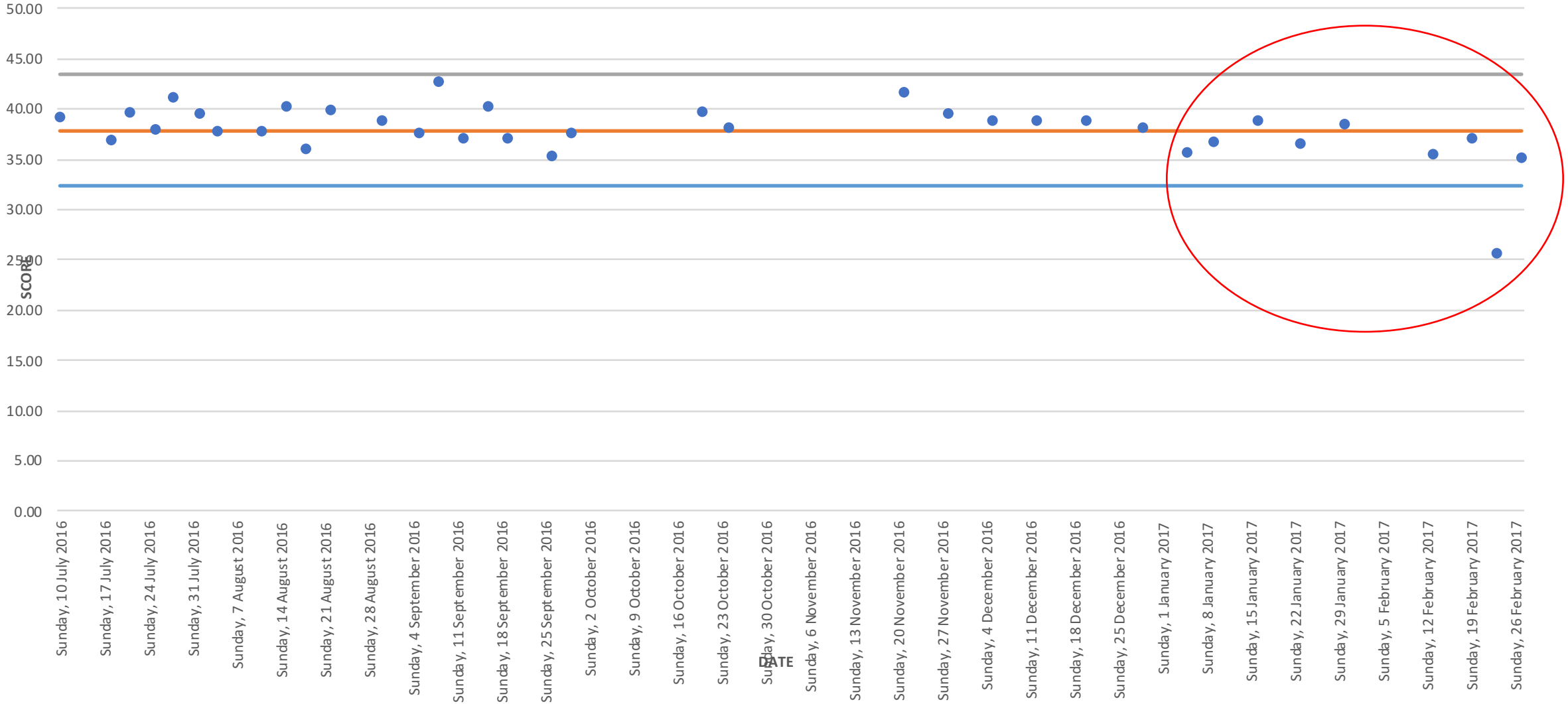

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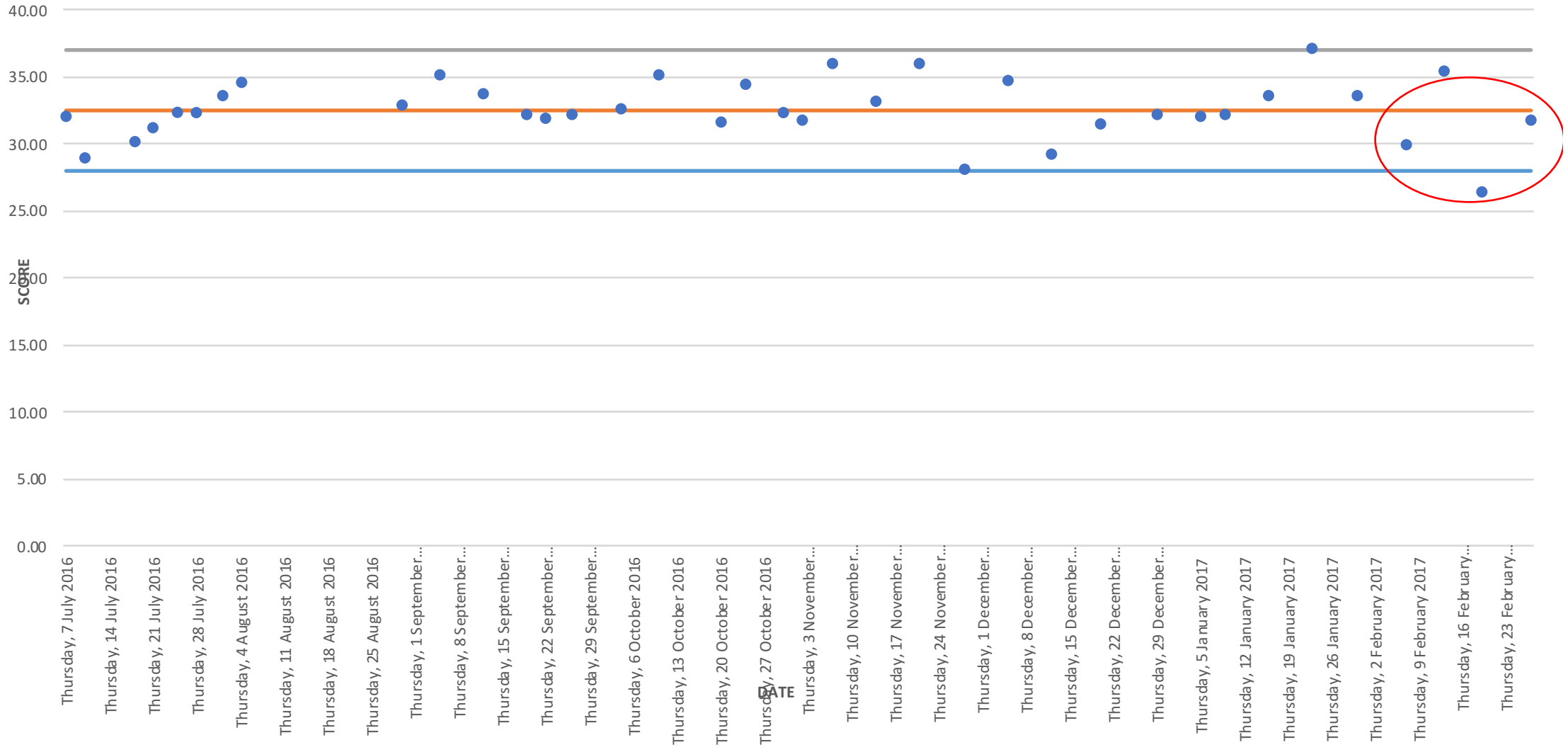

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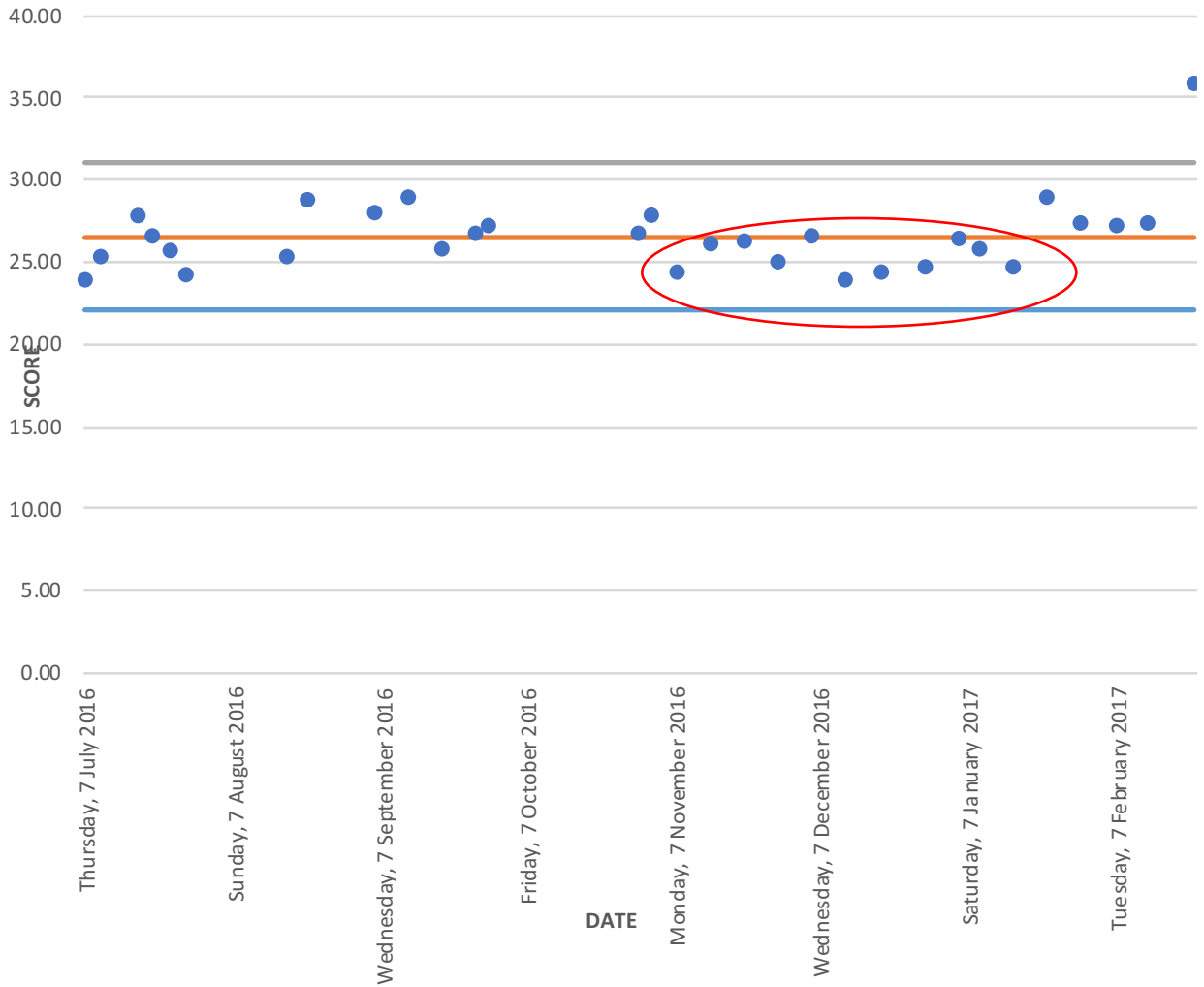

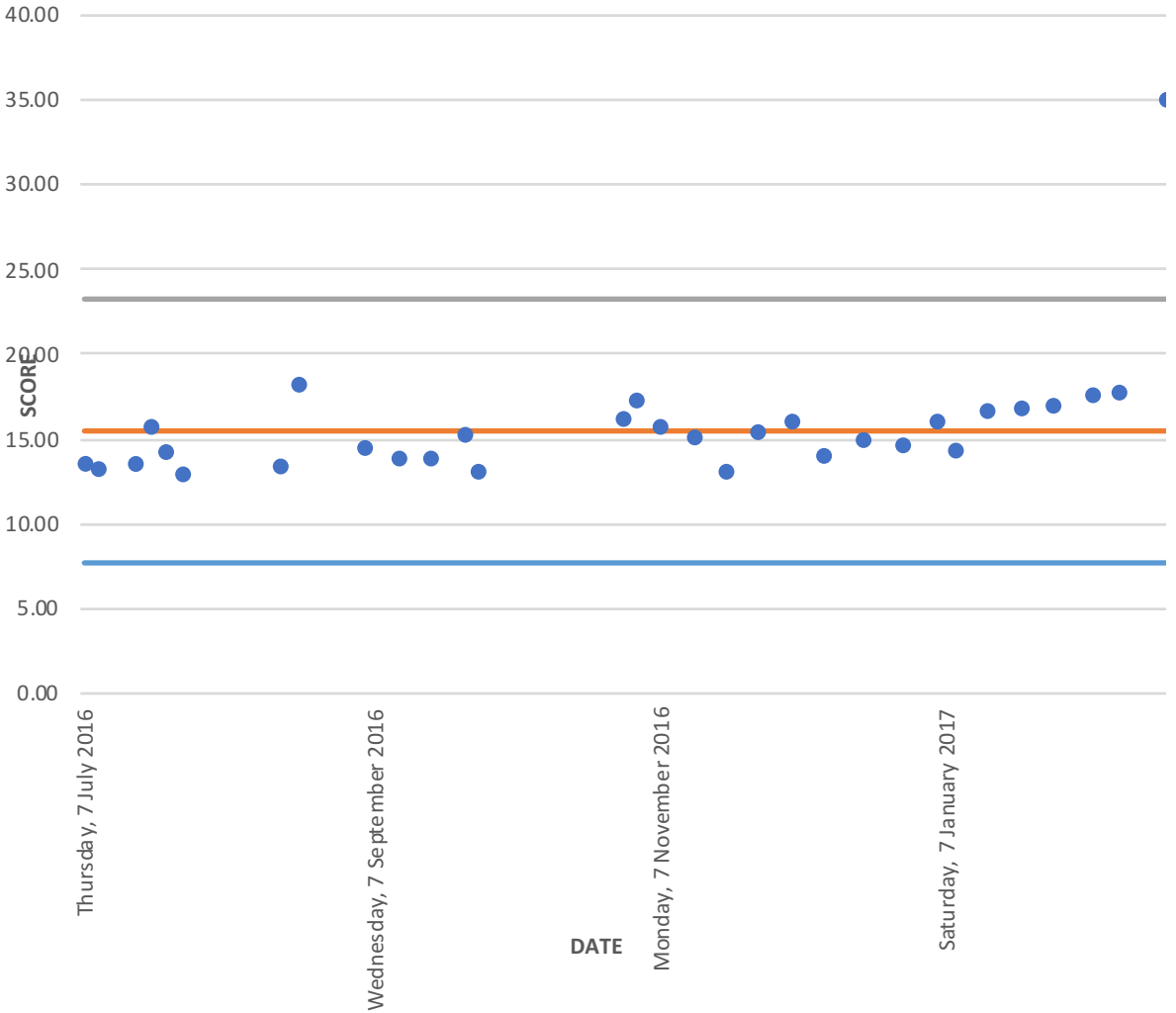

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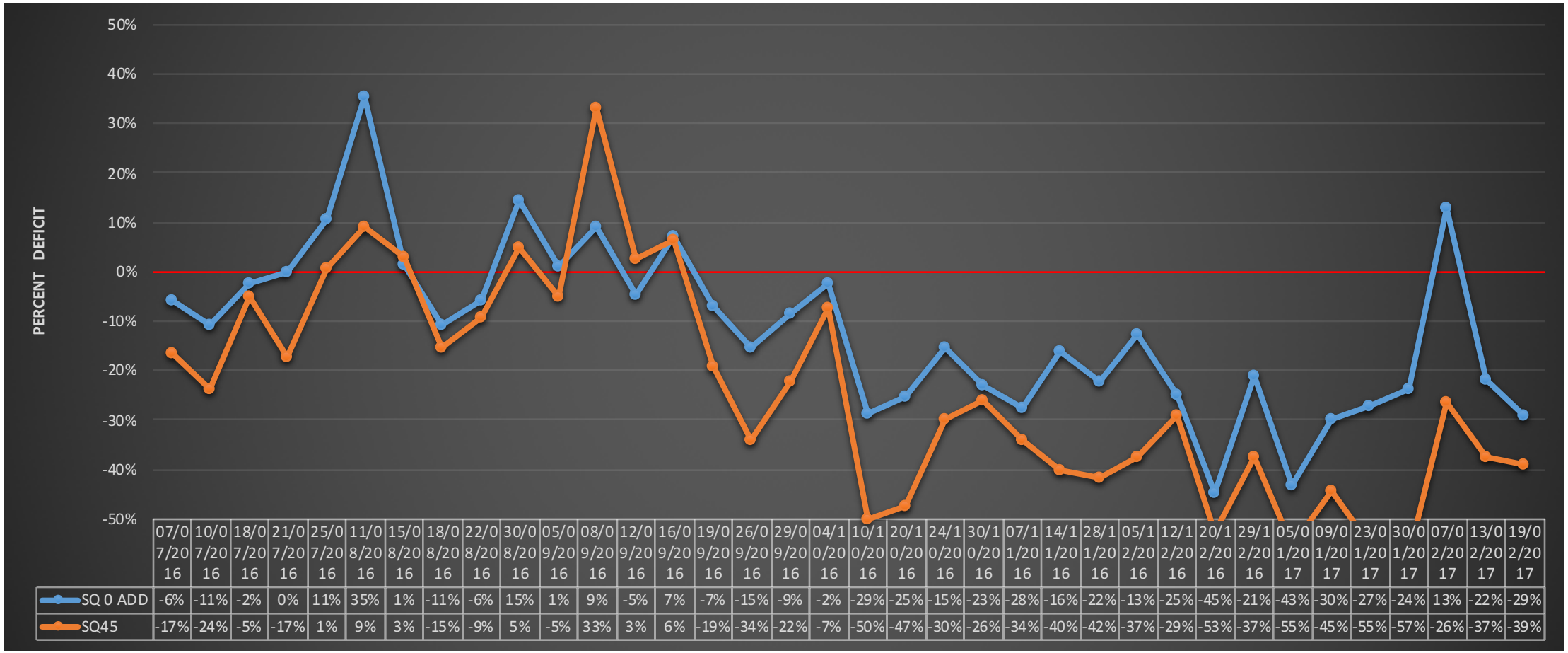

	07/07/2016	10/07/2016	18/07/2016	21/07/2016	25/07/2016	11/08/2016	15/08/2016	18/08/2016	22/08/2016	30/08/2016	05/09/2016	08/09/2016	12/09/2016	16/09/2016	19/09/2016	26/09/2016	29/09/2016	04/10/2016	10/10/2016	20/10/2016	24/10/2016	30/10/2016	07/11/2016	14/11/2016	28/11/2016	05/12/2016	12/12/2016	20/12/2016	29/12/2016	05/01/2017	09/01/2017	23/01/2017	30/01/2017	07/02/2017	13/02/2017	19/02/2017
SQ 0 ADD	-6%	-11%	-2%	0%	11%	35%	1%	-11%	-6%	15%	1%	9%	-5%	7%	-7%	-15%	-9%	-2%	-29%	-25%	-15%	-23%	-28%	-16%	-22%	-13%	-25%	-45%	-21%	-43%	-30%	-27%	-24%	13%	-22%	-29%
SQ45	-17%	-24%	-5%	-17%	1%	9%	3%	-15%	-9%	5%	-5%	33%	3%	6%	-19%	-34%	-22%	-7%	-50%	-47%	-30%	-26%	-34%	-40%	-42%	-37%	-29%	-53%	-37%	-55%	-45%	-55%	-57%	-26%	-37%	-39%

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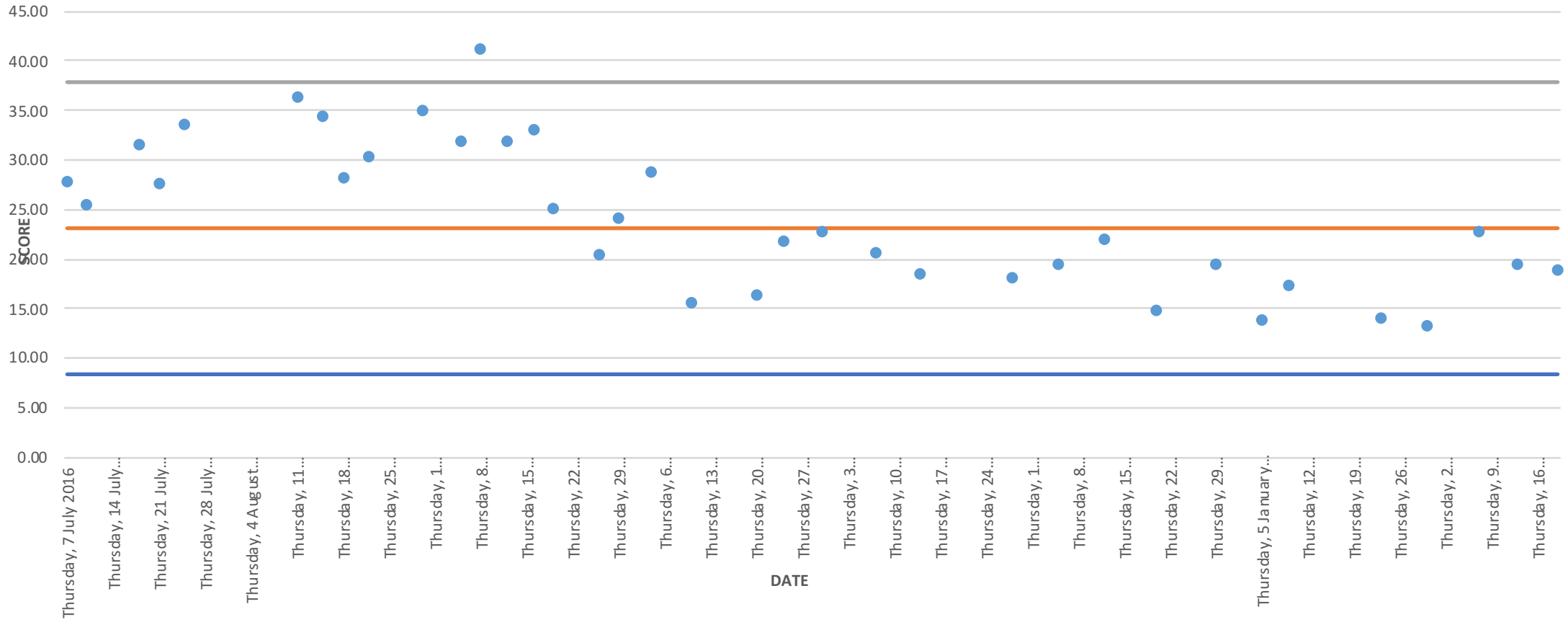

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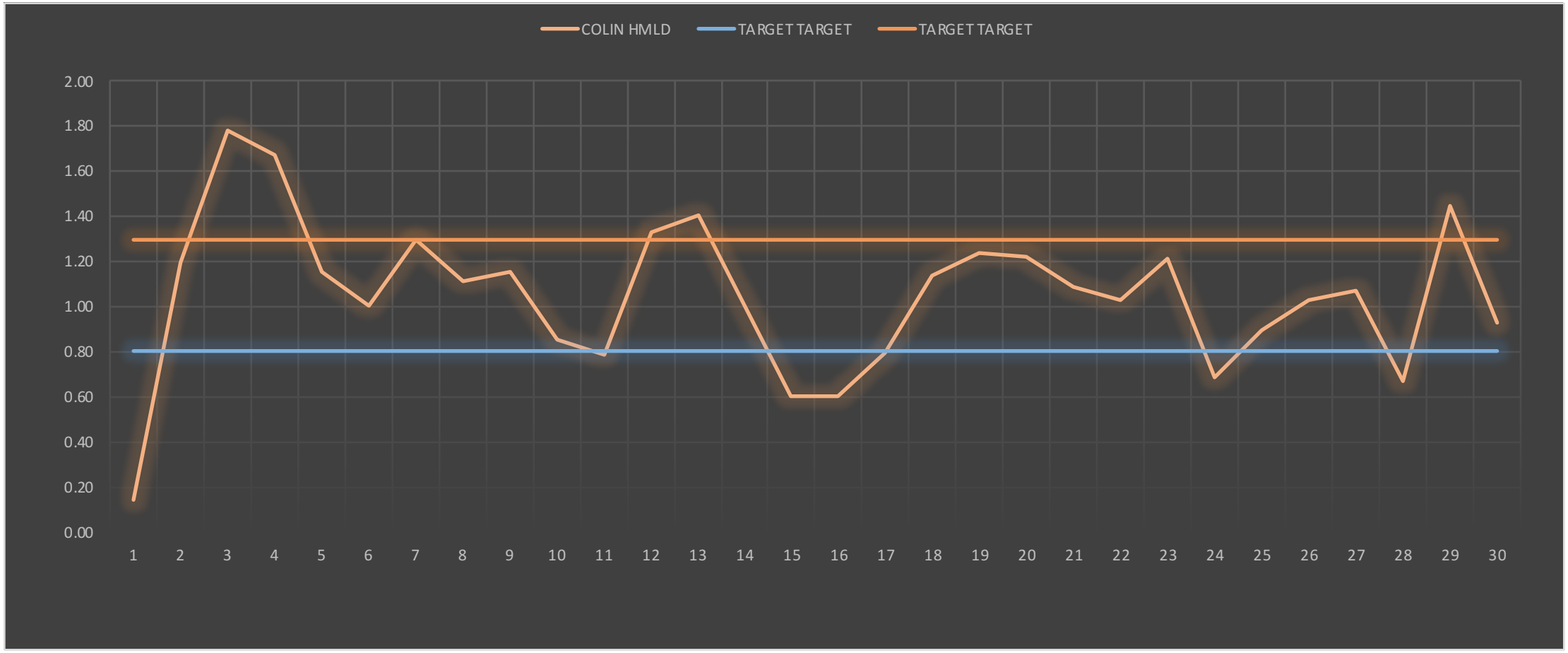

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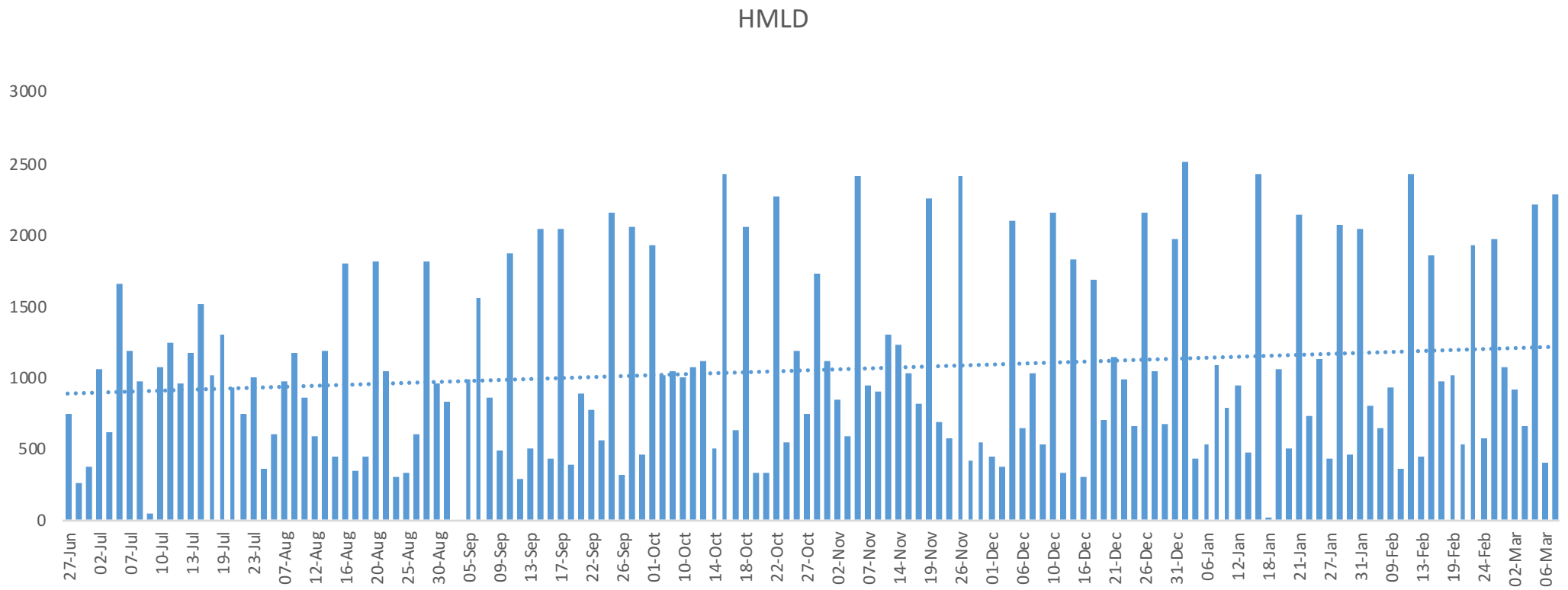

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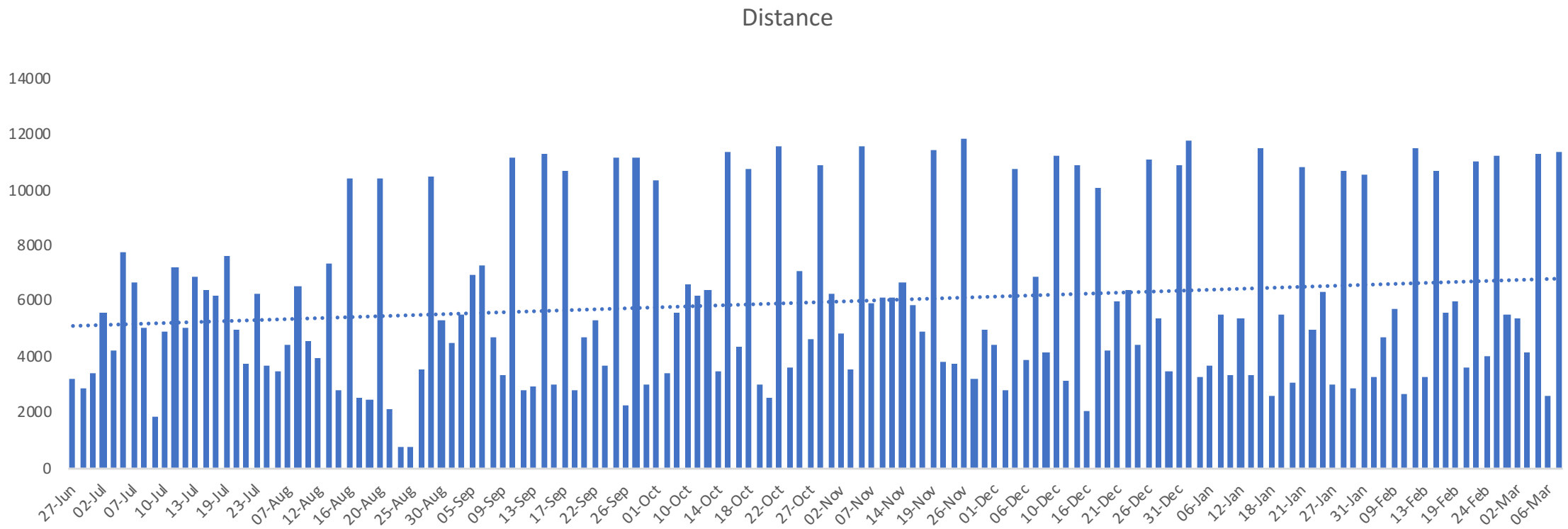
Distance
14000
12000
10000
8000
6000
4000
2000
0
27-Jun
02-Jul
07-Jul
10-Jul
13-Jul
19-Jul
23-Jul
07-Aug
12-Aug
16-Aug
20-Aug
25-Aug
30-Aug
05-Sep
09-Sep
13-Sep
17-Sep
22-Sep
26-Sep
01-Oct
10-Oct
14-Oct
18-Oct
22-Oct
27-Oct
02-Nov
07-Nov
14-Nov
19-Nov
26-Nov
01-Dec
06-Dec
10-Dec
16-Dec
21-Dec
26-Dec
31-Dec
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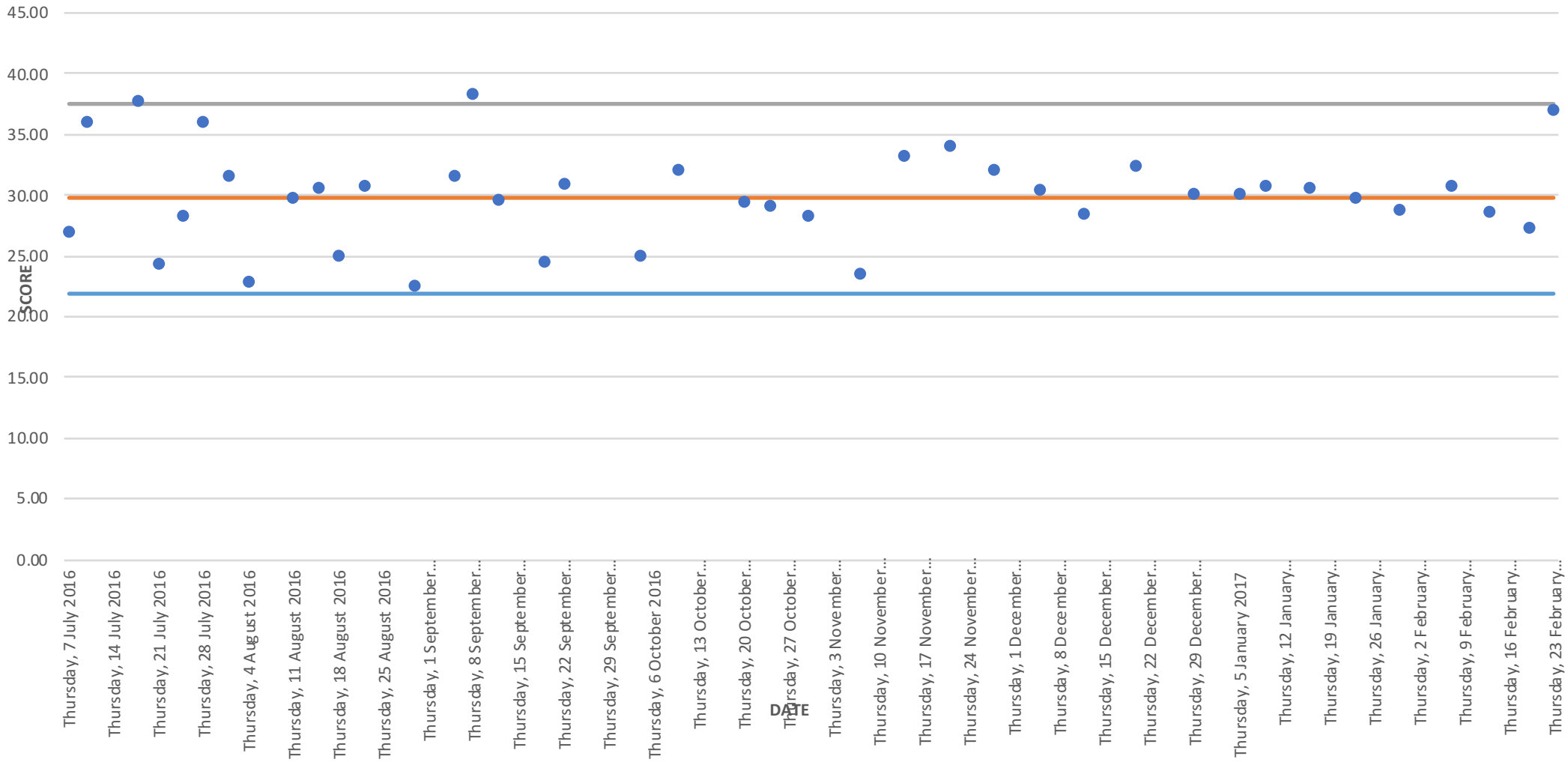
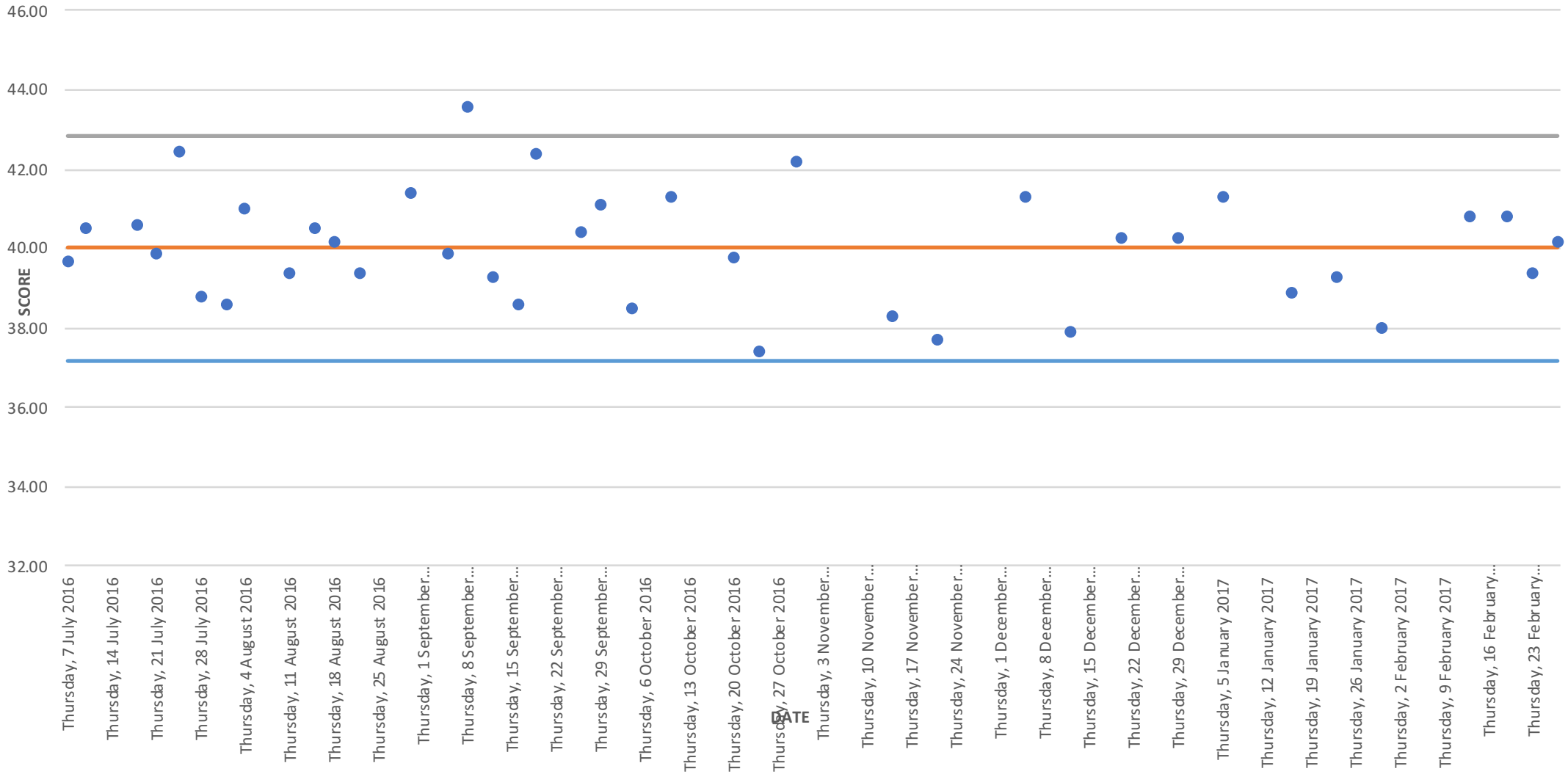
09-Feb
13-Feb
19-Feb
24-Feb
02-Mar
06-Mar

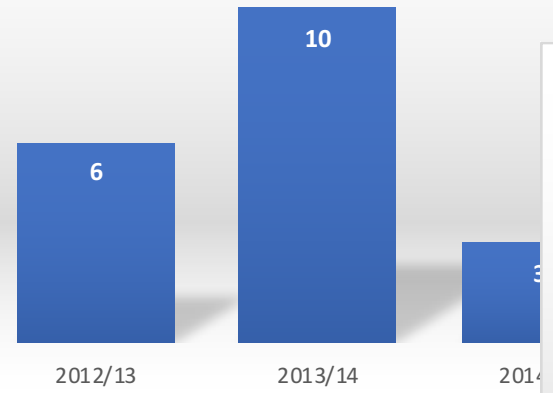


Comparing Adductor Squeeze Tests: Detection = Prevention (N. Light & R. Clark)

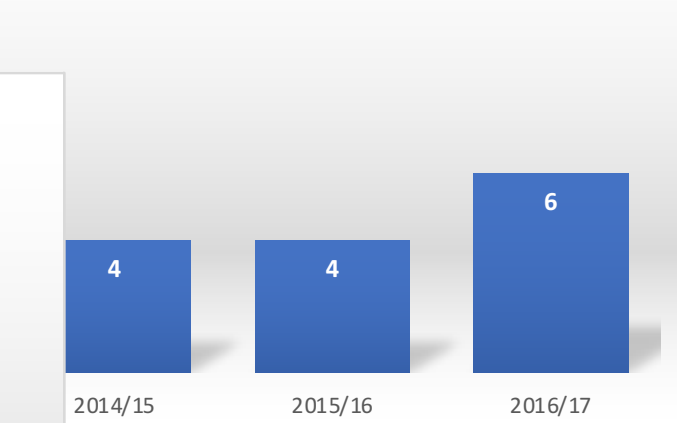


Comparing Adductor Squeeze Tests: Detection = Prevention (N. Light & R. Clark)

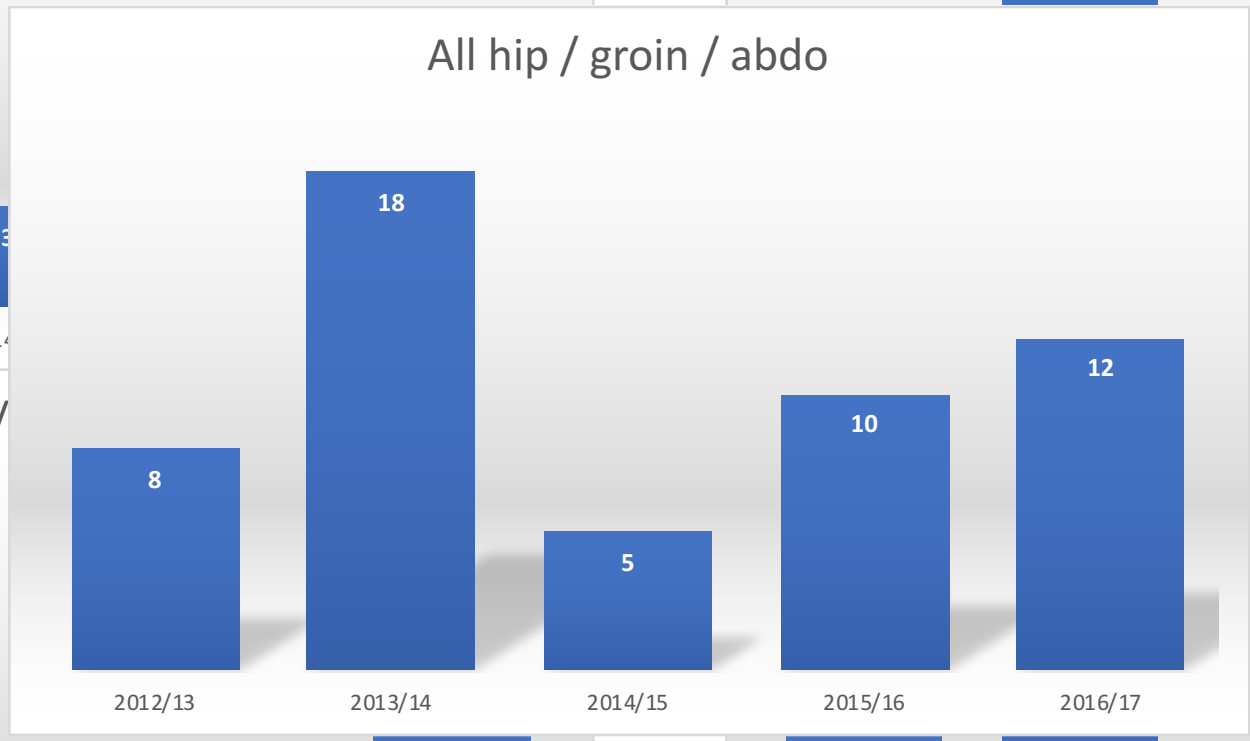
Adductor



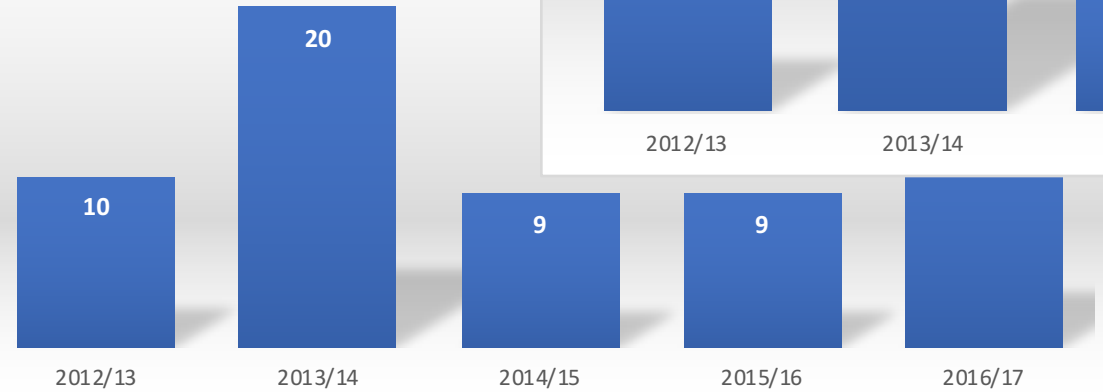
Adductor & Hip Flexor



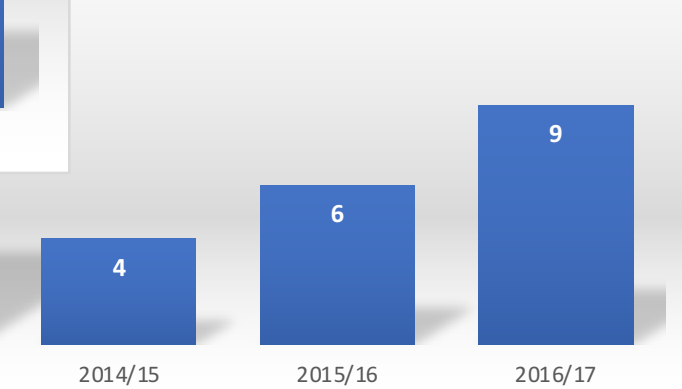
All hip / groin / abdo



Adductor /



roin / OP / Add / HF



SQUEEZE TESTS IN PRACTICE

- 0 degree (adducted) – Difficult to generate strength due to inner range.
- 0 degree (abducted) – Better lever - Increased stress on adductor tendon, pubic symphysis & hip
- 45 degree – Greater adductor recruitment & provocation
- More often 0 degree more sensitive to asymptomatic score reductions
- **Either 0 or 45 degree may reduce or become symptomatic in isolation - possibly pathology specific**
- -20% boundary useful, but outside 2SD correlates highly with symptomatic players
- Weaker baseline scores more associated with injuries or complaints across the groin region

In Summary….

- Can be valuable as test in isolation
- Observe with ROM for more complete assessment
- Use with what you know about the player:
  - previous history
  - pre-season profiling
  - pre-signing medical
  - Attitude
- Consider symptom location and symptom severity
- Look at patterns against other available data
- Appears protective against adductor injuries.
  - Regular testing helps you trust data
  - Helps you trust return to play in event of an injury
- Appears sensitive to chronic injuries – more challenging to manage
  - Regular testing allows for early detection and management plans
- Impact less clear on other muscle injuries around the hip & groin
- Have a plan / intervention in place – make use of your data!

Thank you for listening…

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Special mentions:

Dr Kristian Thorborg (Copenhagen)